Port Authority of New South Wales

Overseas Passenger Terminal Berthing Infrastructure Project - Dredging and Scour Protection

Review of Environmental Factors

263976-00-RPT-0005

Issue 1 | 17 September 2020

Job number 263976-00

Arup Pty Ltd ABN 18 000 966 165

Arup
Level 5
151 Clarence Street
Sydney NSW 2000
Australia
www.arup.com

ARUP

Non-technical summary

The proposal

Port Authority of New South Wales (Port Authority of NSW) proposes to undertake maintenance and capital dredging and scour-protection works at the Overseas Passenger Terminal (OPT) on the western side of Circular Quay in Sydney Harbour.

The proposal is to deepen and expand the OPT berth pocket to increase the under-keep clearance of larger cruise ships and to protect the toe of the quay wall with scour protection.

The proposal's key features are:

- Installing a sheet pile retaining wall of about 70 m long at the southern end of the OPT berth pocket.
- Dredging approximately 20,000 m^3 of sediment to deepen and expand the berth pocket.
- Dredging approximately 20,000 m^3 of sediment to deepen the berth pocket
- Disposal of dredge material either by land disposal or offshore disposal (three Nautical Miles beyond State Waters).

A site compound would be used at Glebe Island to store equipment. The site may also be used for the casting of articulated concrete mattresses for the scour protection and the transfer of dredged materials from the barge to trucks. Activities at Glebe Island would be subject to the existing determination that allows Berths 1 and 2 to be used as a multi-user facility as obtained at the time under Part 5 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) on 6 August 2013.

The proposed works are anticipated to be split. The sheet piling works would take place in Q3 & Q4 of 2020 and the dredging and scour protection works would take place in mid-2021. It would take around two months to complete the sheet piling works, while it would take about three-to-four months to carry out the dredging and scour protection works.

Need for the proposal

It is essential that the OPT berth continues to operate as efficiently and safely as possible, and that the infrastructure is maintained and progressively upgraded to continue to meet cruise vessel demands; including any anticipated increase in the size of visiting vessels. The identified scour and accretion issues pose potential hazards to vessel operations. This includes the potential for further decreasing the under-keel clearance for incoming cruise ships. There is a need for safe, efficient and reliable berthing to ensure the ongoing operation of the OPT.

Proposal objectives and development criteria

Objectives were developed to respond to the proposal's need. They included preventing erosion of the quay wall, preventing sediment movement within the berth pocket, reducing the risk of damage to berthing ships and providing enough depth for ships to berth.

Options considered

The option of doing nothing was initially considered. However, this was discounted as it would not meet the objectives of the proposal to improve safe vessel berthing and would lead the quay wall exposed to further erosion. Various dredging, sediment disposal and scour protection options were then considered.

The preferred option (the proposal) was considered to provide the best combination of positive project outcomes and minimised social and environmental impacts.

Statutory and planning framework

State Environmental Planning Policy (Infrastructure) 2007 permits development on any land for the purpose of port facilities to be carried out by or on behalf of Newcastle Port Corporation (Port Authority of NSW) without consent, providing the development is directly related to an existing port facility.

As the proposal is development for the purpose of a port facility and is to be carried out by Port Authority of NSW it can be assessed and determined under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Environmental impacts

The main environmental impacts of the proposal and the safeguards and management measures to address the impacts are summarised below.

Physical marine environment

There would be localised sediment disturbance during construction from installing piles and dredging. A safeguard has been proposed to install a silt boom around the backhoe dredger, minimising sediment disturbance. There is also the potential for acid sulfate soils and contaminants within the sediment to be released and impact on water quality during transfer for disposal. Sediment would be kept damp if taken to Glebe Island before treated and disposed of on land in a suitable facility. To reduce the risk of spills during the movement of dredging for disposal, a polymer would be added to absorb excess water and reduce the risk of overtopping of contaminated sediments.

Biodiversity

The proposal is unlikely to cause significant impact to any threatened aquatic or terrestrial species, populations or ecological communities or their habitats. The proposal and compound are not located within or near any protected areas, and no threatened or key habitat is expected to occur locally. Impacts on the surrounding substrate and sediment in Sydney Harbour would be limited through proposing to use a silt boom. A Marine Ecology Management Plan would be prepared as part of the CEMP.

Noise and vibration

The noise and vibration assessment concluded that at the OPT during night-time works there would only be minor impacts to residents. Exceedances in noise management levels would mainly be felt for non-residential receivers including Quay Restaurant, Cruise Bar, Squires Landing, Yuki's at the Quay) and MCA museum. Glebe Island residents would experience minor noise impacts.

Vibration impacts are minor due to the distance of residents. Safeguards have been proposed and a noise and vibration construction management plan would be prepared.

Landscape character and visual impact

The proposal would have temporary visual impacts to the landscape character and visual amenity. Impacts are considered to have a low to high visual impact for receivers of the OPT. Viewpoints with high visibility of the proposal would be from the Sydney-Opera House Forecourt and Concourse. Due to the sensitivity of the Sydney Opera House there would be a moderate to high impact.

The visual impact of the proposal would be minimised through safeguards including directional lighting and moving barges and equipment when not in use.

Socioeconomic

There would be a temporary loss of amenity for pedestrians and users of the OPT wharf public space as the OPT quay would be closed-off for periods during works. When works are not being undertaken access for pedestrians would be retained. Noise impacts from night-time works would have a temporary adverse impact on residents living near the OPT within the Rocks, and hotel residents in Campbell Cove.

There would be temporary short-term impacts for commercial vessel access at Campbells Cove and the Commissioners Steps during works.

Safeguards would include a communication plan as part of the construction environmental management plan to help provide timely and accurate information to stakeholders during construction.

Non-Aboriginal heritage

The proposed dredging works would have an impact on the former Campbell's Cove Wharf No.7. The works would remove in situ piles, sections of cut piles and other timber structural remains associated with the former wharf.

This is not considered to be a major impact as the remainder of the site located in Campbell's Cove would remain unaffected. A permit would be required from Heritage NSW, DPC, prior to dredging and scour protection works commencing. Safeguarding measures would include recording remains of the wharf and archaeological testing of material.

Aboriginal heritage

There is a low potential for Aboriginal site to be within the Proposal footprint due to previous activity and dredging. Should unknown archaeology be discovered during works a permit maybe required.

Traffic, transport and access

The proposal would result in a minor temporary increase in traffic during construction from construction workers, deliveries of equipment and concrete trucks. Most of the works (e.g. concrete pumping for scour protection) would occur at night when there is less traffic on the roads. The additional traffic movements would have a negligible effect on the existing road network. Importantly, there would be no construction traffic movement during cruise ship berth days.

During dredging works, barge movements would be required to remove dredged material offsite. These would be minimal and on average there would be one vessel movement a day to Glebe Island or two to three for offshore disposal.

Spoil, dredging and waste management

The proposed works would create spoil from the dredging of sediment. Material if disposed on land would be taken to Glebe Island for offloading and transported to appropriate waste facility. During transport of material by barge there is the risk of over spill. Works would be managed under a Sediment and Water Management Plan when transporting material off site to reduce impacts and a polymer added to absorb water.

During installation of concrete mattresses, concrete would be delivered to site only when needed and removed once pumping has finished. Materials would be barged to site, including fuels, oils and other required liquids which would be stored in bunded containers on the vessels. All waste removed from the site would be transferred by a licenced contractor to a licenced receiving facility.

Hazards and risks

Hazards and risks have been identified for the proposal. These include physical injury to construction workers and public from hazards associated with construction activities and objects falling from vessels, generation of sediment plumes leading to degradation of sensitive marine species and accidental fuel spills.

Odour

The proposal has the potential to create odour as a result of dredging sediments. Dredging is anticipated to be carried out over 10 weeks, depending on the dredge disposal location either on land or offshore; therefore, odour generation due to the proposal would be temporary and for a short duration. Once barges are fully loaded, they would be towed to Glebe Island for unloading and subsequent transport to a suitable disposal facility or towed to the offshore spoil ground for disposal. As any odour would be associated with the dredged materials, any potential impact would likely end once the material is removed from Circular Quay.

Justification and conclusion

The need for the proposal was identified due to a need for safe, efficient and reliable berthing to ensure the ongoing operation of the OPT.

The assessment of the environmental and social impacts has determined the proposal is not likely to have a significant impact and therefore assessment under Part 5.1 of EP&A Act is not needed.

Contents

			Page
1	**Introduction**		**10**
	1.1	Proposal identification	10
	1.2	Report purpose	13
2	**Need for the proposal**		**14**
	2.1	Strategic need	14
	2.2	Existing infrastructure	15
	2.3	Proposal objectives and development criteria	16
	2.4	Alternatives and options considered	17
3	**Proposal description**		**19**
	3.1	The proposal	19
	3.2	Key design features	20
	3.3	Work method	21
	3.4	Traffic management and access	27
4	**Statutory and planning framework**		**30**
	4.1	Environmental Planning and Assessment Act 1979	30
	4.2	State environmental planning policies	31
	4.3	Commonwealth legislation	40
	4.4	Confirmation of statutory position	40
5	**Notifications**		**41**
	5.1	Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 notification	41
	5.2	Fisheries Management Act 1994 notification	41
6	**Environmental assessment**		**42**
	6.1	Physical environment	42
	6.2	Biodiversity	57
	6.3	Noise and vibration	65
	6.4	Landscape character and visual impact	75
	6.5	Socioeconomic	81
	6.6	Non-Aboriginal heritage	87
	6.7	Aboriginal heritage	95
	6.8	Traffic, transport and access	99
	6.9	Spoil, dredging and waste management	105
	6.10	Hazards and risks	108
	6.11	Odour	109
	6.12	Other impacts	111

6.13 Cumulative impacts 112

7 Environmental management 118

7.2 Summary of safeguards and management measures 118

8 Justification and conclusion 132

8.1 Justification 132
8.2 Objects of the EP&A Act 133
8.3 Conclusion 135

9 Certification 137

10 References 138

Figures

Figure 1: Proposal location and compound site at Glebe Island
Figure 2: Local setting
Figure 3: Existing infrastructure
Figure 4: Installation of pumped and articulated concrete mattresses
Figure 5: Example backhoe dredger and waiting barge
Figure 6: Location of Exceedances of Sediment Contaminants
Figure 7: Final cumulative sediment deposition thickness and volume settled in dredge pocket for the scenario assuming maximum dredging rate over a 6 day period
Figure 8: Final cumulative sediment deposition thickness and volume settled in dredge pocket for the scenario assuming average dredging rate over a 16 day period
Figure 9: Timeseries of total suspended sediment concentrations at surface, mid water and nearbed levels, at four reference sites
Figure 10: Noise sensitive receiver locations surrounding the OPT site and NCAs
Figure 11: Landscape character zones around the OPT
Figure 12: Location of viewpoints near the OPT
Figure 13: Location of nearby Heritage items listed on heritage registers
Figure 14: 1960s aerial photograph showing the configuration of the OPT after the expansion works and Wharf No.7 to the north
Figure 15: AHIMS Search results

Tables

Table 1: Existing infrastructure and berth
Table 2: Proposal development criteria
Table 3: Engineering and design constraints
Table 4: Construction and dredging activities
Table 5: Indicative plant and equipment
Table 6: Construction vessel movements at OPT

Table 7: Expected road traffic movements
Table 8: Aims of the Sydney Harbour SREP
Table 9: Zone W1 Maritime Waters objectives
Table 10: Division 2 matters
Table 11: Heritage objectives
Table 12: Other relevant NSW legislation
Table 13: Aquatic environment safeguards and management measures
Table 14: Aquatic pest species
Table 15: Biodiversity safeguards and management measures
Table 16: Existing ambient acoustic noise environment for Circular Quay
Table 17: NCAs and description
Table 18: Residential receivers
Table 19: Non-residential receivers
Table 20: Construction noise assessment criteria
Table 21: Road traffic criteria for traffic generating development - residential receivers
Table 22: Recommended minimum working distances for vibration intensive plant
Table 23: Noise and vibration safeguards and management measures
Table 24: Landscape character and visual impact rating matrix
Table 25: Overseas Passenger Terminal: landscape character zones
Table 26: Overseas Passenger Terminal: viewpoint locations
Table 27: Temporary landscape character impacts
Table 28: Temporary visual impacts
Table 29: Landscape character and visual amenity safeguards and management measures
Table 30: Statistical Data for The Rocks suburb census 2016
Table 31: Socioeconomic safeguards and management measures
Table 32: Summary of listed heritage items within the surrounding area
Table 33: Non-Aboriginal heritage safeguards and management measures
Table 34: Preservation potential by site type
Table 35: Aboriginal heritage safeguards and management measures
Table 36: Traffic, transport and access safeguards and management measures
Table 37: Spoil, dredging and waste management safeguards and management measures
Table 38: Hazard and risk safeguards and management measures
Table 39: Other impacts
Table 40: Other safeguards and management measures
Table 41: Present and future projects
Table 42: Potential cumulative impacts

Table 43: Summary of site-specific environmental safeguards
Table 44: Objects of the EP&A Act

Appendices

Appendix A – Proposal Drawings

Appendix B – Consideration of Clause 228(2) Factors and Matters of National Environmental Significance

Appendix C – Statutory Consultation Checklist

Appendix D – Hydrodynamic Modelling

Appendix E – Noise and Vibration Assessment

Appendix F – Maritime Archaeological and Indigenous Heritage Assessment and Statement of Heritage Impacts

Appendix G – Sediment Contamination Assessment Report

1 Introduction

This chapter introduces the proposal and provides the context of the environmental assessment. The development history is outlined along with the purpose of the report.

1.1 Proposal identification

Port Authority of New South Wales (Port Authority of NSW) proposes to undertake maintenance and capital dredging and scour-protection works at the Overseas Passenger Terminal (OPT) on the western side of Circular Quay in Sydney Harbour.

The proposal is to deepen and expand the OPT berth pocket to increase the under-keep clearance of larger cruise ships berthing at the facility. Scour protection would be installed along the whole length of the quay wall to prevent undermining from hydraulic instability. Currently, there is a risk of some incoming cruise ships having less than 0.5 m under-keep clearance and therefore berthing with operational restrictions.

The proposal's key features are (see Appendix A).

- Installing a sheet pile retaining wall approximately 70 m long at the southern end of the OPT berth pocket.
- Dredging approximately 20,000 m^3 of sediment to deepen the berth pocket.
- Installing scour protection over an area of approximately 12,000 m^2 in the form of pumped or articulated concrete mattresses.

There are two options proposed for the disposal of the dredged material. These are:

- Option 1 – transporting the material to a location at Glebe Island for processing prior to disposal to an appropriately licenced waste management facility.
- Option 2 – transporting the materials offshore for disposal at the Sydney Offshore Spoil Ground located outside of State Waters.

This report assesses the potential for environmental impacts of the dredging and scour protection works. It also considers the impacts of transporting materials to Glebe Island (Option 1) or out to the State Water limit (Option 2).

- Activities at Glebe Island would be subject to the existing determination that allows Berths 1 and 2 to be used as a multi-user facility as obtained at the time under Part 5 of the *NSW Environmental Planning and Assessment Act 1979 (EP&A Act)* on 6 August 2013.
- Offshore disposal under Option 2 would take place in Commonwealth Waters. The Australian Government Department of Agriculture, Water, and Environment (DAWE) would need to permit the ocean disposal under the *Environment Protection (Sea Dumping) Act 1981*.

The proposal compound location where the transported material would be unloaded at Glebe Island is presented on Figure 1. This is a nominal location, with the exact unloading location needing to be determined closer to the time of use due to ongoing port operational requirements. The OPT local setting is shown in Figure 2. Appendix A presents a plan of the key proposal features within the OPT.

Figure 1 Proposal location and compound site at Glebe Island

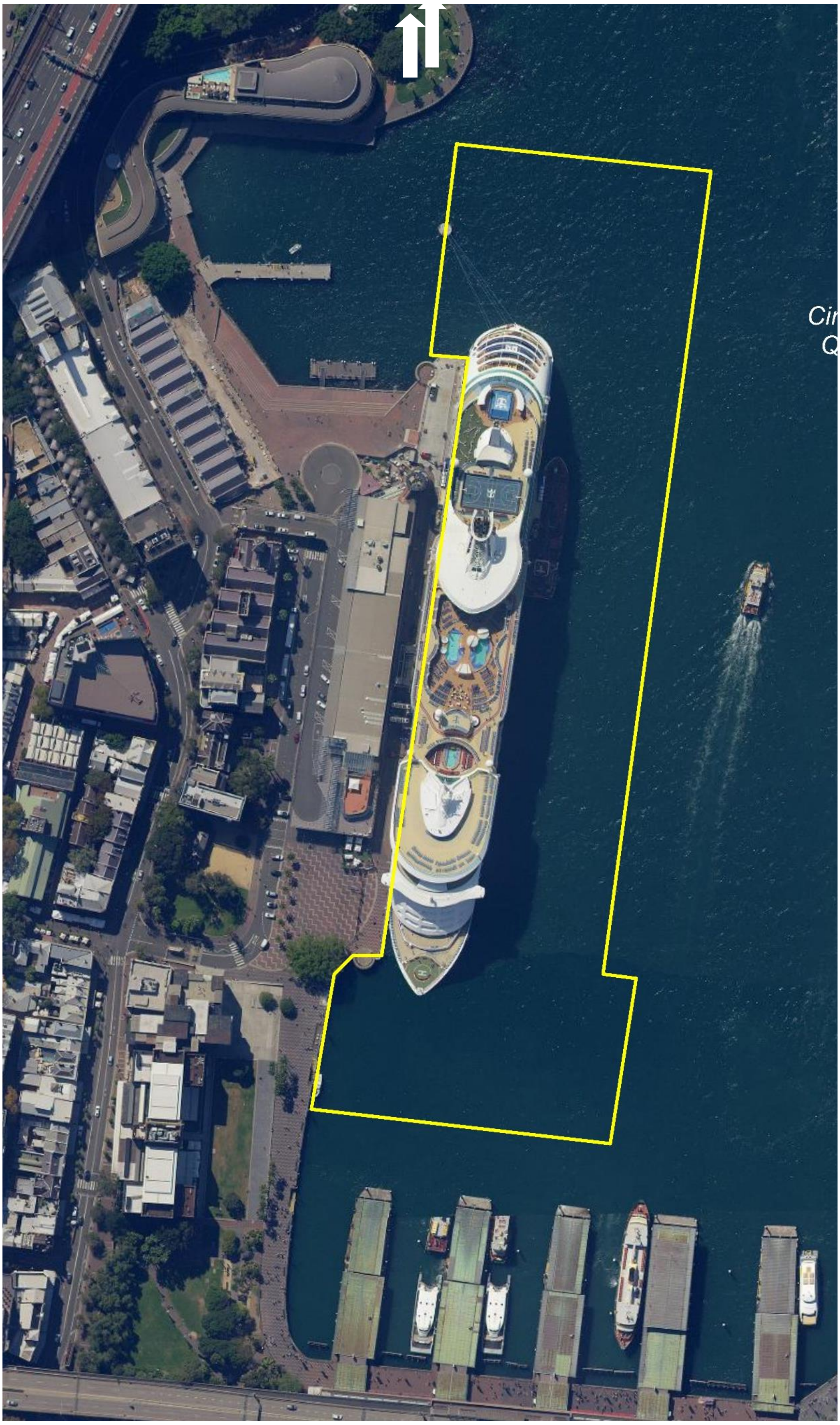


Figure 2: Local setting (proposal footprint shown in yellow)

1.2 Report purpose

Arup has prepared this review of environmental factors (REF) on behalf of Port Authority of NSW. For the purposes of the work, Newcastle Port Corporation (trading as Port Authority of NSW) is the proponent and the determining authority under Division 5.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The purpose of the REF is to describe the proposal, document its likely environmental impacts, and detail the protective measures that would be implemented to safeguard against and minimise impacts.

The description of the proposed work and assessment of associated environmental impacts has been carried out in the context of Clause 228 of the *Environmental Planning and Assessment Regulation 2000 NSW*, the factors in *Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (Is an EIS required? Guidelines, DUAP, 1995/1996), the NSW *Biodiversity Conservation Act 2016* (BC Act), the NSW *Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In doing so, the REF helps to fulfil the requirements of Section 5.5 of the EP&A Act including that Port Authority of NSW "examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity".

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the need for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Places under Division 5.2 of the EP&A Act.
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, and in accordance with Section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement (SIS) or a Biodiversity Development Assessment Report (BDAR).
- The significance of any impact on nationally listed biodiversity matters under the EPBC Act including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured.
- The potential for the proposal to significantly impact any other matters of national environmental significance or Commonwealth land and the need, subject to the EPBC Act strategic assessment approval, to make a referral to the DAWE for a decision by the Commonwealth Minister on whether assessment and approval is required under the EPBC Act.

As mentioned above, the REF provides an assessment of the proposed works including two options for disposal of dredged materials.

2 Need for the proposal

This chapter discusses the proposal's need and objectives. It identifies the various options considered in selecting the preferred option.

2.1 Strategic need

Approximately 350 cruise ships visited Sydney Harbour in 2017/18 handling some 1.6 million passengers. Approximately 220 cruise ships berthed at the OPT, which is basically at full capacity during the primary cruise season from October to March each year.

There are currently two dedicated cruise passenger terminals within Sydney Harbour; the OPT, located east of the Sydney Harbour Bridge, and the White Bay Cruise Terminal (WBCT); located west of the Sydney Harbour Bridge. WBCT opened in April 2013 and it has a primary cruise ship berth and a secondary cruise ship berth known as White Bay berth 4. Access to WBCT requires passage under the Sydney Harbour Bridge, which is not possible for the larger cruise ships visiting Sydney.

It is essential that the OPT continues to operate as efficiently and safely as possible due to the above limitation. This means its infrastructure is maintained and progressively upgraded to continue to meet forward cruise vessel demands.

Since 2011, cruise ships have mainly berthed at the terminal under Azipod and bow thruster power only, rather than with the assistance of tugs. Recent hydrographic and diver surveys identified that scouring is occurring at both the southern and northern end of the OPT berth pocket. There is also evidence of loss of the existing scour protection, deposition of large rocks and slumping of an embankment into the berth pocket at the southern end due to scouring.

The observed scour and accretion can be attributed to:

- Significant increase in vessel size and changes in vessel power and berthing configurations since the construction of the berth in 1959.
- Use of Azipods and thrusters since 2011.

The identified scour and accretion issues pose potential hazards to vessel operations. This includes the potential for further decreasing the under-keel clearance for incoming cruise ships. There is a need for safe, efficient and reliable berthing to ensure the ongoing operation of the OPT.

2.2 Existing infrastructure

Table 1 and Figure 3 provide details on the existing berth infrastructure and berth pocket.

Table 1: Existing infrastructure and berth

Element	Description
Existing berth pocket	The existing berth pocket is 375 m long (Ch -35 m to Ch 340 m) by 50 m wide, with a declared depth of -10 m chart datum (CD). Shoaling areas encroach up to 15 m into the berth pocket within the northern part of the OPT between Ch 310 and Ch 340 with a minimum depth of 6.5 m. Shoaling areas encroach 2 m into the berth pocket within the southern part between Ch -8 and Ch -1 with a minimum depth of 9.4 m.
Quay side and berthing infrastructure	The berth is split into three sections on the quay side. The southern end of the OPT (Ch -35 – Ch .0) consists of a sheet pile wall at the back of an embankment. At the middle of the OPT (Ch 0 – Ch 220) the berth contains a reinforced concrete caisson structure with a rubble apron at the toe. This rock apron is separated into an inner and outer scour with varying rock size and dimensions. The northern end of the OPT (Ch 220 – Ch 280) is supported by a sheet pile wall, which passes through an existing rock revetment up to the end of the berth. Imported 20 mm aggregate engineering fill material is used as backfill at the rear of the sheet pile wall. Between the northern end of the OPT and the northern mooring dolphin (Ch 280 – Ch 340), the seabed consists of marine deposit made up of sand, silt and clay with some remnant scour protection rock. The seabed level rises to its shallowest adjacent to the mooring dolphin at approximately -6 m CD.

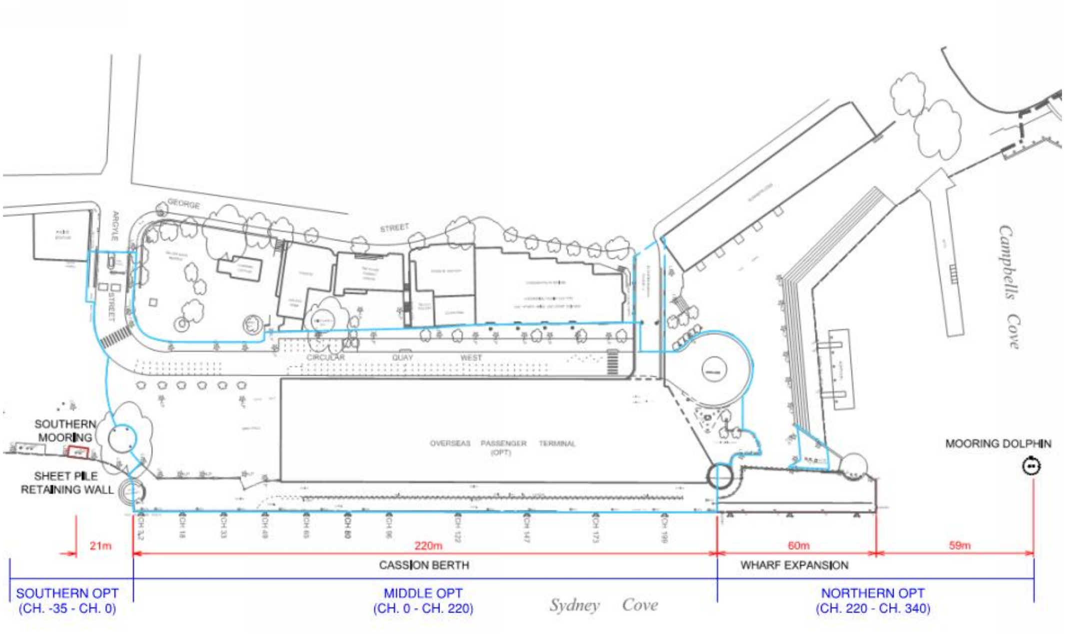


Figure 3: Existing infrastructure

2.3 Proposal objectives and development criteria

This section lists the proposal's objectives and development criteria.

2.3.1 Proposal objectives

The proposal's objectives are to:

- Prevent undermining of the caisson toe and erosion of the embankment south of the caisson wall.
- Prevent the movement of sediment and rock within the berth pocket.
- Reduce the risk of damage to berthing cruise ships from the accretion/movement of sediment and rock.
- Maintain stability of the existing quay infrastructure, including the southern sheet pile wall, caisson wall, northern sheet pile wall and northern mooring dolphin.
- Provide enough depth in the berth pocket for bidirectional berthing of all design vessels.

2.3.2 Development criteria

The proposal has been developed against the following themes and design principles.

Table 2: Proposal development criteria

Theme	Relevant principles
Design depth and dredging	The design depth of the OPT berth pocket has been developed in accordance with the guidelines presented in World Association for Waterborne Transport Infrastructure (PIANC) WG121 Harbour Approach Channels Design Guidelines, 2014 and WG 152 Guidelines for Cruise Terminals 2016. The design depth is to be achieved by dredging and it would provide enough under-keep clearance for berthing vessels without operational restriction, accounting for several vessel-related factors and dredging tolerances.
Scour protection	The installation of scour protection would facilitate dredging works and prevent undermining of the quay wall toe.

2.4 Alternatives and options considered

This section describes the alternatives and options considered to deliver the proposal.

2.4.1 Preliminary considerations

Do nothing

The 'do nothing' option would involve carrying out regular maintenance activities consistent with current operations.

Although it would present the lowest initial capital cost and it would result in the least environmental impact, this option was discounted as it would not meet the objectives of the proposal. It would not provide safe clearance for cruise ships to berth. It would also potentially shorten the terminal's life as it would leave the quay wall exposed and susceptible to erosion and therefore increased destabilisation.

It would potentially result in a higher overall operational cost across the terminal's life due to the need to periodically dredge the berth pocket, while it may result in lost revenue if the larger cruise ships are unable to berth in the future.

Carry out the proposed work

After discounting the 'do nothing' option, consideration was then given to expanding and deepening the OPT berth pocket by dredging, reinforcing and protecting the berth by:

- Installing a sheet pile retaining wall at the southern end of the OPT berth pocket.
- Dredging and installing scour protection over an area of approximately 12,000 m^2 along the base of the berth infrastructure.
- Transporting the dredged materials for disposal either:
  - On land
  - Back in Circular Quay under a waste exemption
  - Offshore at the Sydney Spoil Ground.

Method for selecting the preferred option

The method used by Port Authority of NSW to develop options for carrying out the works considered:

- Existing and future
  - Passenger use
  - Service demand
  - Future ship sizes
- Engineering design requirements and current structural integrity
- Passenger safety
- Environmental and social constraints

- Build cost
- Stakeholder feedback.

Preferred options

The preferred options are to deepen the existing OPT berth pocket and to either transport the materials for disposal on land or offshore.

Disposing of material back into other parts of Circular Quay was discounted due to its potential social impact on what is one of Sydney's most iconic and busiest areas. The decision whether to dispose of the materials on land or offshore would depend on several factors that Port Authority of NSW is still investigating. For this reason, two disposal options remain; both with their own benefits and impacts.

3 Proposal description

This chapter describes the proposal, its design, and the construction methods that would be used to carry out the works.

3.1 The proposal

The proposal's aim is to address scour and undermining of the OPT quay wall and expand the berth pocket. It would involve maintenance and capital dredging of around 20,000 m^3 of sediment and installing approximately 12,000 m^2 of scour protection along the western edge of the berth pocket and southern embankment.

Appendix A shows the proposed works and construction footprint at the OPT.

3.1.1 Design criteria

The proposal and works have been designed to NSW, Australian and international maritime engineering and safety standards and guidelines developed by:

- Building Code of Australia: landside and superstructure
- Standards Australia: AS4997: 2005 Guidelines for the Design of Maritime Structures.
- PIANC.

These standards describe the criteria that were adopted when designing the works as they provide detail on:

- Access and safety requirements for navigation and berthing.
- Enough dredging depths to safely berth without the risk of either grounding or causing notable sediment disturbance and scour from propeller wash.
- Appropriate scour protection material selection and durability.

3.1.2 Engineering constraints

Table 3 lists the main constraints to development and discusses how they have been addressed in the concept design.

Table 3: Engineering and design constraints

Constraint	Design provision
Wind, wave, current and climate change	Develop a design that provides erosion protection from wind and wave impacts with allowance for climate change and storm events. Scour protection is proposed. This is outlined in section 3.2.
Heritage values	Ensure the design is sensitive to the area's heritage values (see Section 6.6). Respect the Aboriginal heritage values (see Section 6.7).

Constraint	Design provision
Existing ferry traffic	Ensure navigational management measures are implemented through delivery of a navigation risk assessment (see Section 6.8).
Social and community infrastructure	Deliver a design to enable a safe passenger terminal in the long-term. Ensure construction works are managed to avoid disturbance to the social and community infrastructure and neighbours (see Section 6.5).

3.2 Key design features

This section describes the proposal's main design features. The construction method is described in section 3.3.

Proposed berth pocket design

The existing berth pocket would be dredged up to -12.1 m CD before placing scour protection mattresses. This would increase the declared depth to -10.7 m CD. The dredge depth includes an additional 0.5 m over-dredging allowance for installing scour protection to achieve the increase in declared depth.

Pumped or articulated concrete mattresses would be installed in front of the southern sheet pile and caisson walls. The mattresses would protect the existing quay wall and berth pocket from the scouring impacts.

Figure 4 shows an example of the installation of pumped and articulated concrete mattresses.

Source: Synthetex

Figure 4: Installation of pumped (left) and articulated (right) concrete mattresses

Sheet pile wall

A 70 m long underwater steel sheet pile wall would be installed from the southern end of the OPT structure. The sheet pile wall would support the toe of the southern embankment to allow the berth pocket to be dredged and deepened.

The harbour bed would be slightly reprofiled to the west of the underwater sheet pile wall. This would allow the concrete mattresses to be installed over an area of approximately 1,500 m^2 (see Appendix A).

3.2.1 Construction and dredging method

The appointed contractor would confirm the final construction activities in discussion with Port Authority of NSW. As such, this section only indicates a likely method and work plan as it may vary due to: the identification of additional constraints before work starts; detailed design refinements; and contractor requirements/limitations. Should the work method differ from what is proposed in this REF then the contractor would consult with Port Authority of NSW to determine if additional assessment is needed.

3.3 Work method

The proposal would be built under a construction environmental management plan (CEMP). The plan would cover environmental performance and management supplemented by aspects such as materials storage and management, and erosion and sediment control. The proposal would likely comprise a sequence of work activities consistent with the preliminary summary in Table 4.

Table 4: Construction and dredging activities

Activity	Associated work
1: site establishment and navigation safety provisions	Notify the public, public transport companies, Transport for NSW, local council and other stakeholders before work starts (see section 5.7). Carry out prework inspections (see Chapter 7), and other investigation work before starting work. Set out, mark and establish a maritime navigation exclusion zone in the harbour and no-go zone areas on land. Establish the site compound. Install environmental management controls. Install temporary drainage controls (where needed).
2: enabling works – Sheet pile wall installation	Install sheet piles via a crane mounted on a barge.
3: stabilise southern embankment	Reprofile the southern embankment using a backhoe dredger. Remove excess material offsite for disposal either on land via Glebe Island (Option 1) under an existing approval, or offshore (Option 2) under a separate approval (see section 1.1). Install scour protection in the form of pumped or articulated concrete mattresses.

Activity	Associated work
4: extending and deepening the berth pocket	Dredge the harbour bed using an excavator off a barge or a backhoe. Transfer the dredged material to a waiting barge.
5: Materials transportation	Transport the material to either Glebe Island for land disposal (Option 1) or to the offshore disposal grounds (Option 2).
5a: Option 1: materials and spoil management, testing (as needed), road transport and disposal (which would take placed under an existing approval as described in section 1.1).	
5b: Option 2: materials disposal offshore (which would take place under a separate approval as described in section 1.1.).	
6. install scour protection for the berth pocket	Articulated concrete mattresses Transport articulated concrete mattresses by barge. Lift and install the articulated concrete mattresses using a crane, within the berth pocket and along the embankment south of the quay wall. Placement of articulated concrete mattresses to be assisted by divers. Pumped concrete mattresses Transport geotextile and mobile concrete trucks. Lay geotextile and pump grout mattress by divers.
7: site finalisation and demobilisation	Demobilise the site compound and remove temporary: Maritime navigation exclusion and no-go zones. Environmental and safety controls (see Chapter 7).

3.3.1 Construction hours

This section describes the proposed timeframe and working hours.

Start date and length of construction

The current proposal is to award contract for the works in Q3 2020, with the intent to carry out the enabling and sheet piling works in late Q3 or Q4 of 2020 (see Activity 1 and Activity 2 in Table 4). It would take around four-to-six weeks to carry out these works. The remaining activities would then take place in mid-2021 taking around three-to-four months to complete. Dredging would last up to 10 weeks and the scour protection works would take about 12 weeks to complete; with these two activities overlapping.

The program would be developed further once more is known about the 2021 cruise ship schedule. The construction program would also be affected by the need to coordinate with Transport for NSW, Port Authority of NSW, Property NSW, and other key stakeholders (see Chapter 5).

Working hours

The OPT works would take place during day, evening and at night over the construction program. However, most works at the OPT, including piling, dredging, and concrete work in the harbour, would need to take place at night. This is due to safety reasons and so that these works can occur when the waters of Circular Quay are far less busy and generally calmer. The duration of activities is anticipated to be as follows:

- Piling (sheet piled wall): six weeks
- Dredging: 10 weeks
- Mattress placement (scour protection): 12 weeks.

There would be some overlap between dredging and mattress placement activities.

Where night-time piling works are proposed, they would likely be scheduled as follows:

- 7:30pm to 8:30pm: Carry out checks, pre-start meetings.
- 8:30pm to 9pm: Set up
- 9pm to 5am: Pile pitching and vibropiling, followed by back-driving of piles
- 5am to 6am: Pack up.

Any night-time piling and hammering works would take place intermittently during the above periods. While piling may also take place during the day it would not be scheduled or permitted between 12pm and 2pm. This would be to ensure that the amenity of the area is preserved in its busiest time as discussed further in section 6.3.4.

On average, a pile would be pitched and vibrated every hour. Vibropiling would only last for approximately two to five minutes and it would be relatively quiet for the rest of the hour. Back-driving or hammering of the piles would occur during the last 30 to 60 minutes of the shift. Individual piles would be hammered for five to 10 minutes, followed by a relatively quiet period for the next five minutes or more before the pile is progressed.

For reference: the use of Glebe Island would generally take place within standard working hours between 7am and 6pm Monday to Friday and 8am to 1pm on Saturday. However, during dredging works, the Glebe Island site would be operated as needed seven days a week and in accordance with the existing 2013 approval (see section 1.1).

3.3.2 Workforce

During peak activities of dredging and scour placement, approximately 26 workers would be working at the OPT.

3.3.3 Plant and equipment

The largest and most complex of the equipment needed to carry out the work would be used during the dredging and piling activities. Table 5 indicates the plant and equipment that would be likely used onsite. The final plant and equipment schedule would be confirmed by the contractor.

Table 5: Indicative plant and equipment

OPT - Plant/equipment	Plant/equipment used to transport materials
Backhoe dredger	2 x hopper barges (unpowered) - intermittent
50 tonne long-reach excavator	Long-arm backhoe
2 x hopper barges (unpowered) - intermittent	Tug/vessel to move barges - intermittent
Tug/vessel to move barges - intermittent	Supply barge (unpowered) - intermittent
Concrete/grout boom pump	Crane
Barge-mounted crane (200 to 250 tonnes crawler crane)	
Barge-mounted backhoe and a barge-mounted/jack-up piling rig	
Impact piling hammer (3 to 5 tonnes)	
Vibropiling and drop hammer	
Storage barge (unpowered)	
Mattress lifting frame	
Day maker	
Dive equipment	
Work punt and dive vessel	
Generator	
Concrete delivery trucks	
Light vehicles	

3.3.4 Sheet pile wall

The sheet pile wall would be installed using a vibropiling method followed by back-driving or hammering of piles operated from a barge restrained by spuds. The sheet piles would be stored on the deck of the barge before being installed.

A steel frame pile gate supported on temporary piles would be installed along the required alignment of the new wall and pairs of sheet piles pitched into the gate. A vibropiling method would install the sheet piles. The piles would then be embedded using a drop hammer.

The pile gates would then be removed and moved to the next location. Once the sheet piles are installed, they would be cut down to the correct level by divers. The southern embankment alongside the sheet pile wall would be reprofiled using a backhoe dredger or an excavator mounted on a barge to redistribute material. The concrete mattress scour protection would then be installed. The method for installation is described in section 3.3.6.

3.3.5 Dredged method and spoil management

A barge-mounted backhoe dredger would be used to carry out the dredging. The backhoe would remove sediment from the harbour floor in a closed bucket, lifting it through the water column before transferring it into an adjacent waiting barge. Figure 5 shows a typical backhoe dredging operation.

Figure 5: Example backhoe dredger and waiting barge

Option 1: transport to Glebe Island

Once the barge is filled, it would be transported to Glebe Island. It is expected that the dredged material would have a high moisture content once loaded into the hopper. As such, two long arm excavators would first mix the dredged material in the barge with polymer. This would absorb any excess water to allow dredged material to be spread. This would allow the dredged material to be handled and loaded into trucks for road transport. Absorbent polymer would be delivered by road in sealed bulker bags that would be stored at Glebe Island.

The polymer would be mixed through the dredged sediment in the hopper barge and left for up to a 12-hours to cure while the barge is moored at Glebe Island. No excess water from the dredged material is expected to be discharged from the hopper barge while moored at Glebe Island.

Option 2: transport offshore

Once the barge is filled it would travel through Sydney Harbour to the Sydney Offshore Spoil Ground. While the barge is transporting material offsite, another barge would continue to be filled. There would be approximately three movements out of the Harbour per day, working 24-hours per day seven day per week. The final transport movements would be confirmed in consultation with the Harbour Master.

3.3.6 Scour protection

The concrete mattresses would be installed following piling and dredging works.

Option A: pumped concrete mattresses

Concrete mattresses, comprising rolled-up fabric formed bags, would be delivered to the OPT site by boat or truck. The mattress fabric would be rolled out by divers and secured prior to being filled with concrete. The mattress fabric would then be filled from the quayside using a long-arm concrete pump once positioned on the harbour bed. Concrete would be pumped through a boom that would be connected to the mattresses by divers. The concrete would be delivered to the OPT by trucks.

The pumped concrete mattresses would be installed by two groups of workers positioned on each end of the OPT. Regular bathymetric surveys would be undertaken to ensure the extent of mattresses are on the correct alignment and depth. Each work-front would install an average of two mattresses per shift. Each mattress would require approximately 25 m^3 of concrete with an approximate total of 16 to 18 truck movements per shift. On average a shift would be approximately 10 hours.

Option B: articulated concrete mattresses

Articulated concrete mattresses would be cast at Glebe Island and brought to the OPT site, most likely by barge. These would be stacked onto a deck of the crane barge and then positioned and lowered into place using a lifting frame and global positioning system (GPS) to about half a metre above the harbour bed. Divers would then provide final directions to position the mattresses into place. Regular bathymetric surveys would be undertaken to ensure the extent of mattresses are on the correct alignment and depth. An average of six mattresses would be placed in each shift.

3.3.7 Source and material quantities

Various standard construction materials that are readily available across the Sydney Metropolitan region would be needed to carry out the works. The main materials needed to construct the proposal would comprise:

- Marine-grade steel for the sheet pile wall.
- Geotextile lining and grout/concrete mix to be pumped or prefabricated for the scour protection system.

3.3.8 Ancillary facilities

Given the limited space and road access, the preference would be to ship any major machinery and equipment to the OPT when needed; potentially making use of an offshore storage barge. When not in use, the storage barge would return to, and berth at, Glebe Island or White Bay, with the location depending on berth availability.

A shipping container may be placed on the OPT site for the duration of the work to store equipment, machinery and some key materials and equipment. Other equipment and materials may be temporarily stored at the Glebe Island site. The specific requirements for these sites would be confirmed by the contractor. Ideally, these sites would be:

- Away from biodiversity and heritage values
- Outside of flood prone land
- On previously disturbed areas
- More than 100 m from residential property
- Outside the drip line of trees and on level ground wherever possible.

As certain equipment maybe stored near Sydney Harbour, additional drainage and containment controls would be installed to prevent spills, leaks, leaching and/or sediment discharge (see Section 6.1).

For reference: a compound site would be provided at Glebe Island, nominally at Berths 1 & 2 (see Figure 1). Depending on the option taken, this may be used to:

- Transfer of dredged spoil from barge to trucks
- Cast articulated concrete mattresses.

3.4 Traffic management and access

This section describes how water and land-based traffic would be managed during construction including expected traffic movements.

3.4.1 Marine navigational traffic management

Most of the materials and equipment would be delivered by barge. Additional barge movements would take place at the OPT to deliver equipment and machinery.

Option 1: transport to Glebe Island

There would be one to two barge trips per day to and from Glebe under Option 1 (two to four movements).

Option 2: transport offshore

There would be several barge movements to and from the offshore ground per day under Option 2.

Both options

During cruise ship days, should these occur during construction, the OPT work site would be demobilised, and this could see movements to and from Glebe Island (or White Bay) increase to four barge trips if alternative moorings are not available.

There would also be a barge-mounted backhoe and a barge-mounted/jack-up piling rig located in the construction footprint at any point during construction. These would be located at Glebe Island (or White Bay) when not in use.

The expected vessel movements required to undertake the works are outlined in Table 6.

Table 6: Construction vessel movements at OPT

Construction Phase	Approximate number of expected vessel movements[1] during construction.	Approximate length of time (may vary during works)
Dredging works and on land disposal (Option 1, see section 1.1)	200	6-10 weeks
Dredging works and offshore disposal (Option 2, see section 1.1)	200	6-10 weeks
Piling	10	3-4 weeks
Articulated concrete mattresses (Option A, see section 3.3.6).	400	11-12 weeks
Pumped concrete mattresses (Option B, see section 3.3.6).	100	11-12 weeks

A maritime navigation exclusion zone would be set up around the construction footprint to prevent both commercial and recreational traffic entering the area. A Marine Works Management Plan (MWMP) would be developed by the Contractor in consultation with the Harbour Master, Transport for NSW (Maritime) and other relevant stakeholders, and would define specifics such as exclusion zones, methods of marking the zones, clearance distances, mooring plans, communication protocols, emergency and incident response procedures, contact details of all parties and responsible persons, and transit routes.

The MWMP would be approved by the Harbour Master in advance of the works commencing. It is noted that Harbour Master approval would be required under Clause 67ZN of the Ports and Maritime Administration Regulation 2012 prior to any disturbance of the seabed.

[1] Based on movements. One trip would equate to two movements

3.4.2 Road traffic management

Despite proposing to deliver most of the material and equipment by barge, road traffic deliveries are expected to the OPT.

Vehicles arriving and leaving OPT would likely access the site via George Street and Circular Quay West Road. Road and turning restrictions mean there would be restrictions on the size and type of vehicles that could access the quayside. Site workers would be prevented from driving to site.

Table 7 Expected road traffic movements

Activity	Approximate number of vehicle movements
Overseas passenger terminal	
Concrete trucks	1,500 movements[2] over 12 weeks during the mattress placement works (see section 3.3.1).
Other vehicles (Light vehicles – Supervisors, divers, concrete testing, etc. and general deliveries)	1,000 movements[3] over four months the dredging and mattresses placement works (see section 3.3.1).

Road traffic access and management would be considered further during the detailed design including limits on the type, size and number of vehicles arriving and leaving the OPT. Any road traffic would be managed under a construction traffic management plan (see Section 6.8).

[2] This is equivalent to 750 trips
[3] This is equivalent to 500 trips

4 Statutory and planning framework

This chapter provides the statutory and planning framework for the proposal and considers the statutory requirements including of the Environmental Planning and Assessment Act 1979 (EP&A Act), the Environmental Planning and Assessment Regulation 2000 (EP&A Regulations) and the provisions of relevant environmental planning instruments.

4.1 Environmental Planning and Assessment Act 1979

The proposed activity is subject to examination, determination and approval under Division 5.1 of the EP&A Act. Relevantly, the proposed activity is not declared to be State Significant Infrastructure (SSI) under Division 5.2 because:

- Based on the conclusions of this REF, Port Authority of NSW has formed the opinion that the activity is not likely to significantly affect the environment and therefore would not require the preparation of an EIS against the provisions of Section 5.7 of the EP&A Act (Clause 1, Schedule 3 of *State Environmental Planning Policy (State and Regional Development) 2011*, SRD SEPP, see section 4.2).
- The proposed activity does not meet the $30 million capital investment value (CIV) threshold to declare development for the purpose of port and wharf facilities to be SSI (Schedule 3, Clause 2 of SRD SEPP). The proposed activity has not otherwise been specifically declared to be SSI by a SEPP, nor has the Minister for Planning and Public Spaces separately declared the activity to be SSI by way of an Order made under Section 5.12 of the EP&A Act.

Port Authority of NSW is the determining authority for the proposed activity under Division 5.1 of the EP&A Act due to the provisions of Clause 68 of ISEPP.

The EP&A Act outlines the matters that need to be considered when determining and approving an activity under Division 5.1 of the Act. Section 5.5 of the EP&A Act states:

> *"For the purpose of attaining the objects of this Act relating to the protection and enhancement of the environment, a determining authority in its consideration of an activity shall, notwithstanding any other provisions of this Act or the provisions of any other Act or of any instrument made under this or any other Act, examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity."*

The environmental impact of the activity has been assessed in section 6 and the supporting technical studies including the noise and vibration assessment (Appendix E), Maritime Archaeological and Indigenous Heritage Assessment and Statement of Heritage Impacts (Appendix F), and Sediment Contamination Assessment (Appendix G).

The authority for a proposed activity is required to determine if an activity will have a significant affect on the environment. To determine this, Port Authority has examined the proposal against the matters for consideration under Clause 228 of the EP&A Regulations (see Appendix B and in the context of the factors in *Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (Is an EIS required? Guidelines, DUAP, 1995/1996), the NSW *Biodiversity Conservation Act 2016* (BC Act), the NSW *Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

4.2 State environmental planning policies

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Clause 68(1) of the ISEPP permits development for the purpose of port facilities by or on behalf of Newcastle Port Corporation (Port Authority of NSW), without consent on any land providing the development is directly related to an existing port facility. Clause 68(6) of the ISEPP, in reference to development for the purpose of port facilities, also specifically permits dredging, or bed profile levelling, of existing navigation channels or to create new navigation channels.

As the proposal is directly related to an existing port facility (the OPT) and is being undertaken by or on behalf of Newcastle Port Corporation (Port Authority of NSW), the proposed activity is therefore permissible without consent and can be determined and approved under Division 5.1 of the EP&A Act.

Development consent from Council is not needed.

State Environmental Planning Policy (State and Regional Development) 2011

The main aim of the SRD SEPP is to identify development that is State Significant Development (SSD) or State Significant Infrastructure (SSI) under Parts 4 and 5 of the EP&A Act respectively. Clause 8(1) of the SRD SEPP states that development is declared to be SSD if:

> *"(a) the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act* [i.e. is not development that can be carried out under Part 5 of the EP&A Act as development without consent]*, and*
> *(b) the development is specified in Schedule 1 or 2.*

The proposed activity is not listed under Schedule 1 or 2 of the SRD SEPP which identifies certain activities, and certain activities located on identified sites, as being SSD. Accordingly, the proposed activity is not declared to be SSD. The proposed activity is permitted without development consent under Clause 68 of ISEPP.

Clause 14(1) of the SRD SEPP states that development is declared to be SSI if:

> *“(a) the development on the land concerned is, by the operation of a State environmental planning policy, permissible without development consent under Part 4 of the Act, and*
> *(b) the development is specified in Schedule 3.”*

As stated above, the proposed activity is permissible without development consent under Clause 68 of the ISEPP and therefore an approval under Part 4 of the EP&A Act is not required. The development is not listed under Schedule 3 of the SRD SEPP and is not development that would require an EIS (pursuant to Schedule 3, Clause 1(1)) to be prepared under Division 5.2 of the EP&A Act. Hence, the proposed activity is not SSI.

State Environmental Planning Policy (Coastal Management) 2018

The aim of this SEPP is to promote an integrated and coordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the NSW *Coastal Management Act 2016.* The SEPP focusses on protecting the environmental asset of the coast, establishing a framework for land use planning, and defining areas where specific development controls should be implemented.

In terms of the proposal, the construction footprint and transport routes are within a coastal environment area. It is unclear if the site is in a costal vulnerability area as the mapping of these areas is still being prepared.

Despite this:

> *Clause 13(3) of the SEPP notes that the development controls covering coastal environmental areas do not apply to land with the Foreshores and Waterways Areas within the meaning of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005. As described below the proposal is entirely within the above designation.*

Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

The proposal is located within the Sydney Harbour Catchment and is subject to the Sydney Regional Environmental Plan (SREP, Sydney Harbour Catchment) 2005, which is a deemed SEPP, meaning its policies are still relevant and treated in the same way as a SEPP.

The aims of the SREP

Table 8 considers the aims of Clause 2 the Sydney Harbour SREP.

Table 8: Aims of the Sydney Harbour SREP

Aim	Comment
(a) To ensure that the catchment, foreshores, waterways and islands of Sydney Harbour are recognised, protected, enhanced and maintained: (i) as an outstanding natural asset (ii) as a public asset of national and heritage significance, for existing and future generations.	Chapter 7 of this REF includes safeguards to protect and maintain the natural and heritage values of the area. This would ensure the values of Sydney Harbour are recognised, protected, enhanced and maintained.
(b) To ensure a healthy, sustainable environment on land and water.	Provided the relevant measures and controls are implemented and monitored, as described in Chapter 7, the environmental impacts of the proposal are expected to be safeguarded and minimised. Therefore, the land and water environments near the harbour would be protected.
(c) To achieve a high quality and ecologically sustainable urban environment.	The proposal aims to reduce the frequency of maintenance dredging of the OPT and safeguard the existing structure and berth pocket by installing scour protection, which is designed to protect the asset for 30 years.
(d) To ensure a prosperous working harbour and an effective transport corridor.	The proposal would allow for continued and safe berthing of cruise ships at the OPT, helping ensure the retention of a prosperous working harbour. There would be minimal impact to public ferry transport during the construction phase. It is not expected that changes to public transport services and wharf closures would be required. Any changes would be communicated with commuters ahead of time and direct them to alternative transport options as outlined in section 6.8.
(e) To encourage a culturally rich and vibrant place for people.	The proposal would continue to provide access to cruise ships to Sydney Harbour and Circular Quay. Cruise ship visitors would therefore continue to contribute to the economy through spending money at local restaurants and shops, maintain a vibrant place.
(f) To ensure accessibility to and along Sydney Harbour and its foreshores.	The proposal would not change the operational movements and management of the existing OPT. Road closures would not be required during construction, however access along the OPT quay would be temporarily restricted for pedestrians during working hours.
(g) To ensure the protection, maintenance and rehabilitation of watercourses, wetlands, riparian lands, remnant vegetation and ecological connectivity.	The proposal would have no significant impact on notable terrestrial or marine environments or values in the area. Additional standard controls would be implemented to prevent any indirect impact on the wider ecological environment from spills and sediment disturbance, mobilisation and smothering.
(h) To provide a consolidated, simplified and updated legislative framework for future planning.	The proposal is being delivered under the relevant planning provisions covering waterfront and port development set at a State and Commonwealth level.

Maritime Waters Zone and Sydney Opera House Buffer Zone

The proposal is within the W1: Maritime Waters Zone and the Sydney Opera House Buffer Zone but is not within a Wetland Protection Area. The proposal has been considered in respect of the objectives from Clause 17 of the SREP Sydney Harbour Zone W1 Maritime Waters objectives shown in Table 9.

Table 9: Zone W1 Maritime Waters objectives

Objective	Comment
(a) To give preference to and protect waters required for the effective and efficient movement of commercial shipping	The proposal would ensure continued and safe use of the OPT to receive cruise ships. Minor disruption would be caused during construction from increased vessel movements however most of works would be undertaken during night-time to minimise impacts.
(b) To allow development only where it is demonstrated that it is compatible with and will not adversely affect the effective and efficient movement of, commercial shipping, public water transport and maritime industry operations,	The proposal includes maintenance and capital dredging works within an existing cruise ship berthing facility to ensure the continued safe berthing of ships. The dredging pocket would be within a similar extent of the existing berth area. Measures will be put in place to minimise impacts to ferry services at Circular Quay and other shipping and maritime industry operations in Sydney Harbour.
(c) To promote the equitable use of the waterway	The proposal works would be undertaken mainly at night-time to minimise disruption impacts to other users and public ferry transport. Cruise ships would continue to berth as scheduled with all equipment being removed during these times.

Under Clause 18 of the Sydney Harbour SREP, the proposal is permissible with consent in the W1 Zone. In any case, the development is permissible without development consent pursuant to the provisions of the ISEPP which override the zoning provisions of the Sydney Harbour SREP (see clause 7(5) of the Sydney Harbour SREP).

Matters for consideration

The matters for consideration listed in Division 2 at Clause 21 to Clause 27 of the Sydney Harbour SREP are provided in Table 10.

Table 10: Division 2 matters

Division 2 matter	Comment
Clause 21 Biodiversity, ecology and environment protection	Section 6.2 describes the terrestrial and marine impact associated with the proposal. In summary, there is not predicted to be any significant environmental impact within the meaning or definition of the *Fisheries Management Act 1994* or *Biodiversity Conservation Act 2016* with the implementation of the mitigation measures outlined in Section 7 of this REF.
Clause 22 Public access to, and use of, foreshores and waterways	Access to the foreshore at the OPT in the immediate vicinity of the works would be restricted, as required, for safety. There would be no changes to public access to and use of the foreshore area following completion of construction activities.
Clause 23 Maintenance of a working harbour	The proposal would allow cruise ships to continue to safely berth at the OPT and reduce the frequency of maintenance dredging.
Clause 24 Interrelationship of waterway and foreshore uses	Access to the foreshore at the OPT in the immediate vicinity of the works would be restricted, as required, for safety. There would be no changes to the existing interrelationship of waterway and foreshore use at the OPT following completion of construction activities.
Clause 25 Foreshores and waterways scenic quality	There would be temporary visual impacts during works however these would have no lasting change once the proposal is complete.
Clause 26 Maintenance, protection and enhancement of views	Section 6.4 describes the landscape character and visual impacts associated with the proposal. The overall construction impact would be low as people accept there being a port facility operating in this location, and temporary. There would be no change to existing views once construction activities are complete.
Clause 27 Boat storage facilities	There is no boat storage work associated with, or impacted by, the proposal.

Clause 31 of the Sydney Harbour SREP requires consultation for certain development proposals not requiring development consent. Consultation, including under the Sydney Harbour SREP is discussed in Chapter 5.

Part 5 of the Sydney Harbour SREP contains heritage provisions that are to be considered in respect of Division 5.1 activities. The Sydney Opera House is located 370 m east of the proposal footprint and is of World and National heritage importance. The Sydney Harbour Bridge is located 250 m west of the proposal footprint and is of National importance. The heritage objectives from the Sydney Harbour SREP in Clause 53(1) and Clause 53(2) are considered in Table 11 below.

Table 11: Heritage objectives

Objective	Comment
1(a) To conserve the environmental heritage of the land to which this Part applies.	The proposal would impact on part of the former historic Wharf No.7 in Campbells Cove. Dredging would remove around 18 percent of the heritage material associated with the Wharf. A permit under section 140 of the *Heritage Act 1977* would be needed to allow the work to progress. The Wharf heritage would be recorded before work starts and relics collected.
1(b) To conserve the heritage significance of existing significant fabric, relics, settings and views associated with the heritage significance of heritage items.	The remains of the wharf on the harbour bed would be recorded before starting construction to help understand the site formation processes associated with the demolition of the wharf.
1(c) To ensure that that archaeological sites and places of Aboriginal heritage significance are conserved.	There are no registered Aboriginal sites within the proposal footprint. The potential for submerged remains is considered to be low-to-moderate. Should relics be identified during dredging they would be recorded and an Aboriginal Heritage Impact Permit (AHIP) maybe required under Section 90 of the *National Parks and Wildlife Act 1974.*
1(d) To allow for the protection of places which have the potential to have heritage significance but are not identified as heritage items.	Works would be carried out within the vicinity of the OPT and not within proximity to the Opera House. While the proposal is within the buffer zone, it comprises ‘minor works’ in accordance with Clause 58c of the SREP. This is because the works are temporary and comprise of alternations to the quay wall carried out below ground level. Minor works are exempt from the requirements of the buffer zone set out in the SREP.
2(a) To establish a buffer zone around the Sydney Opera House to give added protection to its world heritage value.	Following the end of each shift, all equipment and barge mounted cranes would remain temporarily within the OPT berth when cruise ships are not mooring at the OPT. When a cruise ship is berthing, all equipment and barges will be removed to Glebe Island. There would be temporary impacts to the character of the setting of the Sydney Opera House. Following construction, there would be no change to the setting and views within the Sydney Opera House buffer zone and Campbells Cove.
2(b) To recognise that views and vistas between the Sydney Opera House and other public places within that zone contribute to its world heritage value.	There will be no change to existing views and vistas between the Opera House and other public places once construction activities are complete following the completion of construction activities.

Clause 55 to Clause 60 of the SREP provide protection for heritage items. A heritage impact assessment has been carried out in accordance with Clause 54 to Clause 60 (see Appendix F). As noted in section 6.7.2, no Aboriginal sites or relics were identified and therefore there is no need to seek permission or consult in accordance with Clause 57.

Other relevant NSW legislation

Table 12 lists the NSW legislation relevant to the proposal or the land on which the proposal would be built.

Table 12: Other relevant NSW legislation

Legislation and application	Relevance to the proposal and further requirements
National Parks and Wildlife Act 1974: which provides for the protection of Aboriginal heritage values, national parks and ecological values	There are no registered Aboriginal sites present within the proposal footprint. Submerged remains of Aboriginal features are low to moderate potential. If Aboriginal objects are discovered during dredging, a Aboriginal Heritage Impact Permit (AHIP) would be applied for under section 90 of the Act.
Heritage Act 1977: which provides for the protection and conservation of buildings, works, maritime heritage (wrecks), archaeological relics and places of heritage value through their listing on various State and statutory registers	A heritage impact assessment has been carried out in accordance with the requirements of the *Heritage Act* (see Appendix F). The proposal would lead to the removal of 18 percent of the historic remains of Wharf No. 7 within Campbell's Cove. The Wharf is of local significance. Measures have been put in place to ensure that material associated with the Wharf removed during dredging is recorded and tested. This would ensure that there would not be a significant impact from the partial removal of buried remains of the Wharf. Prior to the commencement of these works, a Section 140 permit would be required.
Fisheries Management Act 1994: which provides for the protection of fishery resources	The proposal would not result in a significant impact on critical marine flora and fauna habitat, or marine threatened species, populations and ecological communities and their habitat. As such, SIS would not be required as per Section 221 of the Act. This is supported by the ecology assessment (see section 6.2) carried out to support the REF, which concluded that any impacts would not significantly affect aquatic ecology. Consultation has been carried out with the Minister for Primary Industries (NSW Fisheries) in accordance with Section 199 of the Act.
Contaminated Land Management Act 1997, which sets out requirements for investigating, remediating and managing land that is considered to pose a human health of environmental risk.	Investigation works have been carried out on the harbour bed material. This confirmed the presence of certain contaminants of concern. The proposal would remove the dredged material to Glebe Island where it could be tested and (waste) classified. It would then be disposed of at an appropriate licenced waste facility. If the option is taken to dispose of the materials offshore, then this Act would not

Legislation and application	**Relevance to the proposal and further requirements**
	apply. However, in securing a sea dumping permit (see section 1.1), Port Authority of NSW would need to demonstrate the suitably of the materials for ocean disposal against the National Assessment Guidelines for Dredging 2009.
Protection of the Environment Operations Legislation Amendment (Scheduled Activities) Regulation 2019 under the *Protection of the Environment Operations Act 1997,* which focusses on environmental protection and provisions for the reduction of water, noise and air pollution, and the storage, treatment and disposal of waste. It introduces licencing provisions for scheduled activities that are of a nature and scale that have a potential to cause environmental pollution.	Pollution management measures will be undertaken during the works to prevent impacts to water, noise and air pollution. These are set out in Chapter 7. If Option 1 is taken (see section 3.3.5) then a licence is likely needed under Clause 47 of Schedule 1 of the *Protection of the Environment Operations Act 1997* due to the use of a polymer agent to cure the dredged material. This is considered a mobile waste processing activity. Further consultation should be carried out with the NSW EPA to discuss additional licencing requirements.
Waste Avoidance and Resource Recovery Act 2001, which defines the waste hierarchy of avoidance, recovery and recycling over disposal while the Guidelines support waste classification.	The proposal would classify the dredged material for waste classification prior to disposal to a licenced facility. Due to contaminants present within the sediment, material would not be reused. If the option is taken to dispose of the materials offshore, then this Act would not apply.
Work Health and Safety Act 2011 and *Work Health and Safety Regulation 2017*, which provide a framework to protect the health, safety and welfare of all workers at work. It also protects the health and safety of all other people who might be affected by the work.	The works would be carried out by a qualified and registered contractor who would need to demonstrate its ability to protect the workforce and public when carrying out work. This extends to on-land and over-water safety, including navigation safety.
Marine Pollution Act 2012, which sets out pollution provisions in the marine environment.	The proposal is unlikely to result in any oil, noxious liquid, pollutant, sewage or garbage discharge as controlled under this Act, providing relevant standard controls are implemented and monitored (see Chapter 7).
Ports and Maritime Administration Regulation 2012, which requires Harbour Master permission to change any structure or disturb the	The dredging works would disturb sediment on the harbour bed and therefore require permission from the Harbour Master before this work starts pursuant to Clause 67ZN of this Regulation.

Legislation and application	Relevance to the proposal and further requirements
harbour floor within Sydney Harbour.	
Biosecurity Act 2015, which provides for the control of noxious weeds and other plant and pathogen species. It places a responsibility on landowners to control, remove and eradicate noxious weeds while managing the introduction of marine pest species.	It is possible that pest species could be introduced due to the movement of vessels into and out of the construction footprint. This impact is expected to minimal, provided the relevant standard controls are introduced and monitored in accordance with the guidelines set out by the Department of Primary Industries as discussed in section 6.2.
Marine Safety Act 1998 and *Marine Safety Regulation 2016*, which set out the requirements for marine safety and the roles of the Harbour Master and marine pilots. It includes provisions relating to marine and navigational safety including collision prevention, spill limits, no-wash zones, shipping operation restrictions, and controls on reckless, dangerous and negligent navigation.	The *Marine Safety Act 1998* aims to ensure the safe and responsible operation of vessels in ports and other waterways to protect the safety and amenity of other users of those waters and occupiers of adjoining land. The proposed activity would minimise impacts to users of the waters of Circular Quay and Sydney Harbour by setting up a maritime navigation exclusion zone around the construction footprint and developing a vessel traffic management plan in consultation with, and to the satisfaction of, the Harbour Master. In addition, Harbour Master approval will be obtained under clause 67ZN of the Ports and Maritime Administration Regulation 2012 prior to any disturbance of the seabed.
Biodiversity Conservation Act 2016, which provides for the strategic approach to biological conservation in NSW. It includes provisions for the risk-based assessment of native plant and animal impacts, including the Biodiversity Assessment Method (BAM) to assess the impact of actions on threatened species, ecological communities and their habitats.	Due to the high volume of boat traffic and disturbed nature of the site, it is unlikely to provide significant habitat features for threatened plant and marine species. An assessment has been undertaken in section 6.2 supporting this conclusion.
Coastal Management Act 2016, which aims to protect and enhance natural coastal processes and coastal environmental values, while facilitating ecological sustainable development in the coastal zone	As noted, while the proposal is in a coastal environmental area and coastal use area none of the provisions of the *State Environmental Planning Policy (Coastal Management) 2018* apply to the proposal or its development. Despite this, the assessment has considered the objects of the Act in ensuring the proposal is consistent with principles protecting the coastal environment in an ecologically sustainable manner for the social, cultural and economic well-being of the people of the State, as described in Chapter 6.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) a referral is required to the Australian Government for proposed 'actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land'. These are considered in Appendix B and Chapter 6 of the REF.

The assessment of the proposal's impact on matters of national environmental significance and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant matters of national environmental significance or on Commonwealth land. Accordingly, the proposal has not been referred to the Australian Government Department of Agriculture, Water and the Environment under the EPBC Act.

4.4 Confirmation of statutory position

The proposal is categorised as development for the purpose of a port facility and is being carried out by or on behalf of Newcastle Port Corporation (Port Authority of NSW). Under Clause 68 of the ISEPP, the proposal is permissible without consent. As the proposal is not SSI, it can be determined and approved as an activity under Division 5 of the EP&A Act. Accordingly, Port Authority of NSW is the determining authority for the proposal, with this REF fulfilling the obligation under Section 5.5 of the EP&A Act "to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity".

5 Notifications

This chapter presents a summary of the notification submitted to Foreshores and Waterways Planning and Development Advisory Committee and NSW Fisheries department by Port Authority of NSW.

5.1 Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 notification

Under the provisions of Clause 31 of the Sydney Harbour SREP, Port Authority of NSW is required to consult with the Foreshores and Waterways Planning and Development Advisory Committee (Department of Planning, Industry and Environment). In the case of the proposal, it triggers the consultation provisions of Part 3: Division 3, Clause 31 of the above Plan due to the works including dredging.

Accordingly, the Foreshores and Waterways Planning and Development Advisory Committee was notified on 17 January 2020. A response was received on 13 February 2020 from the Committee that they did not have any specific issues with the proposal.

5.2 Fisheries Management Act 1994 notification

Division 3 of Part 7 of the FM Act relates to dredging and reclamation. The objects of this Division are to "conserve the biodiversity of fish and aquatic vegetation and to protect fish habitat by providing for the management of dredging and reclamation work".

As discussed in section 6.2, no protected marine vegetation is known to occur in the study area therefore impacts on marine flora and fauna are considered highly unlikely.

In accordance with Section 199 of the FM Act, a public authority needs to write to the Minster for Primary Industries and consider any raised matters concerning the proposed activity within 28 days before carrying out dredging works.

Port Authority notified the Department of Primary Industries on 17 January 2020. No response was received during the 28-day feedback period.

6 Environmental assessment

This chapter provides a detailed description of the potential environmental impacts associated with the its construction and operation. All aspects of the environment potentially impacted upon by the proposal are considered. This includes consideration of:

- *Potential impacts on matters of national environmental significance under the EPBC Act.*
- *The factors specified in the guidelines Is an EIS required? (DUAP 1995/1996), Marinas and Related Facilities EIS Guideline (DUAP, 1995) as required under Clause 228(1) of the Environmental Planning and Assessment Regulation 2000 (DUAP, 1996, see Appendix B).*

Site-specific safeguards and management measures are also provided to mitigate against identified potential impacts.

As noted in section 1.1 either disposal option would be carried out under an existing determination (Option 1: land disposal) or a separate approval (Option 2: offshore disposal)

6.1 Physical environment

This section describes the predicted hydrodynamic and physical environmental impacts from carrying out the proposed works.

6.1.1 Method

Published mapping and data were used to define the hydrodynamic and physical characteristics of the harbour and marine environment. This included:

- Hydrographic and Dredge Plume Modelling report prepared by MetOcean Solutions (May 2020).
- Circular Quay Investigation: Sediment Contamination Assessment Report (GHD, December 2019)

Construction assessment

The assessment considered how the proposed construction activities, work methods, and required management controls (see section 3.3) would temporarily affect the physical characteristics of the harbour and marine environment at the OPT including localised sediment and pollutant disturbance and dispersion and any secondary aquatic ecology impacts.

Assessment criteria

The assessment was supported by a contamination report produced by GHD that assessed the results of sediment sampling within the proposal footprint. This report also considered the potential for acid sulfate soils (ASS).

Samples of the sediment within the proposal footprint were analysed and provisionally classified under the Waste Classification Guidelines (NSW EPA, 2014), the National Assessment Guidelines for Dredging (NAGD, Australian Government 2009), and Australian Water Quality Guidelines for Fresh and Marine Water Quality (‘the ANZECC Guidelines, ANZECC/ARMCANZ, 2000).

6.1.2 Existing environment

Marine environment: overseas passenger terminal

Sea level and tides

Sydney Harbour is tidally influenced, and the cycle is semi-diurnal meaning there is 12.5 hours between high tides. At Fort Denison the tidal conditions are as follows:

- Mean spring tide is 1.23 m above Australian Height Datum (AHD).
- Mean neap tide is 0.75 m above AHD.
- Mean high water is about 0.5 m above AHD.
- Mean low tide can be about one metre below AHD.
- The highest high tide that would occur once every 50 years is about 1.6 m above AHD.

Bathymetry (water depth)

The harbour bed is approximately -10.7 m CD, varying from -16 m to 0 m CD across the proposal footprint, with CD defined as -0.95 m AHD. The elevated section of harbour bed is located north-west and south-west of the site.

The existing berth pocket is 375 m long by 50 m wide, with a declared depth of -10.1 m CD. These levels have been maintained by undertaking dreading, as required, to allow for safe access of ships.

Currents and circulation

Sydney Harbour is influenced by the East Australian Current (EAC). It generally provides a nutrient depleted sub-tropical water mass (Sydney Institute of Marine Science, 2016). Average offshore current speeds are about 1.5 m/s, meaning that the water flowing past the heads is being constantly renewed. This allows for mixing, flushing and seawater exchange.

While no tide, current or gauge data were obtained in Circular Quay, it is appropriate to consider the current speeds to be at or close to zero. This reflects the sheltered and enclosed environment. However, the stormwater runoff from the land, in combination with seaward groundwater movement, would mean that the water would trend towards the main deep channel and heads. Over any tidal cycle there would therefore be a very small (likely about 0.01 m/s) net current towards the heads. There is also likely to be a localised swash created by propeller turbulence and general vessel movements and activities. This has no influence other than immediately within Circular Quay. It creates turbid conditions locally.

Wind conditions

Three dominant wind patterns affect Sydney Harbour. The strongest winds, which occur for about 17 percent of the time, come from the south. These affect the northern shoreline. The most frequently observed winds come from the north east (about 22 percent of the time), and the third most common pattern are winds coming from the west, which occur for about 17 percent of the time mainly during the winter (Sydney Institute of Marine Science, 2016).

Sydney Harbour is largely an enclosed system. This means the waves are typically only wind generated. The maximum wave heights are closer to the heads and across the main channels however they are typically less than one metre peak to trough. However, the low-energy and sheltered nature of the many bays, including Circular Quay, means that the conditions are further limited, resulting in very small waves and typically calm to still conditions other than in storm conditions.

Water exchange (flushing) and quality

Sydney Harbour, including the OPT, receives stormwater surface runoff from the surrounding land. The waters around the terminal are highly disturbed from propeller wash, vessel movements and other human activity. This creates turbid water of poor quality.

While water is regularly exchanged in this part of the Harbour due to the tidal influence, it is still affected by stormwater runoff and general human activity. Poor water quality is typically experienced after a dry period followed by a storm; an effect known as first flush runoff. The water quality is also likely affected by the corresponding poor sediment quality (see the following heading). When disturbed, any sediment bound contaminants may transfer into solution (e.g. dissolve) affecting the water quality.

Aquatic geology and sedimentology

The geology and sedimentology of the proposal footprint is characterised by the following layers:

- Hawkesbury Sandstone underlies the Harbour. This is medium-to-coarse with minor shale and laminate. Its depth and composition vary locally within Circular Quay. It is overlain by alluvial and estuarine sediments. The top of the sandstone is -5 to -39 m CD across the area, with the shallowest section occurring north-east of the proposal footprint. The change in depth across the proposal footprint corresponds approximately to changes in sediment thickness.
- Alluvial and estuarine deposits, consisting of clay-to-sand quaternary sediment with layers of shale, range from 0 to -30 m CD across the proposal footprint. The thinnest section is in the north-west corner and along the quay wall.

Sediment chemistry

Contamination testing was undertaken on collected sediment samples. The results are presented in the Sediment Contamination Assessment Report (see Appendix G) and summarised below.

Under the National Assessment Guidelines for Dredging 2009, the following was identified:

Exceedances of:

- Soil quality guideline (SQG) screening levels for:
  - (SQG-low) copper, lead, mercury, silver and zinc
  - (SQG-high) zinc and lead.

Detected:

- Polycyclic aromatic hydrocarbons (PAHs)
- Total polychlorinated biphenyl (PCBs)
- Tributyltin (TBT, normalised to total organic carbon, TOC).

Undetected (e.g. below the laboratory reporting limits):

- Total petroleum hydrocarbons (TPH)
- Cyanide, herbicides, chlorinated hydrocarbons, explosives, nitroaromatics, nitrosamines and phthalates.

TOC ranged from 0.05 to 2.82 percent.

See Figure 6 for the location of exceedances of contaminants.

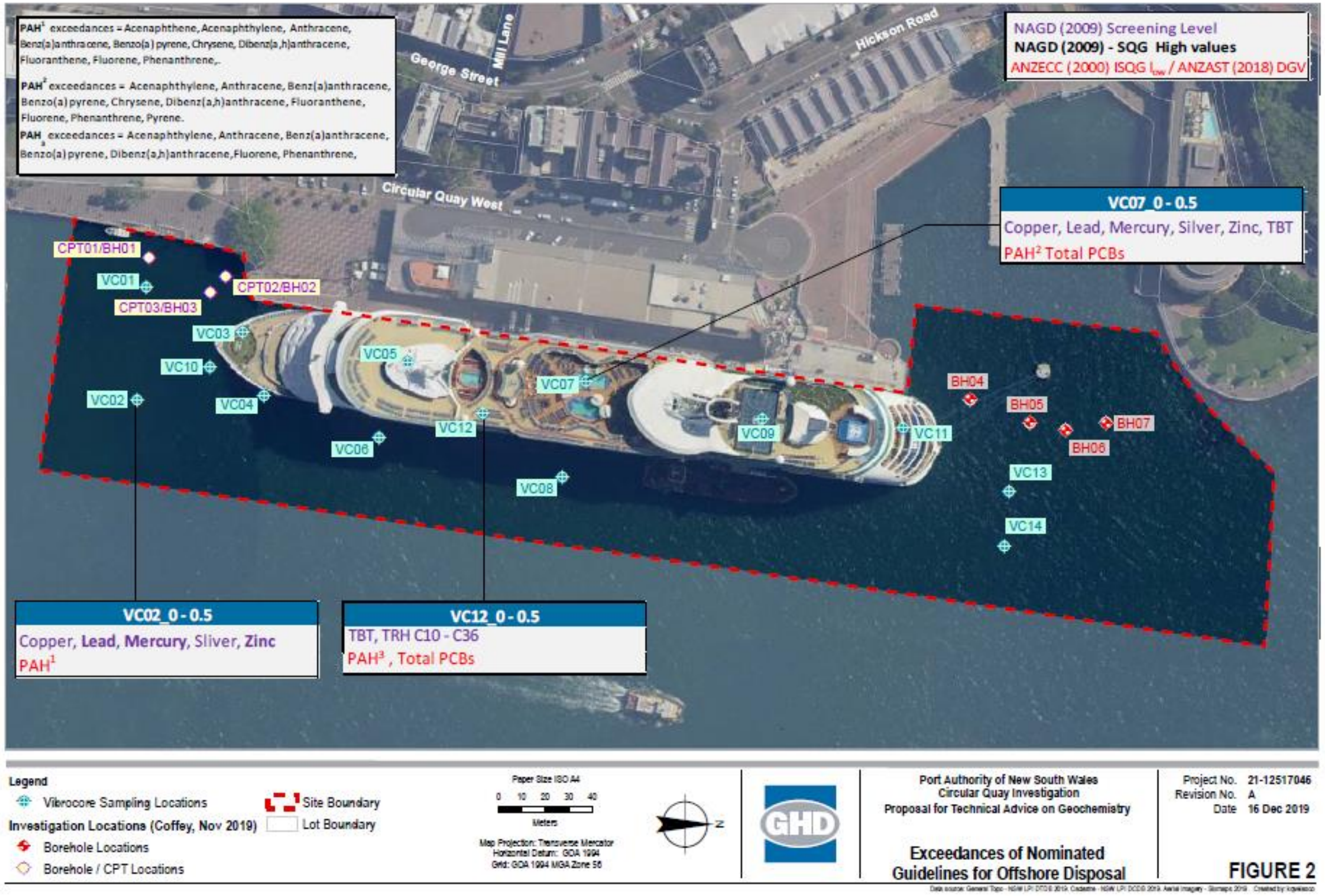


Figure 6 Location of Exceedances of Sediment Contaminants

Acid sulfate soils

Potential acid sulfate soils (PASS) are present in the sediments.

6.1.3 Potential impacts

Hydrodynamic effects

The proposed piling, dredging and the installation of the concrete scour mattresses would physically disturb the marine and harbour environment. The scale of the disturbance would be minimal and insufficient to cause any dynamic changes in current speed, wave characteristics, saline/freshwater mixing or flushing. As the location of the proposal footprint is within a sheltered area of the harbour disturbance from changes in wave movement would be only during a peak ebb flow and flood conditions. Works would only be typically carried out during calm conditions therefore the proposal activities would have a minimal impact.

Erosion and scour

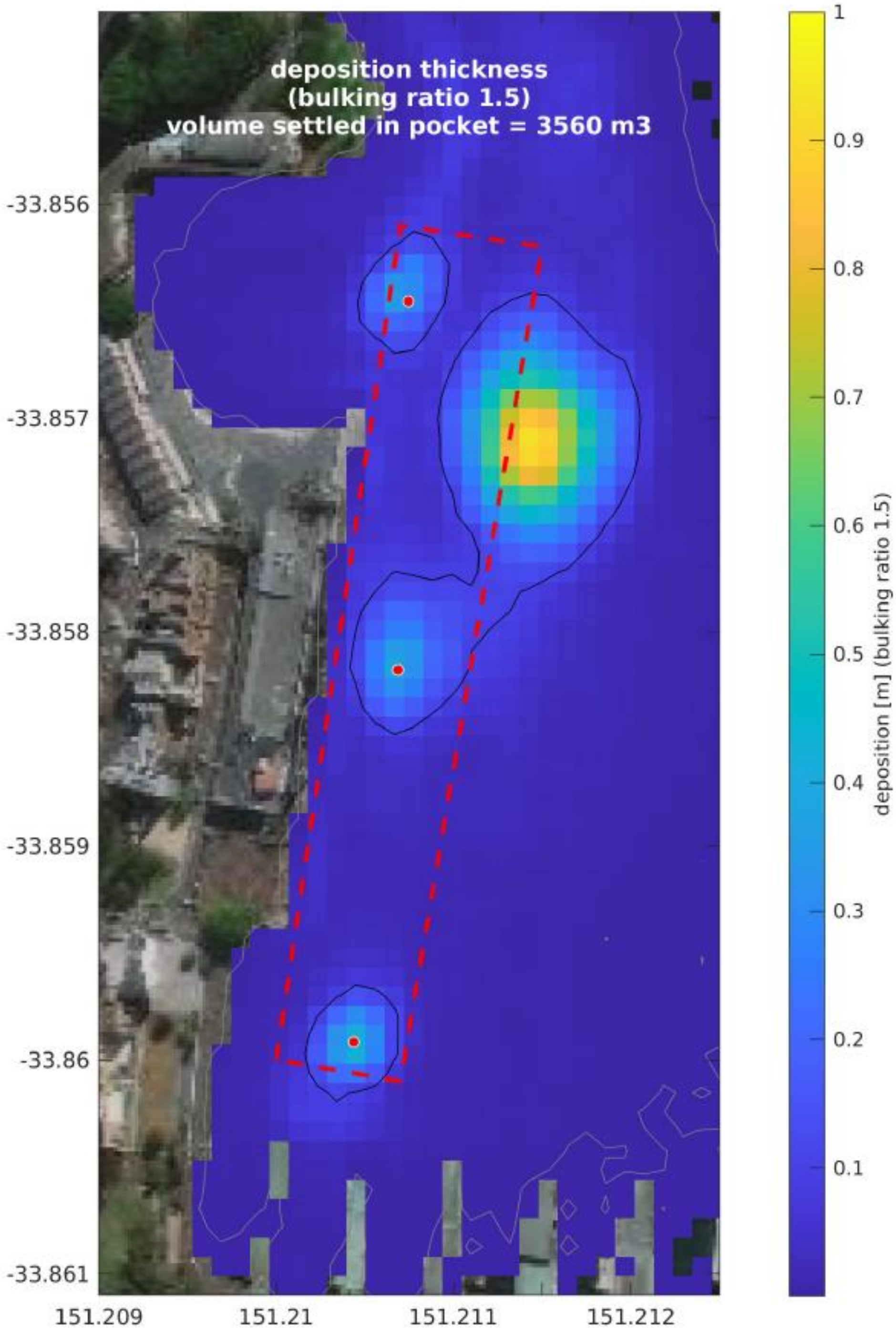
During construction, the dredging and piling would be the only main activities that may impact the harbour bed. However, dredging works would be temporary and would not cause any significant scouring. The piling would also be a temporary activity taking place over a short period. It would take place during calm conditions. This would reduce any potential scour and erosion.

While anchors and spud would be used during construction the associated erosion and scour would be limited as they would remain in place for a short time. They would also have a minimal impact compared to the disturbance created by the dredging and piling works.

Sedimentation dispersion, deposition and smothering

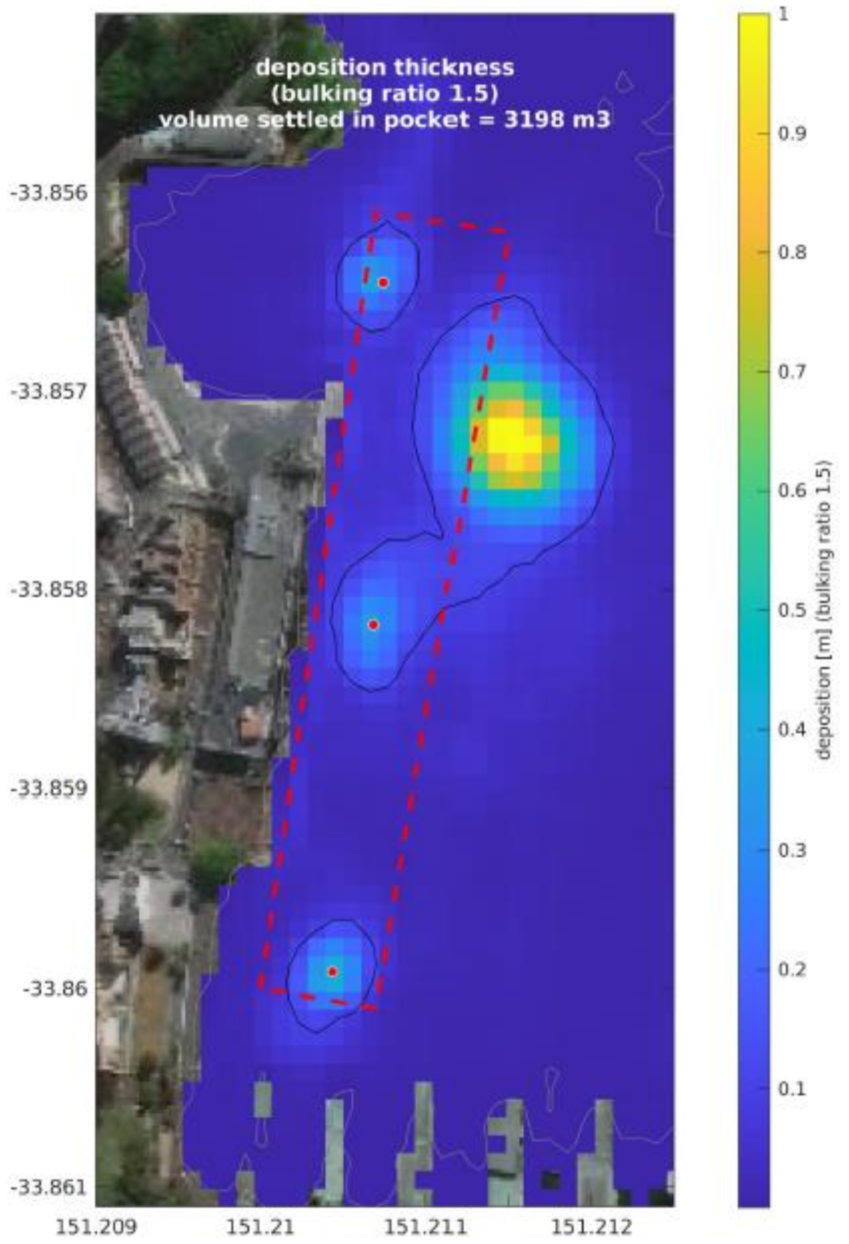
The proposal would disturb sediment during dredging creating turbidity.

The results of the hydrodynamic modelling report (see Appendix D) shows that at a worst case, the maximum level of temporary suspended sediment concentrations (turbidity) would be higher within the vicinity of the dredging location. Finer sediments would disperse and transport across a larger area beyond Circular Quay.



Source: MetOcean Solutions, 2020, Hydrodynamic and Dredge Plume Modelling

Figure 7 Final cumulative sediment deposition thickness [m] and volume settled in dredge pocket for the scenario assuming maximum dredging rate over a 6-day period



Source: MetOcean Solutions, 2020, Hydrodynamic and Dredge Plume Modelling

Figure 8 Final cumulative sediment deposition thickness [m] and volume settled in dredge pocket for the scenario assuming average dredging rate over a 16-day period

The proposal would generate a limited amount of sediment as shown in Figure 7 and Figure 8 . The maximum thickness of the sediment deposition (settlement) is shown to be below 1 mm within the proximity of the proposal footprint. The sediment within this area would reduce quickly over time, while the finer sediment (a thickness of 0.2 mm and below) would deposit and settle over a larger area. This concentration of finer sediments is far less than the natural variability in dispersion and settlement patterns that occurs during storm events and shipping movements (e.g. propeller wash).

The results of the turbidity levels presented within Appendix D were modelled without mitigation of a silt boom. With a silt boom in place, the levels of turbidity outside the boom would be reduced. Further monitoring during dredging works is proposed to ensure impacts are maintained to an acceptable level.

Accidental spills (sediment and pollutant discharge)

The works would be undertaken by machinery and barges as described in section 3.3.3. There is the potential for accidental spills. Should accidental spills occur these would result from:

- Accidents during loading, unloading and installation work.
- Leaks and drips from poorly maintained machinery and equipment.
- The mismanaged storage of waste materials, including potential for debris to enter the water. This would be greatest when loading, transporting and unloading the dredged sediment.

The principal impact from any spills would be pollution and reduction in water quality. The impact would depend on the quantity and type of materials spilt. However, providing relevant standard controls are implemented the impacts are expected to be minimised.

Acid sulfate soils

There is the potential for water quality and health impacts from transporting the dredged sediments. ASS generate sulphuric acid once dried out and exposed to the oxygen in air. The sediment would therefore be classified and/or treated in accordance with the NSW Environment Protection Authority's (EPA) Waste Classification Guidelines – Part 4: Acid Sulfate Soils (2014) for onshore disposal and dampened down to reduce potential oxidisation of sediment.

Under either disposal option (see section 1.1) then then they would be prevented from drying out during transportation. Sediment would be monitored during transit. Where required the sediments would be sprayed with sea water and kept moist to prevent drying out. If the decision is taken to dispose of the material on land (see section 1.1) a polymer would be used to absorb excess water. They would remain wet to a level that would reduce the risk for ASS generation (GHD, 2020, pers comms).

These provisions would be included with the Acid Sulfate Soil Management Plan.

Localised pollutant disturbance

Given the history of the surrounding area and marine traffic, it is likely that contaminated sediments and poor water quality, particularly following storm events and runoff from the surrounding land, would be encountered within the proposal footprint. As described above, the sediment contamination assessment (see Appendix G) identified contaminants and pollutants to include heavy metals that exceed the soil quality guidelines (see the sediment chemistry heading above). While a range of hydrocarbons were detected along with TBT, concentrations were less than the ANZECC guidelines for fresh and marine water quality.

The contaminants could be transported in a sediment-bound form through dredging activities, including the activity of lifting the sediment through the water column and transferring it to a barge at the OPT. The hydrocarbon and benzo(a)pyrene contaminants could pass into solution and be dispersed into the water column.

GHD prepared a series of hydrodynamic modelling plots to consider the above. Appendix D describes the modelling. A small portion of the dredged material would remain in suspension for enough time that they would be carried beyond Circular Quay and transported around Bennelong Point and Dawes Point on the ebb and flood tides respectively. The pollutant concentrations dispersed over this area would be well below any trigger or water quality levels.

Odour generation

The hydrocarbon and organic carbon present in the sediment has the potential to be odour generating if it oxidizes (e.g. exposed to the air). This could happen once the sediments are lifted onto a barge and transported to Glebe Island. Odours could also potentially occur if any of the organic material has broken-down below the surface, as this can release gases through the water column. However, this pathway is considered unlikely. Section 6.11 describes the odour impact in more detail and its potential effect on receivers in the area.

Creation of migration pathways

The presence of marine sediments over sandstone, coupled with the shallow depth to groundwater means that any piling activities could create a pollution pathway into the underlying groundwater. Sheet piles would be installed using a vibropiling method followed by back-driving or hammering of piles operated from a barge restrained by spuds (see section 3.3.4).

There is the potential for pollution impacts from the creation of such pathways during piling. Standard controls would be implemented within a CEMP to ensure the potential for significant impacts are managed.

6.1.4 Safeguards and management measures

Table 13 lists the safeguards and management measures that would be implemented to protect the aquatic environment to account for the impacts identified in section 6.1.3.

Table 13: aquatic environment safeguards and management measures

Ref.	Impact	Environmental safeguard	Responsibility	Timing
1	Sediment and water	A **Sediment and Water Management Plan** (SWMP) would be prepared and implemented as part of the CEMP. The SWMP would outline all reasonably potential risks relating to sediment erosion and water pollution and describe how to address these risks throughout construction.	Contractor	Pre-construction/ construction
2	Sediment and water	The SWMP would include turbidity monitoring requirements that would be implemented before starting the dredging works and maintained throughout. The plan would involve the following steps and activities: Develop and submit a **Water Quality Monitoring Plan** to Port Authority of NSW at least one month before deploying instrumentation. Establish turbidity monitoring system to capture (baseline) data before starting work and while the work is taking place. As a minimum the system would comprise monitoring equipment, buoys, anchoring system, data management, timing, quality assurance and an equipment failure plan. Install and commission the water quality monitoring instrumentation at least 10 days before starting dredging. Operate the equipment for up to 14 days or as agreed with Port Authority of NSW after the completion of post dredge clearance survey. Fit a water sensor at each monitoring location to record turbidity. The sensors would be installed approximately 1 m below the surface. Deploy twin turbidity sensors at each monitoring location to allow the collection of two independent data sources. The two data sources shall undergo automatic processing noting that: • Any difference in turbidity readings within 20% then the average value shall be used	Contractor	Pre-construction/ construction

Ref.	Impact	Environmental safeguard	Responsibility	Timing
		• If the difference in turbidity readings is greater than 20%, then the minimum value shall be used. • Calibrate and clean water quality sensors as required, just prior to dredging and no longer than two-week intervals. • Ensure the water quality loggers provide continuous logging of data, with anti-fouling guards and sensor wiping apparatus to prevent interference to sensors from marine growth. • Carry out continuous water quality monitoring for each location and data shall be fed live onto a secure website and processed for real-time viewing by key project personnel and Port Authority of NSW. • Ensure the water quality monitoring system provides automatic instantaneous notifications to identify when the water quality thresholds are met or exceeded. • Controls for sediment and rock debris. • Controls to avoid concrete pour spills. • Oil/fuel/chemical storage and spill management. • Machinery and engine maintenance schedule to minimise risk of oil/fuel leakage. • Response for accidental waste/material overboard (e.g. construction materials fallen into harbour).		

Ref.	Impact	Environmental safeguard	Responsibility	Timing
3	Sediment and water	Turbidity limits would be in accordance with Table 3.3.3 of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality Volume 1 (ANZECC, 2000) and (in the absence of local limits) the relative increase criteria is set out under Turbidity Water Quality Standards Criteria Summaries; A Compilation of State/Federal Criteria (USEPA, 1998) where relative to background concentrations the following would be achieved: • *Seven-day rolling average criterion*: no more than a 5 nephelometric turbidity units (NTU) increase • *24-hour rolling average criterion*: No more than a 10 NTU increase • *Instantaneous criterion*: No more than a 10% increase when background concentrations are above 50 NTU or above.	Contractor	Pre-construction/ construction
4	Sediment and water	Should the monitoring record an exceedance of the instantaneous criterion or detect an abnormal reading at the 'near field' monitor then: Dredging works and any water discharge would stop Work would only recommence once the near-field readings had stabilised/normalised over a 30-minute period and the there was also no exceedance of the instantaneous criterion for the same period.	Contractor	Pre-construction/ construction
5	Sediment and water	Should the monitoring record an exceedance of the 24-hour or seven-day rolling average criteria then: • Dredging would stop if there were three exceedances of either criteria within a 24-hour period. • Work would only recommence once limits had dropped to below the associated criteria relative to the rolling average.	Contractor	Pre-construction/ construction

Ref.	Impact	Environmental safeguard	Responsibility	Timing
6	Sediment and water	A silt boom would be installed around the backhoe dredger bucket when dredging the harbour bed. The boom would only be removed when dredging work is complete or if required for maintenance once the sediment concentrations in the water column inside the silt boom had dropped to below the 24-hour rolling average criterion described in **safeguard 3** above.	Contractor	Construction
7	Sediment and water	A silt boom would also be placed around the vessel when unloading materials onshore if the option is taken to dispose of the material on land via Glebe Island. The material transfer between the barge and quayside would be carefully managed to limit any transfer loss into the marine environment.	Contractor	Construction
8	Sediment and water	An **Acid Sulfate Soil Management Plan** (ASSMP) would be prepared in line with the requirements of the Acid Sulphate Soils Management Advisory Committee Guidelines (ANZECC/ARMCANZ 2000) and implemented as part of the CEMP. Sediment would be kept damp to reduce potential oxidisation. This includes during the period when the sediment would be temporarily stored at Glebe Island or transported offsite. Sediment would be monitored during transit. Where required the sediments would be sprayed with sea water and kept moist to prevent drying out. It would also include the need for adequate sampling and testing prior to disposal in line with the wider requirements of **safeguard 50** in Table 37 below to classify waste before disposal in accordance with Waste Classification Guidelines: Part 1 Classifying Waste (DECCW, 2014). Where possible the material to be dredged will be classified prior to dredging based on sampling data and confirmation from NSW EPA that the dredged material meets general solid waste criteria.	Contractor	Detailed design/pre-construction

Ref.	Impact	Environmental safeguard	Responsibility	Timing
9	Sediment and water	Weather forecasts would be frequently checked during construction. Should severe weather be forecasted, works would stop, and all equipment and materials would be removed from the construction area or secured.	Contractor	Construction
10	Water quality	A **Spill Management Plan** would be prepared, implemented as part of the CEMP and communicated to all staff working on site. Any spill, whether it occurred in water or on land and subsequently entered the water, must be immediately reported to Sydney Vessel Traffic Service (VTS). Aquatic spill kits are to be kept on site during construction.	Contractor	Construction
11	Water quality	All equipment and machinery would be maintained in good condition and regularly inspected visually for leaks.	Contractor	Construction
12	Water quality	Any fuels or chemicals stored on Glebe Island, at the OPT or on barges, would be stored in a bunded area to prevent any chemical leaks or spills entering the water.	Contractor	Construction
13	Water quality	Work involving barges and piling should take place during calm conditions and at night where possible to minimise scouring and other impacts.	Contractor	Construction

6.2 Biodiversity

This section describes the predicted terrestrial and marine ecology impacts from carrying out the proposed works.

6.2.1 Method

The assessment included a desk review of State and Commonwealth records, data and literature to confirm the likely presence of threatened flora, fauna and endangered communities in the local aquatic environment. The following published records were reviewed:

- NSW Wildlife Atlas: containing information on State protected species.
- NSW Fisheries species profiles, 'Primefact' publications and expected distribution maps.
- Department of Primary Industries (Fisheries) Policy and Guidelines for Fish Habitat Conservation and Management (2013).
- Protected Matters Search Tool: containing information on Commonwealth protected species.
- Foreshore and Waterways Area Development Control Plan: Ecological Communities and Landscape characteristics map.
- PlantNet Database: containing information on sensitive and rare plants.
- BioNet Atlas of Wildlife: containing information on threatened and protected fish species.
- List of Noxious Weeds: containing information on non-native plant species that are listed as noxious weeds.

The impact assessment was prepared with consideration of the:

- BioBanking Handbook for Local Government (DECCW, 2008)
- Significant Impact Guidelines 1.1: Matters of National Environmental Significance (Commonwealth Department of Environment and Energy, 2013).

The assessment focussed on a desk review to confirm if the ecological potential in the area was enough to warrant further investigation (e.g. a maritime ecology or dive survey). Based on the desk review, no further investigation was carried out. Also, the lack of ecological value and nature of proposed works resulted in the conclusion of there being no potential impact on protected matters of national environmental significance. As such, no assessment was made against the EPBC Act Significant Impact Guidelines 1.1 and the proposal was not referred to the Australian Government DAWE.

The assessment considered the impacts from the activities descried in Chapter 3.

Once the works were complete, there would be no change in operation. As such, there is predicted to be no operational impacts.

6.2.2 Existing environment

Marine environment: Overseas Passenger Terminal

Protected areas and key ecological communities

The proposal is not located close to any protected areas, namely wetlands of international significance, seagrass habitat, coastal saltmarsh, coastal wetlands, fish spawning or nursery areas, wetland protection areas (see Section 4.1.1 SREP policy objectives), or mangrove habitat (as reviewed on Creese *et al* 2009 mapping habitats of NSW estuaries). While there is currently no mapping to show coastal vulnerability areas, it is considered unlikely that the proposal footprint is in such an area.

A review of the Foreshore and Waterways Area Development Control Plan: Ecological Communities and Landscape characteristics map did not show the presence of terrestrial or aquatic ecological communities within or close to the proposal footprint.

Habitat

A search of the Protected Matters Search Tool identified no threatened ecological communities in proximity to the proposal footprint. Due to the high volume of boat and ship traffic, the type of berth construction and disturbed nature of the area, it is unlikely to provide significant habitat features for threatened species that are recorded elsewhere in parts of Sydney Harbour such as black rock cod, sygnathiformes (e.g. White’s seahorse) or turtles.

White’s seahorse *Hippocampus whitei*, is endemic to Sydney Harbour and found throughout its reaches, including west of the Harbour Bridge up to Mort Bay at Balmain. They have been listed as endangered under Part 1 Schedule 4 of the FM Act.

The substrate habitat is bare sand, which under the Department of Primary Industries (Fisheries) Policy and Guidelines for Fish Habitat Conservation and Management (2013), is identified as a key fish habitat (KFH) type 3. Type 3 is a minimally sensitive KFH that is represented by unvegetated subtidal sediment, intertidal mudflat with sparse infauna and intertidal seawall.

Threatened flora

No threatened plant species were identified from a desk study review. Due to the bare sand substrate within the proposal footprint, there is lack of supporting habitat for seagrass cover.

Threatened fauna

A review of the BioNet Atlas of NSW and the NSW Fisheries Species Profiles identified that vulnerable shark species (grey nurse and great white) and other fish had been sighted locally. However, due to the habitat of the proposal footprint being bare unvegetated substrate (harbour floor), the potential for it to support habitat for threatened species or for foraging is unlikely.

Circular Quay is a very busy part of Sydney Harbour and is heavily used by a variety of vessels and cruise ships berthing regularly. The vessels create significant propeller wash; particularly with cruise ships generating significant thrust causing disturbance of the harbour bed. This means any megafauna are only likely to enter the area by exception, potentially when chasing prey or occasionally for protection.

Other fauna

A range of benthic or sub-benthic sessile fauna and infauna species are likely to be present in the sediment. These species are common to any sediment and create an important function in supporting primary production. They provide an indication of wider ecological health. While no benthic sampling was carried out, the level of activity in Circular Quay, coupled with the sediment quality (see section 6.1) means the benthic communities are likely limited and provide no real value to the wider ecology of the Harbour.

Native and non-native bird species have also been sighted in the area. These are non-threatened species and common to many parts of Sydney Harbour and its foreshores (e.g. ibis, gulls, cormorants).

Pests

Aquatic pest species can reduce local aquatic values and introduce toxins into the marine environment. Table 14 lists the aquatic pest species and pathogens that have a moderate-to-high potential of occurring locally due to ship movements.

Table 14: Aquatic pest species

Habitat	Description	Effect
Caulerpa taxifolia: seaweed	Ballast water and ship hull fouling	Leading to habitat degradation through outcompeting key habitats.
Alexandrium sp.: dinoflagellate: aquatic plankton	Cysts carried in benthic sediment	Can introduce neurotoxins in the water column leading to fish kill and bioaccumulation in shellfish.

Underwater noise sensitivity

Large megafauna and fish are sensitive to the impacts of underwater noise. While they can perceive piling generated noise up to 400 metres from its source, they typically avoid coming within 30 metres (Engell-Sorensen, K, *et al.*, 2000). If they do come within 30 metres of any piling work, then they could be injured or harmed through hearing loss or in extreme instances they can be killed; a term known as acoustic shock.

Terrestrial

The landside of the terminal is considered to have limited habitat potential. The area is made up of hardstand within an urbanised area. There is evidence of native pest and vermin in the area. Due to limited habitat potential on the landside, this has not been included in the assessment of impacts.

6.2.3 Potential impacts

Marine environment: overseas passenger terminal

Protected areas and threatened species

As identified above, the proposal footprint and compound are not located within or near any protected areas, and no threatened or key habitat is expected to occur locally. While threatened fauna have been recorded in the area, these species are unlikely to rely on its habitat or values for foraging or their survival. Any recorded species are wide-ranging, and they would likely use other parts of the harbour. As such, there is unlikely to be any direct or indirect impact on protected areas or threatened species.

Loss of aquatic vegetation and habitat

The dredging and scour protection work would directly impact the harbour bed. However, given the location of the proposal in an area of high traffic and the disturbed nature of the proposal footprint, it is unlikely that any notable vegetation or habitat would be directly lost to the proposal.

The harbour bed in the proposal footprint is identified as a Type 3 KFH low-sensitive habitat. The loss of this habitat from dredging would have no associated material impact.

Smothering and light preclusion

Impacts on the surrounding substrate and sediment in Sydney Harbour would be somewhat mitigated using a silt boom (see Table 13).

There would be some additional sediment disturbance from the temporary increase in vessel movements, the piling, and from the use of spuds and anchors to stabilise the dredger. While none of these have not been modelled, the associated level of disturbance would be unlikely to have any material benthic or primary production impact on the area's ecological values despite some thin-layer smothering (see section 6.1.3) of nearby low-value benthic habitat including infauna burrows.

As described in section 6.1.3 and Appendix D, the maximum depth of deposition would be 1 mm without the use of a boom. Most benthic fauna and habitat communities can tolerate a temporary covering of sediment to this depth without critical loss or impact. It is also likely that the natural variability of sediment deposition across the harbour bed is far greater than the deposition caused as a result of the proposal; again, noting that the modelled results are a worse case because they do not include the silt boom.

Source: MetOcean Solutions, 2020, Hydrodynamic and Dredge Plume Modelling

Figure 9 Timeseries of total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, at four reference sites

Figure 9 shows a time series of turbidity levels in and local to Circular Quay. The figure shows that the peak turbidity levels at the surface, mid-level and bottom of the harbour at different times. However, the turbidity levels are predicted to return to ambient concentrations within three to four days after dredging. Concentrations would also vary during the dredging works, depending on the rate of work and natural conditions.

While turbidity levels may be up to 10 times that of the natural conditions without using a silt boom, this would only occur for about an hour over a very localised area in Circular Quay, with concentrations being near to ambient conditions farther-a-field. Given the limited amount of time the water would remain turbid and the small area this would cover, this is unlikely to cause any impact through the loss of light. Further, there are no important photosynthetic communities within the dredge-impact footprint.

Injury and mortality

While there is the potential for large fauna to pass through the area, including grey nurse and great white shark, the risk of injury or death is currently present due to the existing movement of ferries, cruise ships and other vessels in the area. Any temporary increase in activity due to the barges or boats required for construction would present minimal additional boat strike impact or risk.

There is the potential for any benthic fauna and infauna and sessile species near the proposal footprint to be injured or killed due to the dredging, piling work and/or use of spuds and anchors impacting on the harbour floor. Similarly, benthic and sessile species may be injured or killed due to the localised smothering of these species. The nature of these impacts is considered unlikely to have a material impact on ecological function or value in the harbour. Impacts would be further reduced by introducing the safeguards and management detailed in section 6.2.4. Providing these are in place and effective, then any associated impacts could be avoided or minimised.

Entrapment and impingement

A silt boom would be provided around the backhoe dredger bucket to manage and help reduce larger sediment dispersion. This is unlikely to have an impact on entrapment of fish as there would be no curtain to trap fish. The silt boom would float on the surface.

Underwater noise

The potential for underwater noise impacts is minimal due to several reasons:

- The potential for aquatic megafauna to pass through the proposal footprint is low and they would likely avoid any dredging or scour protection activities.
- Although there are fish present in the area, they would likely avoid any underwater noise sources.
- Drilling of piles (the key underwater noise impact) would occur intermittently over a six-week period. Pile hammering typically happens for two to five minutes, followed by a relatively quiet period of 30 minutes or more before the next stage begins.

The most likely impact would be any startled response from the start of the drilling of piles. This would be avoided by gradually increasing the piling rate to avoid startling surrounding fish and megafauna.

Key threatening processes

The proposal would not include a key threatening process listed under Part 7A of the FM Act.

Indirect and secondary impacts

There is potential for sediment discharge, accidental spills and localised scour and unplanned erosion to occur during construction. By including standard safeguards described in section 6.2.4, the impact on the marine environment is assessed to be low.

There would be a small increase in vessel movements through Sydney Harbour during the works (see Table 6). This would have negligible impact in terms of any disturbance to fish and megafauna due to the existing shipping activity in the area.

Pest species

Pest species may be introduced due to the movement of vessels into and out of the proposal footprint and while in transport to and from Glebe Island and offshore. This impact is expected to be minimal provided the relevant standard controls are introduced and monitored.

Terrestrial environment

While noise and lighting would be temporarily introduced during construction, along with general disruption in the area, this is unlikely to have any terrestrial ecology impacts. This is due to there being no terrestrial habitat loss; while any fauna in the area is habituated (used to) the high level of human activity in Circular Quay.

Conclusion on significance impacts

The proposal is unlikely to cause significant impact to any threatened aquatic or terrestrial species, populations or ecological communities or their habitats, within the meaning of the BC Act or FM Act, and thus a SIS is not needed.

The proposal is also unlikely to cause significant impact to threatened aquatic or terrestrial species, populations or ecological communities or migratory species, within the meaning of the EPBC Act. Therefore, a referral to the Australian Government DAWE is not required for matters relating to biodiversity.

6.2.4 Safeguards and management measures

Table 15 lists the aquatic biodiversity safeguards and management measures that would be implemented to account for the impacts identified in section 6.2.3.

Table 15: biodiversity safeguards and management measures

Ref.	Impact	Environmental safeguard	Responsibility	Timing
14	Aquatic biodiversity	A **Marine Ecology Management Plan** would be prepared as part of the CEMP. This would include, but not limited to, measures relating to the following activities: • Aquatic fauna management • Biological hygiene (e.g. prevention of noxious species spreading on and off site)	Contractor	Pre-construction
15	Biodiversity	If a previously unidentified threatened aquatic species is observed in the proposal footprint during construction works would temporarily stop until a suitably qualified expert has advised that works can recommence.	Contractor	Construction
16	Biodiversity	Work would stop if large aquatic fauna is observed nearby.	Contractor	Construction
17	Biodiversity	Gradual start-up piling to allow undetected aquatic fauna to move away from the area.	Contractor	Construction
18	Pest species	Equipment and machinery would be locally sourced and/or procured from areas where the risk of introducing pest species is low. Regular inspection of machinery, materials and equipment would be carried out where needed to ensure the importation of pests or weeds to the area is prevented.	Contractor	Construction
19	Biodiversity	Positioning work barges, drilling and pile driving should occur during calm conditions.	Contractor	Construction

6.3 Noise and vibration

This section describes the proposal's predicted noise and vibration impacts during construction. Changes are not proposed to the day-to-day operation of the OPT therefore no operational assessment has been undertaken. Appendix E contains the supporting technical paper.

Note: Appendix E also considered the noise amenity impacts from carrying out the works at Glebe Island under Option 1 (see section 1.1). This was to ensure the impact on the community was consistent with the assessment carried out in 2013.

6.3.1 Method

The construction assessment was undertaken from a review of the proposed activities and methodology. The assessment focussed on impacts from:

- Construction activity noise
- Construction traffic noise
- Construction vibration.

A baseline review of background noise data was undertaken and inputted into a model to predict noise emissions. Noise background data presented in the following environmental assessments were used:

- Overseas Passenger Terminal Wharf Extension: Construction Noise and Vibration Assessment (AECOM, 2014).

6.3.2 Existing environment

Ambient noise levels

Overseas passenger terminal

The OPT is located within an area of relatively low-to-medium ambient noise. The main activities and sources that contribute to the ambient noise are:

- Harbour-related activities such as boat noise, ferry movements, and major shipping movements.
- Residential and commercial activities, including traffic, bars and restaurants, visitors.

Table 16 presents the background noise levels (AECOM, 2014), which are discussed further in Appendix E. The table also details the noise monitoring locations.

Table 16: Existing ambient acoustic noise environment for Circular Quay

Monitoring Location	RBL: rating background level[1] dB(A)[3]		
	Day	Evening	Night
Holiday Inn, 55 George Street, The Rocks	61	60	57
Quay Grand, 61 Macquarie Street, East Circular Quay	63	62	52
Destination NSW Office, Level 2, 88 Cumberland St.	61	61	57
Park Hyatt, 7 Hickson Rd, The Rocks	61[2]	59	56

1 - Day is defined as the period from 7 am to 6 pm Monday to Saturday; or 8 am to 6 pm on Sundays and Public Holidays. Evening is the period from 6 pm to 10 pm. Night is the remaining period.

2 – Denotes results in which all periods were affected by rain or wind noise.

3 – Db (A) denotes a single number sound pressure level that includes a frequency weighting to reflect the sound level.

Note: The noise monitoring was undertaken from 23 July 2013 to 1 August 2013 at the first two locations and further logging was conducted at two additional locations from 8 November 2013 to 2 November 2013.

The local background noise levels represent the activity in the area, with noise levels remaining high during the day, evening and at night compared to other areas of Sydney. It was noted that in three locations, the Holiday Inn, Destination NSW office and the Park Hyatt, background levels were within 1dB or each other. Therefore, the Holiday Inn monitoring location was used to represent the background noise at all receivers on the western side of Circular Quay. Measurement results from the Quay Grand were used to represent background noise at receivers east of Circular Quay.

Sensitive receivers

Overseas passenger terminal

The proposal footprint is near to non-residential and residential receivers.

Heritage structures have also been identified within 100 m of the OPT (see Appendix F). The heritage buildings are considered structurally sound, and in accordance with industry standards (BS7385-2[4]), these are not considered to be more sensitive than other surrounding structures. Based on the distance of the heritage items from the proposal footprint, vibration is not anticipated to be an issue.

Residential receivers located within similar environments and with comparable relationship to surrounding noise sources have been grouped into Noise Catchment Areas (NCAs). They are shown in Figure 10 and described in Table **17**.

4 British Standard 7385 Part 2-1993

Table 17 NCAs and description

NCA	Description	Noise environment
NCA 1	Eastern Circular Quay	Background levels dominated by road traffic along Cahill Expressway, local road traffic and surrounding local activity from entertainment venues or commercial premises.
NCA 2	Western Circular Quay	Generally, background levels are dominated by local intermittent road traffic, local activity and natural sources.

Residential receivers with the potential to be impacted by the proposed construction are listed in Table 18.

Table 18: Residential receivers

Receiver ID	Address	No. of floors	Approximate distance to site [m]
R1	1-3 Macquarie Street, Sydney	12	260
R2	3-7 Macquarie Street, Sydney	12	260
R3	61-69 Macquarie Street, Sydney	15	270
R4	8 Hickson Road, Dawes Point	6	160
R5	54 Gloucester Street, The Rocks	2	250
R6	2 Phillip Street, Sydney	27	320

The nearest non-residential sensitive receivers to the OPT are listed in Table 19. All identified receivers are also shown in Figure 10.

Table 19: Non-residential receivers

Receiver ID	Name	Address	No. of floors	Approximate distance to site [m]
Commercial				
C1	Northern Commercial Premises (Quay Restaurant, The Squire’s Landing)	Overseas Passenger Terminal, The Rocks	3	<10
C2	Southern Commercial Premises (Cruise Bar, Yuki’s at the Quay)	Overseas Passenger Terminal, The Rocks	3	<10
C3	Park Hyatt	7 Hickson Road, The Rocks	5	110
C4	Opera Bar	Sydney Opera House, Macquarie Street, Sydney	1	320
C5	Holiday Inn Old Sydney1	55 George Street, The Rocks	5	130

Receiver ID	Name	Address	No. of floors	Approximate distance to site [m]
Educational Facilities				
E1	APM College of Business and Communication, Torrens University Australia, William Blue	1-5 Hickson Road, The Rocks	5	70
E2	Julian Ashton Art School	117 George Street, The Rocks	3	140
Passive Recreation Area				
PR1	First Fleet Park	George Street, The Rocks	0	130
PR2	Hickson Road Reserve	Hickson Road, The Rocks	0	140
PR3	Foundation Park	Gloucester Walk, The Rocks	0	200
Cultural				
H1	Australian Steam Building	1-5 Hickson Road, The Rocks	5	70
H2	Cadman’s Cottage	110 George Street, The Rocks	2	70
H3	Museum of Contemporary Art	136-140 George Street, The Rocks	6	50
H4	The Rocks Discovery Museum	Kendall Lane, The Rocks	3	130
H5	Susannah Place	58/64 Gloucester Street, The Rocks	2	260
1In accordance with the NSW Interim Construction Noise Guidelines 2009, hotel residents are classified as non-residential receivers. However, hotel guests would experience some sleep disturbance as identified within section 6.3.4. Mitigation measures for residential receivers would also be applied to hotel guests.				

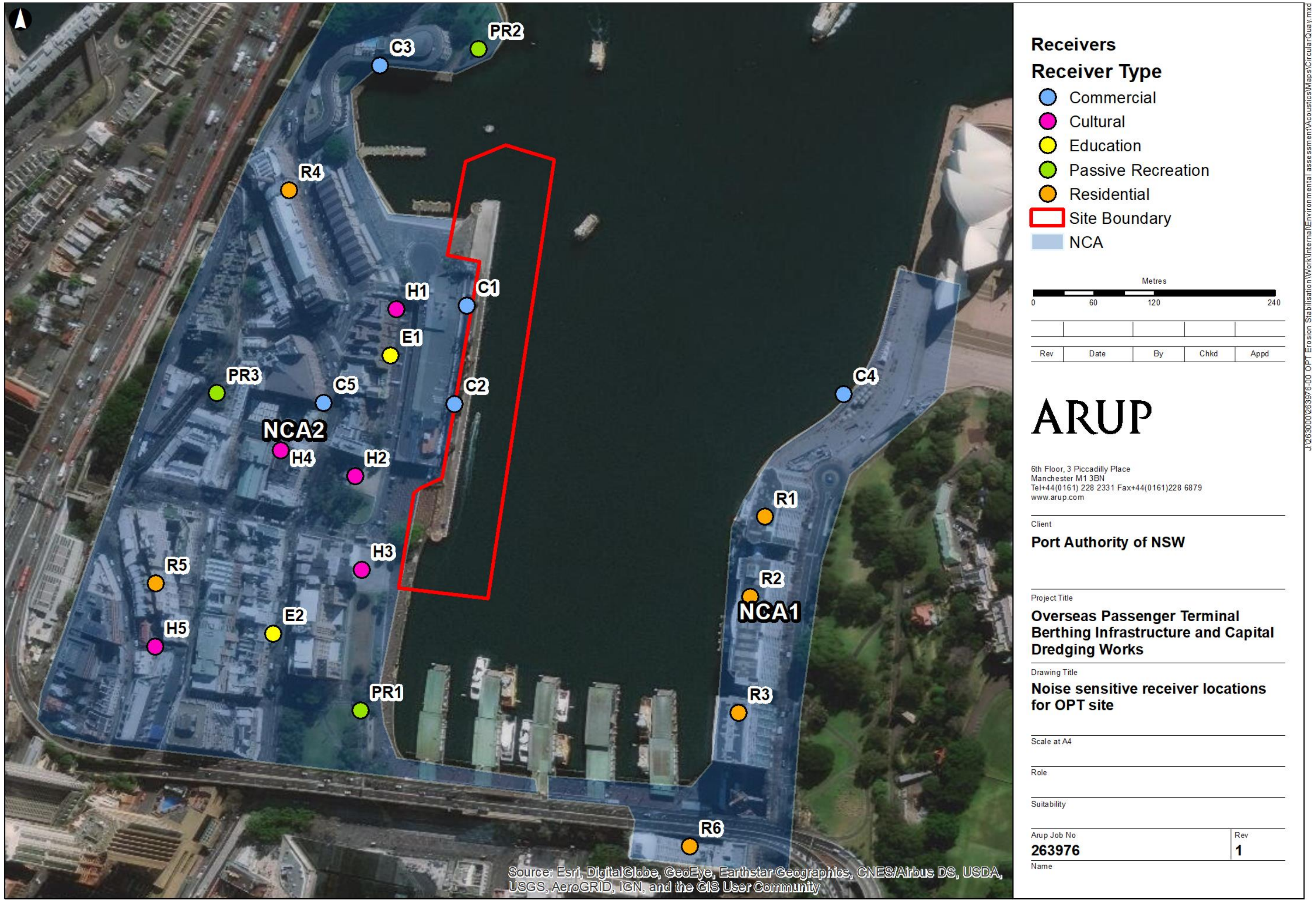


Figure 10: Noise sensitive receiver locations surrounding the OPT site and NCAs

6.3.3 Assessment criteria

The assessment of noise impacts was assessed against criteria discussed in detail in Appendix E. Table 20 to Table 22 summarises the key criteria used for the assessment.

Table 20 Construction noise assessment criteria

Aspect	Criteria (LAeq (15 min)1)	
Work activity noise Note: measured externally RBL: rating background level	Residents: Standard hours	Noise affected: RBL + 10dB
		Highly noise affected: 75dBA
	Residents: out of hours	RBL + 5 dB
	Residents: sleep disturbance	LA902 noise level by more than 15 dB3
	Passive recreation areas	60 dB(A)
	Active recreation areas	65 dB(A)
	Educational institutions	45 dB(A)
	Museums	45 dB(A)2
	Commercial premises	70 dB(A)

1 The average equivalent (‘eq’) continuous sound level, used to describe the level of a time-varying sound or vibration measurement.

2 The sound level exceeded for 90% of the measurement period. The L90 is often defined as the ‘average minimum’ or ‘background’ noise level for a period of measurement. For example, 45 dBLA90,15 min indicates that the sound level is higher than 45 dB(A) for 90% of the 15-minute measurement period.

3 Not applied to traffic noise.

Table 21 Road traffic criteria for traffic generating development - residential receivers

Road category	Type of project/land use	Assessment criteria – dBL_{Aeq}	
		Day (7 am-10 pm)	Night (10 pm-7 am)
Freeway/arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing roads generated by land use developments.	$L_{Aeq,(15\ hour)}$ 60 (external)	$L_{Aeq,(9\ hour)}$ 55 (external)

Note: These criteria are for assessment against façade corrected noise levels when measured in front of a building façade.

The following guidance provides recommended minimum safe working distances for vibration intensive plant. These are based on international standards and guidance and reproduced in Table 22 below for reference.

Table 22: Recommended minimum working distances for vibration intensive plant

Plant Item	Rating/description	Minimum working distance	
		Cosmetic damage (BS 7385)	Human response (OH&E Vibration Guideline)
Vibratory pile driver	Sheet piles	2 m to 20 m	20 m

6.3.4 Potential impacts

Overseas Passenger Terminal

Activity-based noise

The construction works would include different activity stages, each with different types of equipment in each construction work area. Equipment sound power levels are provided in Appendix E. These define the noise levels emitted at the source of the equipment.

The OPT works would take place during day, evening and at night over the construction program. Most of works at the OPT, including piling, dredging, and concrete work in the harbour, would mainly take place at night. This is due to safety reasons and the water tends to be calmer at night and the harbour is least busy, however there may be a need to undertake these activities during the day.

As assessment has been carried out to consider works taking place during the day, evening and at night (see section 3.3.1 construction hours).

Activity-based noise impacts at the OPT

Chapter 6 of Appendix E describes the detail of the noise impacts. In summary, and in relation to Table 4 Construction and dredging activities:

- There would be no impact during the **day**.
- Residents and hotel guests in Campbells Cove would be affected **at night** and they may have their sleep disturbed when: installing the sheet piling (enabling works), stabilising the embankment, and extending and deepening the berth pocket (dredging). These include:
  - R1: 1-3 Macquarie Street, Sydney
  - R2: 3-7 Macquarie Street, Sydney
  - R3: 61-69 Macquarie Street, Sydney
  - R6: 2 Phillip Street, Sydney

Exceedances of NMLs for non-residential receivers would mainly impact the commercial receivers (Quay Restaurant, Cruise Bar, Squires Landing, Yuki’s at the Quay) and MCA museum. They would be affected when they are open.

The duration of these impacts would depend on the final work schedules and whether the identified works would take place during the evening or at night (see section 3.3.1).

While noisy activities including piling and hammering may also take place during the day it would not be scheduled or permitted between 12pm and 2pm. This would reduce impacts during the busiest time of day for commercial receivers within Campbells Cove and the MCA museum, as well reducing impacts on the public amenity for receivers passing through the area.

Road-traffic noise impacts at the OPT

Construction works at the OPT are proposed to be 24/7 operation. A worst-case assessment has been undertaken for traffic generated during the night-time period of 10pm to 6am.A maximum of 20 daily truck movements is anticipated for construction works at the OPT. A workforce of 22 has been assumed to arrive within one hour during the night-time.

The predicted traffic-generated noise levels at the nearest residential receiver, 8 Hickson Road, Dawes Point (R4) would be noticeable however they would not exceed the criteria in Table 23 (see Chapter 6 of Appendix E).

Activity-based vibration impacts

Vibratory sheet piling would be the only activity that could give rise to potential vibration impacts. As this work would be more than 20 m from the nearest receiver a safe working distance could be maintained (see Table 25).

Glebe Island

Appendix E includes a noise assessment of the works at Glebe Island. This was to see if the impacts of the planned activities are consistent with the impact predicted in 2013. In summary:

- The noise impact from the planned works would be in general accordance with the 2013 assessment.
- The influence of the shipping movements to and from Glebe Island would have negligible influence on the overall noise emissions. This is because the vessels produce a comparatively low level of noise compared to the other planned activities and they only arrive and leave site a few times each day (see section 3.4.1).

6.3.5 Safeguards and management measures

Table 23 summarises the noise and vibration safeguards and management measures that would be implemented to account for the impacts identified in section 6.3.3.

Table 23 noise and vibration safeguards and management measures

Ref.	Impact	Environmental safeguard	Responsibility	Timing
20	Noise	A **Construction Noise and Vibration Management Plan** would be prepared and implemented as part of the CEMP. This will specify the actual plant to be used and will include updated estimates of the likely levels of noise and the scheduling of activities. The Plan would include: • All potential significant noise and vibration generating activities associated with the activity • Feasible and reasonable mitigation measures to be implemented • A monitoring program to assess performance against relevant noise and vibration criteria. • Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures, and contingency measures to be implemented in the event of non-compliance with noise criteria.	Contractor	Pre-construction
21	Noise	Electric/hydraulic equipment would be used where possible using the smallest equipment as is practical. All plant and equipment used on site would be: • Maintained in a proper and efficient condition. • Operated in a proper and efficient manner. • All vehicles, plant and equipment would be turned off when not in use.	Contractor	Construction
22	Noise	The offset distance between noisy plant and adjacent sensitive receivers would be maximised. Plant used intermittently would be throttled or shut down. Noise-emitting plant would be directed away from sensitive receivers where possible. Truck movements and haulage routes would be planned to avoid residential streets where possible.	Contractor	Construction

Ref.	Impact	Environmental safeguard	Responsibility	Timing
23	Noise	Non-tonal reversing beepers (or an equivalent mechanism) would be fitted and used on all mobile site-based vehicles, plant and equipment.	Contractor	Construction
24	Noise and vibration	All works would be scheduled with the aim of avoiding particularly noisy works (installing the sheet piling, stabilising the embankment, and dredging) after 10pm and before 6am, noting that these works will likely have to take place at night due to safety and operational reasons. Piling and particularly noisy works would be restricted and not undertaken between 12pm and 2pm.	Contractor	Pre-construction
25	Noise and vibration	Advanced warning of works and potential disruptions to the community would be provided. The notification may consist of a letterbox drop (or equivalent) detailing work activities, time periods over which these will occur, impacts and mitigation measures. This would be in accordance with the provisions in **Safeguard B** in Table 43 below.	Contractor/Port Authority of NSW	Pre-construction

6.4 Landscape character and visual impact

This section describes the proposal's potential landscape character and visual impacts.

6.4.1 Method

Landscape character and visual impacts

A desk review of the landscape character and visual receivers was undertaken for the site and surrounding area through online mapping. The landscape assessment for the Overseas Passenger Terminal Wharf Extension REF by AECOM (2017) was reviewed to identify key viewpoints to assist in the assessment.

The assessment of impacts used the ratings outlined in the Guidelines for Landscape Character and Visual Impact Assessment (EIA-N04, Roads and Maritime, 2013) to determine:

- The sensitivity of viewpoints and the landscape character to changes in form, setting and composition from carrying out the proposed works.
- The scale of change in the landscape and to people's views.

The grading matrix from EIA-N04 is shown in

Table 24 below. This has been considered within the assessment of potential impacts.

Table 24: landscape character and visual impact rating matrix

		Magnitude			
		● High	● Moderate	● Low	● Negligible
Sensitivity	● High	● High impact	● High-moderate	● Moderate	● Negligible
	● Moderate	● High-moderate	● Moderate	● Moderate-low	● Negligible
	● Low	● Moderate	● Moderate-low	● Low	● Negligible
	● Negligible	● Negligible	● Negligible	● Negligible	● Negligible

Lighting impacts

An assessment of light spill activities at the OPT was undertaken with reference to AS4282-1997: Control of the Obtrusive Effects of Outdoor Lighting (Standards Australia, 1997).

Only construction impacts have been assessed as the operation of the proposal would remain unchanged.

6.4.2 Existing environment

Overseas passenger terminal

Landscape character and context

The OPT is in Sydney Harbour within a visually prominent location with uninterrupted views to and from Circular Quay, Sydney Opera House and the Harbour Bridge. The OPT lies within the Sydney Opera House World Heritage Site buffer zone (see section 4.1.1).

The landscape character of the area is defined by its urban waterside setting and the context of key tourist landmarks and high-rise residential and office buildings.

The waterfront is locally characterised by the regular movement of ferries, tourist craft, water taxis and cruise ships, which tend to dominate and temporarily change the area's local character. The level of tourist activity and movement helps shape and place-make the area. This collectively leads to creating a distinct sense of place, which is characterised differently by locals, commuters, tourists and visitors, who hold different values to the area's landscape characteristics. For instance, tourists' reference and value the key iconic structures and the area's relationship with the Sydney Opera House and Sydney Harbour Bridge. By comparison, commuters see the area more functionally, characteristically valuing the transport interchange between light rail, bus, rail and ferry services.

The landscape characteristics have been divided into four key zones within the local area of the OPT. Each has distinct and recognisable components and patterns. Table 25 describes the key LCZs in the local area along with their characteristics, quality and sensitivity to change. These LCZs are presented in Figure 11.

Table 25: Overseas Passenger Terminal: landscape character zones

Zone	Land use characteristics	Sensitivity to change
LCZ1: The Rocks	Forms the backdrop to the OPT. Characteristic of historic buildings and mix of high rise and low-rise buildings. Urban character of bars, shops and restaurants. Views across to the Sydney Opera House.	● **Moderate** due to the historic nature of the area.
LCZ2: Circular Quay	Characteristics of open water within a busy ferry port. The backdrop of Circular Quay is characterised by high rise buildings and Sydney CBD.	● **Low** due to the nature of the area as a busy ferry hub.
LCZ3: Sydney Opera House	Characterised as a tourist landmark. Prominent views of the harbour and harbour bridge, as well as Circular Quay and the Rocks. World Heritage Site. Provides public open space and tourism.	● **High** given the heritage and national/world importance of this site.

Zone	Land use characteristics	Sensitivity to change
LCZ4: Kirribilli	Characteristic of a residential urban area with mix of medium to low rise buildings. Adjacent to the harbour with prominent views of the city, Sydney Opera House, Harbour Bridge and the OPT.	● **Low** due to changeable views of construction sites within the city and movement of ferries.

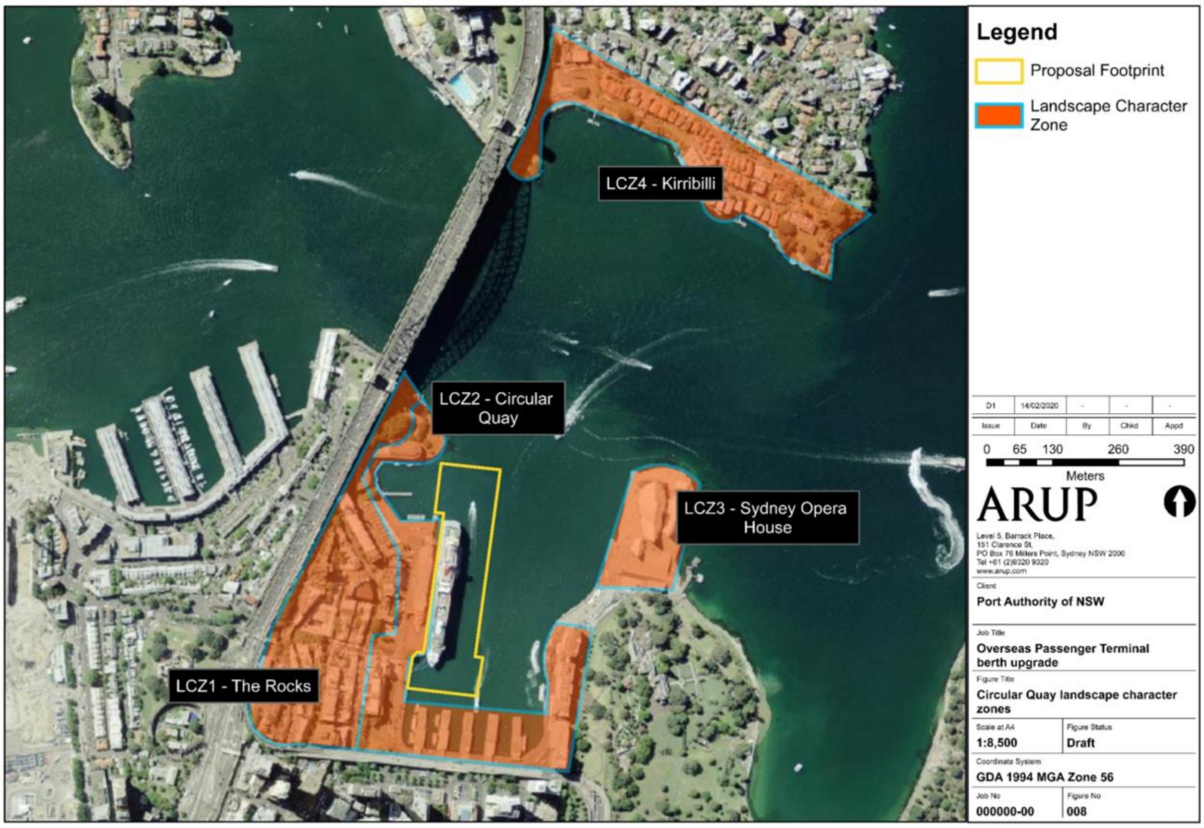


Figure 11: landscape character zones around the OPT

The character areas provide moderate-to-high amenity value due to the provision of public spaces and an historic built form.

Viewpoints and receivers

A review of the Overseas Passenger Terminal Wharf Extension REF (AECOM, 2017) identified key landmark viewpoints to and from the OPT. These are also relevant for this proposal as the works are within the same location. These viewpoints are listed in Table 26 and shown on Figure 12.

Table 26: Overseas Passenger Terminal: viewpoint locations

Viewpoint	Location	Sensitivity to change
VP1: tourists	Sydney Opera House Forecourt	● High, due to high number of observers and visitors.
VP2: tourists	Sydney Opera House concourse	● High, due to high number of observers and visitors.
VP3: tourists	Cahill Walk lookout point	● Moderate, due to the moderate number of users.
VP4: tourists	Museum of Contemporary Art (MCA) café	● Moderate, due to the moderate number of users.
VP5: tourists and residents	Harbour Bridge walk entry	● High, due to high number of observers and visitors to the bridge.
VP6: tourists	Cadman’s Cottage	● Moderate, due to the moderate number of users.
VP7: tourists and residents	Dawes Point	● High, due to high number of observers and visitors.
VP8: tourists	Harbour Bridge Pylon	● High, due to high number of observers and visitors.
VP9: commuters and tourists	Sydney Harbour view from the ferries and recreational boat users	● High, due to high number of observers and visitors.

Ambient light levels

Sydney Harbour and Circular Quay are lit at night from the surrounding land uses. The proposal footprint therefore experiences a high level of lighting from the OPT terminal and adjacent properties.

Note: VP9 shown on the figure represents boat users through the harbour

Figure 12 Location of viewpoints near the OPT

6.4.3 Potential impacts

Overseas passenger terminal

Landscape character and visual amenity

The works would be perceptible within the landscape setting as they would involve a distinct activity that does not normally take place in the area. Given this distinction it may temporarily distract from the key and important landscape values and landmarks in the area as summarised in Table 33.

Table 27: temporary landscape character impacts

Zone	Sensitivity	Magnitude	Impact
LCZ1: The Rocks	● Moderate	● Low	● Moderate-low
LCZ2: Circular Quay *The presence of construction equipment and barges*	● Low	● Moderate	● Moderate-low
LCZ3: Sydney Opera House	● High	● Low	● Moderate
LCZ4: Kirribilli	● Low	● Negligible	● Negligible

Visual amenity construction impacts are outlined below in Table 28.

Table 28: temporary visual impacts

Viewpoint	Sensitivity	Magnitude	Impact
High visibility			
VP1: Sydney Opera House Forecourt	● High	● Moderate	● High-moderate
VP2: Sydney Opera House Concourse	● High	● Moderate	● High-moderate
VP3: Cahill Walk Lookout Point	● Moderate	● Moderate	● Moderate-low
VP4: MCA Cafe	● Moderate	● Moderate	● Moderate
VP7: Dawes Point	● High	● Moderate	● Moderate
Low or obscured visibility			
VP5: Harbour Bridge Walk Entry	● High	● Low	● Moderate
VP6: Cadman's Cottage	● Moderate	● Low	● Moderate-low
VP8: Harbour Bridge Pylon	● High	● Low	● Moderate

The proposal would also affect the visual amenity of:

- Visitors to Sydney Opera House concourse (VP2), Cadman's Cottage (VP6), and MCA Café (VP4).
- Recreational users and pedestrians on Cahill Walk lookout point (VP3) and Harbour Bridge (VP8).

The visual amenity and landscape character impacts would be temporary in nature and would occur at different times of the day (see section 3.3.1). Overall, despite the discernible nature of the works, their small scale and short duration (see section 3.3.1) means any impact would be short-term.

Light spill and night work

As described in section 3.3.1, night works would be undertaken given the harbour conditions are more suitable for activities such as piling and dredging. This would require additional safety and security lighting. There is potential for temporary light spill impacts affecting nearby residents within the Rocks and hotel guests in Campbells Cove. While this is the case, stationary site lighting and security lights on the barges would be carefully directed and shielded to limit its impact.

Transport movements

The movement of around four vessels between Circular Quay and either Glebe Island or the offshore disposal ground (see section 3.4.1) who have negligible influence on the landscape setting and visual amenity of Sydney Harbour in the context of the many commercial, recreational, tourist and other vessel movements that occur each day.

6.4.4 Safeguards and management measures

Table 29 lists the landscape character and visual amenity safeguards and management measures that would be implemented to account for the impacts identified in section 6.4.3.

Table 29: landscape character and visual amenity safeguards and management measures

Ref.	Impact	Environmental safeguard	Responsibility	Timing
26	Light spill	Direction of lighting would be controlled to limit light spill from nearby receivers such as residencies in the Rocks and take into consideration any reflective impacts from the water.	Contractor	Construction
27	Landscape character and visual amenity.	The shipping container at the OPT would be stored for the duration of the works and would be screened where possible to reduce visual impacts for pedestrians and ferry users accessing the area.	Contractor	Construction

6.5 Socioeconomic

This section describes the proposal’s predicted social and economic impacts and benefits.

6.5.1 Method

The assessment considered the following community, business and industry impacts and benefits:

- Community disruption during construction from noise, traffic, visual amenity, and community values such as the sense of place.
- Ferry service disruption.
- Tourism impacts and effects on social amenity and infrastructure.
- Business and economic disruption, including the aquatic-based companies that use the harbour and ferry passenger services.

Operational impacts have not been considered the would be no change from the current activity at the OPT.

A qualitative construction assessment has been undertaken based on:

- Census data
- Council website data (City of Sydney, 2013, Our Villages: CBD and Harbour)
- Noise and vibration assessment for the proposal (see Section 6.3)
- Landscape character and visual assessment of the proposal (see Section 6.4)

- Traffic, transport and access assessment of the proposal (see Section 6.8).

6.5.2 Existing environment

Overseas passenger terminal

Demographic and socioeconomic profile

The proposal is situated next to the Rocks which is part of the City of Sydney Local Government Area (LGA). The Rocks include a mix of land uses focussed on office-based employment, retail and tourism. The area is home to a small but diverse population, living in apartment towers, heritage terraces and public housing. The area had a population of approximately 8,500 residents (City of Sydney 2014 data) and 227,000 workers (City of Sydney 2012 data).

The key social and economic characteristics of the people that live in area is summarised in Table 30. The Rocks suburb occupies an area of 0.3km^2 (ABS, 2012).

Table 30: Statistical Data for The Rocks suburb census 2016

Demographic Indicator	2016	
Population	774	
Population by age bracket	0-19	58
	20-34	210
	35-49	237
	50-64	141
	65+	127
Method of travel to work	Car	20.2%
	Bus	2.6%
	Train	12.4%
	Walked	41.3%
	Other	23.5%
Weekly household income	$ 3516	
Home ownership/rentals	Homeowners	44.8%
	Renters	53.9%
	Other	1.3%

The above information demonstrates that the Rocks is an affluent suburb. Residents are mainly renters within high rise apartments. Most residents walk to work. The most common occupation for people living in the Rocks in 2016 was professionals (42% of the employed residents).

Ferry service users

Approximately 50 million people travel to Circular Quay by ferry every year. This is forecast to increase up to 81 million by 2041 (Transport for NSW).

Community values

Community values are those socioeconomic aspects that people hold important to their quality of life and wellbeing. They include physical assets, such as parks and recreational areas, as well as social factors such as a sense of safety and wellbeing, belonging and community diversity.

Accordingly, there is a likely high level of community value associated with the area's landscape and heritage values and setting within the Rocks; a conservation area. Community values are likely held by a wider demographic than lives in the area, including visitors, workers and tourists. These include:

- Liveability, due to harbour access and access to the commercial centre of Sydney.
- Retained local character defined by the ease of access to facilities, restaurants and bars.
- Local amenity and sense of place provided by: the historic buildings and history of the area; its continued significance use as a transport hub and overseas passenger terminal; the high-levels of public activity; its use for special events such as Vivid; and its setting as part of Sydney Harbour and views towards the Sydney Opera House and Sydney Harbour Bridge.

Social infrastructure

Social infrastructure refers to the community facilities, services and networks that help individuals, families, groups and communities meet their social needs, maximise their potential for development, and enhance their community well-being. It includes such things as: educational facilities; health, emergency and aged-care services; sports, recreational and cultural facilities; community support services; and transport facilities.

The social infrastructure associated with the local area benefits a wider demographic than those people that live locally. It includes:

- Circular Quay, which provides a major transport hub for ferries, light rail, busses and trains.
- The OPT as an arrival and departure point for tourists. It also includes restaurants, function facilities, and public open space.
- Campbells Cove, which provides public open space, and restaurants.
- MCA, which provides a cultural facility for residents and tourists.
- Sydney Opera House, which provides a cultural facility for residents and tourists.

Key public events

Major public events have been cancelled and impacted during 2020 due to the COVID-19 restrictions. The programme of proposed works is therefore not expected to be impacted by the usual, scheduled large-scale public events in the immediate area. At this stage it is unclear when these activities would resume.

6.5.3 Potential impacts

Overseas passenger terminal

There would be a small temporary level of employment needed during construction (approximately 39 workers across the proposal).

The proposed works would not disrupt ferry movements in and out of Circular Quay as the proposal footprint and need for a maritime exclusion zone (see section 6.8) would not impact ferry movements to and from the wharves. Ferry times are also not predicted to be impact. This is further considered within section 6.8.

Cruise ships could continue to berth at the OPT during the construction program, providing they are operating at the time. Construction works would stop during this time and this has been considered in the construction program.

The proposed works would occur adjacent to a busy tourist area. This has the potential to impact nearby businesses. This includes businesses located at the OPT, in Campbells Cove and its environs and along George Street including the MCA. The businesses located within Campbell Cove comprise restaurants, although the site is not yet fully occupied by businesses following a major renovation. Access to these businesses would be maintained off George Street and Hickson Road. Construction activity would therefore not directly affect access to these businesses by foot or car. However, there may be amenity impacts associated with noise from construction works, which would affect these during day works (see section 6.3).

Noise impacts from night-time works would have a temporary adverse impact on residents living near the OPT within the Rocks and hotel guests at Campbells Cove (see section 6.3). While lighting impacts may also have a temporary adverse impact on nearby hotel guests (see section 6.4.3) it is unlikely to have any material impact on community values, including liveability. This is due to the limited duration and scope of the works and that any lights would be controlled to minimise glare.

There would be a temporary, minor loss of amenity for pedestrians and users of the OPT as parts of the site would be closed-off for periods during works. When works are not being undertaken (e.g. cruise days) pedestrian access would be reinstated. There is unlikely to be impacts to public events held within the area, as works would not be carried out during these times.

During the enabling works for the sheet pile wall installation, a crane mounted barge would install sheet piles in front of the Commissioners Steps. This area would be temporarily restricted for commercial vessels accessing the Commissioners Steps during these works. Commercial vessels mainly include water taxis and small ferries. This would have a temporary impact on commercial vessel operators and users not being able to access this area during the enabling works. This would be short term and prior to works Transport for NSW would be notified of restriction to access.

Transport movements

The movement of around four vessels between Circular Quay and either Glebe Island or the offshore disposal ground (see section 3.4.1) who have negligible influence on the area's amenity, and it would have no effect on the area's community values. It would not prevent any commercial, recreational or public transport traffic or vessel movements during the movement of dredged material. Overall, this element of the proposal is not predicted to have any material socio-economic impact.

6.5.4 Safeguards and management measures

Table 31 lists the socioeconomic safeguards and management measures that would be implemented to account for the impacts identified in section 6.5.3.

Table 31: socioeconomic safeguards and management measures

Ref.	Impact	Environmental safeguard	Responsibility	Timing
28	General socio-economic impacts	A **Communication Plan** would be prepared and implemented as part of the CEMP to help provide timely and accurate information to stakeholders prior to and during construction.	Contractor/Port Authority of NSW	Pre-construction
29	Social impacts	Access to neighbouring businesses would be maintained during construction, any temporary constraints to access would be communicated ahead of time.	Contractor/Port Authority of NSW	Pre-construction/ construction
30	Socio-economic impacts	The maritime exclusion zone would be clearly defined as part of the **Marine Works Management Plan** (see **Safeguard 43** in Table 36 below) and communicated to relevant stakeholders to delineate access restrictions for surrounding water users.	Contractor/Port Authority of NSW	Pre-construction/ construction
31	Socio-economic impacts	The works would be scheduled to maintain public access to Circular Quay and the wharf frontage where feasible and reasonable; especially during peak and event periods.	Contractor	Pre-construction/ construction

6.6 Non-Aboriginal heritage

This section describes the proposal's predicted non-Aboriginal heritage impacts. Appendix F contains a supporting technical report prepared by AECOM (2020).

6.6.1 Method

The assessment included a desk review of local, State, national and world heritage registers to confirm the likely presence of non-Aboriginal heritage values locally. It also included a review of borehole data and a maritime archaeological assessment carried out by Cosmos Archaeology in 2014. This was followed by a dive survey in February 2020 that was used to confirm the non-Aboriginal heritage value and potential by searching for evidence of surface items and relics, intact natural deposits, and sediment disturbance.

The assessment also referred to: Assessing Heritage Significance (NSW Heritage Office, 2001), Statements of Heritage Impact (NSW Heritage Office and DUAP, 2002), and The Burra Charter: The Australian ICOMOS Charter for Places of Cultural Significance (2013).

6.6.2 Existing environment

European history

Appendix F details the European settlement history of the area. In summary:

- The first wharf was in operation by 1792 in the vicinity of present day First Fleet Park.
- The Rocks was developed into Government Dockyards and the OPT was occupied by Captain Piper comprising a property, rocky foreshore and possible wharf. Campbells Cove was home to Robert Campbell. It contained stables, warehousing and a wharf.
- By 1845, Campbells Wharf contained a house, stores, warehouse and wharf. Three stores and an office were also located at the northern end of the wharf.
- Circular Quay was constructed between 1854 and 1855.
- Argyle Street was extended out over reclaimed land between 1859 and 1863 moving the foreshore alignment.
- In 1876, a 320-foot wharf and two jetties were built within Campbells Cove along the foreshore. The warehousing was further developed in the mid-1890s with further wharfage improvements.
- By 1900s, the Rocks street layout was redesigned, and terrace housing was built. Large areas of existing buildings were demolished to create the area. Campbells Cove also changed leading to the demolition of the two jetties built in 1876 and the erection of a single central wharf (Wharf No. 17) for commercial shipping.

- Following the Second World War, cruise passenger movements increased dramatically demanding the need for a passenger terminal. Sydney Cove (Circular Quay) was chosen due to its proximity to public transport. The OPT was constructed in 1958. This led to the demolition of wharves and sheds built in the early 1900s and further land reclamation.
- In the 1980s the wharf was reconfigured, and frontage reshaped. Campbells Cove was further redeveloped resulting in the upgrade of the OPT in the lead up to the 2000 Olympics.

Heritage items

Table 32 lists the recorded items in the local area. They reflect its history as described above along with describing the key wider values represented in the Sydney Opera House and Sydney Harbour Bridge. The location of listed heritage items within and or adjacent to the proposal footprint is shown on Figure 13.

Table 32 Summary of listed heritage items within the surrounding area

Item	Value and designation
World Heritage	
Sydney Opera House	Located 370 m east of the proposal footprint. The Sydney Opera House is listed on the World Heritage List and National Heritage List and has an international and national level of significance.
Other Heritage	
Sydney Harbour Bridge	Located 250 m west of the proposal footprint. The Harbour Bridge is listed on the National Heritage List and is of National Significance.
The Rocks Conservation Area (Sydney Harbour Foreshore Authority Section 170 Register)	Located adjacent to the Proposal footprint.
Railings, Sydney Cove (State listed #01572)	Located 10 m west of the Proposal footprint of State significance
Sydney Cove West Archaeological Precinct (State listed #01860)	Located 50 m west of the Proposal footprint of State significance
Cadman's Cottage, grounds, trees, space (State listed #00981)	Located 70 m west of the Proposal footprint of State significance
Sailor's Home (former) (State listed 01576)	Located 70 m west of the Proposal footprint of State significance
Coroner's Court (former) – Shops & offices (State listed #01541)	Located 70 m west of the Proposal footprint of State significance
Mariners' Church (State listed #01559)	Located 70 m west of the Proposal footprint of State significance

Item	Value and designation
ASN Co Building (State listed #01526)	Located 70 m west of the Proposal footprint of State significance
Campbell's Stores (State listed #01536)	Located 100 m west of the Proposal footprint of State significance
Sydney Cove Passenger Terminalis (listed on Port Authority of NSW Section 170 heritage and conservation register)	Located 40 m from the Proposal footprint and are of State significance.
Three Bees shipwreck	Unknown location may have been re-floated or have not been located but unlikely to be within the Proposal footprint.
Ann Jameson shipwreck	Unknown location may have been re-floated or have not been located but unlikely to be within the Proposal footprint.
Princess shipwreck	Unknown location may have been re-floated or have not been located but unlikely to be within the Proposal footprint.

Source: AECOM 2020, Maritime Archaeological and Indigenous Heritage Assessment and Statement of Heritage Impact

Figure 13 Location of nearby Heritage items listed on heritage registers

Maritime archaeology

Historic research and geophysical and archaeological surveys carried out in 2014 and 2020 confirmed the presence of the remains of the former Wharf No.7 (1901-1980) in Campbells Cove. This is within the north of the proposal footprint (see Table 11 or a historic photo location of Wharf No.7). These include cut sections of piles and deck beams on the harbour bed. The archaeological survey undertaken in 2020 noted material present below the harbour bed it concluded that this may also relate to the construction of the OPT wharf extension and/or from the construction of the mooring dolphin

This wharf was an integral part of maritime commerce and trade functioning in Sydney Harbour. It was leased by international merchant shipping companies before being taken over by the Maritime Services Board. The remains of the former Campbells Cove Wharf are of local significance.

Source: AECOM 2020, Maritime Archaeological and Indigenous Heritage Assessment and Statement of Heritage Impact

Figure 14: 1960s aerial photograph showing the configuration of the OPT after the expansion works and Wharf No.7 to the north

Archaeological potential

The potential for other maritime archaeological remains and relics is low due to existing disturbance from dredging of the OPT berth pocket and the previous extension works of the OPT.

6.6.3 Potential impacts

Heritage listed items impacts

The proposal footprint is within the Sydney Operate House buffer zone; introduced to protect its world heritage values (see Table 11). There would be no change to existing views once construction activities are complete. Following construction, there would be no change to the setting and views within the Sydney Opera House buffer zone and Campbells Cove.

The proposed works would have a temporary impact on the setting of the heritage listed items (see Table 32) from crane mounted barges using for the dredging and piling works. There may also be temporary impacts when installing the pumped or articulated concrete mattresses (see section 3.2). These would result in a minor short-term impact that would have permanent impact on any heritage values in the area.

Wharf No. 7 impacts

The proposed dredging works would have an impact on the former Campbells Cove Wharf No.7. The works would remove in situ piles, sections of cut piles and other timber structural remains associated with the former wharf.

The depth of the proposed dredging in the area of the former wharf would also remove material remains and unknown relics that are present below the current harbour bed. The total area that would be impacted would be 18 percent of the Wharf No. 7 site. The remainder of the Wharf site would remain undisturbed. This would include relics associated with the operation of the Wharf with vessels that berthed at the former Wharf.

This is not considered to be a major impact as the remainder of the site would remain unaffected including its key heritage values. A permit would be required from Heritage NSW prior to any construction works commencing.

Archaeological and other heritage impacts

There is not expected to be any additional impacts from dredging other areas of the berth pocket as no previous historic wharves or structures were located within this area prior to the land reclamation that took place in 1958 Previous dredging would have also removed any maritime archaeology that might have existed.

There are not expected to be any shipwrecks or related materials within the proposal footprint or surrounding area based on historical research.

The scour protection works is also not considered to have an impact as the proposed works would repair and add to the existing armour wall already present.

6.6.4 Safeguards and management measures

Table 33 lists the non-Aboriginal heritage safeguards and management measures that would be implemented to account for the impacts identified in section 6.6.3.

Table 33: non-Aboriginal heritage safeguards and management measures

Ref.	Impact	Environmental safeguard	Responsibility	Timing
32	Non-Aboriginal heritage	A permit under section 140 of the *NSW Heritage Act* would be obtained prior to the commencement of dredging and scour protection works.	Port Authority NSW	Pre-construction
33	Non-Aboriginal heritage	The remains of the wharf on the harbour bed would be recorded before starting construction to help understand the site formation processes associated with the demolition of the wharf.	Contractor	Pre-construction
34	Non-Aboriginal heritage	An archaeologist would inspect, and record elements associated with the timbers before their removal to better-understand the construction techniques used.	Contractor	Construction
35	Non-Aboriginal heritage	As part of the early works, and once the timbers on the harbour bed had been removed, a series of maritime archaeological test transects would be used to understand the potential for relics, patterning and dispersal of relics across the site. This information would be held as a record to support an application made under section 140 of the *Heritage Act 1997*, to secure permission to excavate or disturb land that would likely "result in the discovery, movement and/or destruction of [a heritage] relic". Dredging work would only be allowed to take place once the Heritage Council of NSW gives its permission under the Act.	Port Authority of NSW	Pre-construction

Ref.	Impact	Environmental safeguard	Responsibility	Timing
36	Non-Aboriginal heritage	If it is not possible to carry out the pre-construction investigations under **safeguard 35** above, then the contractor would work with Port Authority of NSW and a heritage specialist to develop an agreed sampling program of the dredged sediment to ensure a representative sample is collected to record and recover any remaining.	Port Authority of NSW/ contractor	Construction
37	Non-Aboriginal heritage	A **Standard Management Procedure for Unexpected Heritage Items** would be followed as per Appendix B of Appendix F in the event of unexpected heritage items, skeletal remains, archaeological remains or relics are encountered. This would include an adequate stop-and-start work procedure and the need to engage a qualified heritage specialist to advise on the required action.	Contractor	Construction

6.7 Aboriginal heritage

This section describes the predicted Aboriginal heritage impacts. Appendix F contains a supporting technical report prepared by AECOM (2020).

6.7.1 Method

The assessment included a desk review of published records, data and literature, including the Aboriginal Heritage Information Management System (AHIMS), National Native Title Register (NNTR) and Register of Native Title Claims (RNTC) to confirm the likely presence of values in the local area. This was followed by a dive survey in February 2020 to confirm the potential for archaeology.

The assessment also referred to the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (DECCW, 2010), Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW, 2010) and the draft code of Practice of Archaeological Investigations in NSW (DECCW, 2010).

6.7.2 Existing environment

Aboriginal history

Aboriginal Peoples have occupied the Sydney region for at least 36,000 years. The OPT is located within the traditional lands of the Gadigal People; a member of the Eora nation who referred to Circular Quay as 'Warrane'. Research has also identified that the Darug territory may have also extended to the coastline between Port Jackson and Botany Bay based on observations of early explorers and settlers.

Darug is believed to have been spoken in the area. Available historical records indicate that a wide range of marine and freshwater fauna were exploited by Darug-speaking peoples for food and other resources.

Any Aboriginal sites within submerged water are less likely to have survived as discussed in Table 34, which provides a summary of different Aboriginal site types and likelihood within the proposal footprint.

Table 34 Preservation potential by site type

Site type	Description	Preservation potential	Likelihood
Open Artefact Sites	Objects susceptible to abrasion and translocation during slow and highly dynamic inundation. Artefact scatter sites likely to be dispersed rather than being identified in situ.	● Moderate	● Moderate

Site type	Description	Preservation potential	Likelihood
Culturally modified trees	Unlikely to survive in marine conditions.	● Low	● Low
Shell middens	Only likely to survive rapid, low-energy inundation unless deeply buried in consolidated sediments prior to inundation.	● Low to moderate	● Moderate
Fish traps	Only fish traps constructed from stone would survive inundation, more likely to survive relatively intact in low-energy environs, e.g. estuarine.	● Low to moderate	● Low
Rock shelters	Moderately resistant to inundation, particularly in low energy environs.	● Moderate	● Moderate
Rock art sites	Engravings are unlikely to survive on soft sandstone where dynamic environs may result in rapid erosion.	● Low	●Low

Recorded items and artefacts

A search of the AHIMS database identified no registered Aboriginal sites within the proposal footprint. The closest site is an Open Artefact called Harrington IFS01 (#45-6-3762) located approximately 280 m south west inland of the proposal footprint. The location of recorded sites items within the surrounding area to the proposal footprint is shown on Figure 15.

A search of the NNTR and RNTC confirmed that there are no current Native Title listings or claims within the City of Sydney LGA.

Source: AECOM 2020, Maritime Archaeological and Indigenous Heritage Assessment and Statement of Heritage Impact

Figure 15 AHIMS Search results

Archaeology

Despite the known Aboriginal history of the local area, there is enough evidence that the proposal footprint has been subject to disturbance from historic ship building activities and land reclamation. This means there is low archaeological potential. This confirmed during the 2020 surveys, which did not identify any features or artefacts.

6.7.3 Potential impacts

There is a low potential for Aboriginal sites to be within the proposal footprint due to previous activity and dredging. Should unknown archaeology be discovered during works a permit maybe required (see section 6.7.4 below).

6.7.4 Safeguards and management measures

Table 35 lists the Aboriginal heritage safeguards and management measures that would be implemented to account for the impacts identified above.

Table 35: Aboriginal heritage safeguards and management measures

Ref.	Impact	Environmental safeguard	Responsibility	Timing
38	Aboriginal heritage	A **Standard Management Procedure for Unexpected Heritage Items** would be followed as per Appendix B of Appendix F in the event of unexpected heritage items, skeletal remains, archaeological remains or relics are encountered. This would include an adequate stop-and-start work procedure and the need to engage a qualified heritage specialist to advise on the required action.	Contractor	Construction
39	Aboriginal heritage	Should any Aboriginal objects be identified at any stage of the project, an Aboriginal Heritage Impact Permit (AHIP) maybe required under Section 90 of the *National Parks and Wildlife Act 1974*. This would be obtained in accordance with the requirements of the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011) and the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010a).	Contractor and Port Authority	Construction

6.8 Traffic, transport and access

This section describes the proposal's predicted maritime and land-based traffic, transport and access impacts.

6.8.1 Method

The assessment considered how the work methods, program, expected vehicle movements, and required traffic and navigational management controls (see section 3.4) would temporarily impact:

- Traffic network performance on the key roads in the area.
- All modes of public, private and active transport.
- Public road and private property access.
- Maritime commercial, public and recreational traffic.
- Ferry services and timetables.

Only construction impacts have been considered as the operation of the OPT would remain unchanged.

6.8.2 Existing environment

Overseas passenger terminal

Land transport and parking

The OPT is accessed from Circular Quay West Road. This is a private road owned by Port Authority of NSW that leads off George Street and Hickson Road. Vehicular access to Circular Quay West Road is controlled through a gatehouse located at the entrance of Circular Quay West.

During cruise ship days access is restricted and parking is not available. Vehicular access to Circular Quay West Road during this time is restricted to delivery supplies for the ships and restaurants, service cars, taxis and private buses, other cruise related traffic and Port Authority of NSW staff.

On non-cruise ships berthing days vehicular access and parking is provided and open to the public. There are 120 spaces available that are privately managed through Wilson Parking.

The OPT is pedestrianised around the terminal building and public access is also provided along the quay adjacent to the proposal footprint. This leads to Campbells Cove and Walsh Bay. Events are held in the area throughout the year; including Vivid, Bastille festival, Sydney Harbour 10km race, and Blackmoore's running festival. These events attract large numbers of visitors. However, due to the current global Covid-19 pandemic these events will not be occurring in 2020 and currently their future is yet to be confirmed.

Maritime transport in Circular Quay

The OPT wharf is used by cruise ships all year round. The busiest period is over the summer months. Campbells Cove is adjacent to the wharf to the north and has three berths; one on each side of a jetty and one on a floating pontoon on the southern shore. The jetty berths are used by visiting superyachts and sailing vessels that offer harbour cruises. The pontoon berth is used by water taxis and Transport for NSW as an overflow berth. The jetty and pontoon berths are managed by Transport for NSW.

There is a mooring dolphin located in Campbells Cove that is used by larger cruise ships when berthed at the OPT. When in use, access to Campbells Cove by other vessels remains open but is partially restricted due to the cruise ship mooring lines.

Harbour City Ferries operates throughout the harbour and the closest wharves are at Circular Quay. The ferries operate from Circular Quay from 5.30am to 00.20am Monday to Friday, and 6.20am to 00.20am Saturday and Sunday. Captain Cook Ferries also operate a service starting from 7.15am to 6.40pm from Circular Quay.

To the south of the site at the location of the enabling works for the sheet pile wall (see Appendix A) is located the Commissioners Steps which are used by commercial vessel access e.g. water taxis and ferries, to pick up and drop off passengers. The access is regulated by Transport for NSW and must be booked prior to use.

A jet boat company (Thunder Jet) operates within the harbour during the day between 11am and 4pm.

Transport movements

Glebe Island is used by dry bulk for cargo ships and for various ad hoc port related activities as an ancillary site by Port Authority of NSW. There are four commonly used berths. Glebe Island Berth 1 and Berth 2 are in Johnstons Bay. They serve the unloading/loading of dry bulk goods and other port-related purposes such as laying-up and decommissioning of shipping vessels. Glebe Island Berth 7 and Berth 8 are in White Bay. They are used for unloading and loading of dry bulk shipping vessels (sugar, cement and gypsum). The compound would likely be located within the area of Berth 2, which is also the general site for the upcoming construction of the Glebe Island Multi-user facility.

6.8.3 Potential impacts

Overseas passenger terminal

Land transport

The proposal would result in a minor temporary increase in traffic during construction from workers, deliveries of equipment and concrete trucks. Peak construction traffic would be during the installation of scour protection where around 20 concrete trucks would access the OPT on a typical shift for Option A. If Option B is undertaken, articulated concrete mattresses would be cast at Glebe Island and brought to the OPT site by barge which will reduce construction traffic at the OPT.

The additional traffic movements would have a negligible effect on the existing road network. Importantly, there would be no construction traffic movement while cruise ships are at berth, should this resume during the term of the works.

The area along the OPT quay adjacent to the proposal footprint would be closed to the public, which would temporarily restrict pedestrian movement in this area. This would have only a minor impact on pedestrians walking along the harbour to Campbells Cove when works take place. This would be the inconvenience of using the available alternative routes such as Circular Quay West Road and George Street. These alternatives would mean pedestrian access would be maintained and the additional travel (walking) times would be marginal.

Works would be coordinated during key events, should they resume, to ensure adequate pedestrian access is maintained.

Onsite car parking is not expected to be notably impacted as a maximum of 10 workers would be present onsite during construction. They would only park onsite during the works (e.g. when there was not a cruise ship berthed) otherwise they would park offsite at any number of public parking areas in the vicinity or at Glebe Island.

Maritime transport in Circular Quay

Construction of the proposal would require a maritime navigation exclusion zone to be set up around the works area. A similar exclusion zone applies around the berthed cruise ships, as such, there is expected to be no disruption to the ferry services or for other vessel activities that take place in Circular Quay.

A Marine Works Management Plan (MWMP) would be developed by the contractor in consultation with the Harbour Master, Transport for NSW (Maritime) and other relevant stakeholders. The stakeholders would define specifics such as exclusion zones, methods of marking the zones, clearance distances, mooring plans, communication protocols, emergency and incident response procedures, contact details of all parties and responsible persons, and transit routes. The MTMP would be approved by the Harbour Master in advance of the works commencing. Harbour Master approval will also be required under Clause 67ZN of the Ports and Maritime Administration Regulation 2012 (see Table 12) prior to any disturbance of the seabed.

There would be no change in access to the jetty berths in Campbells Cove used by visiting superyachts, commercial sailing vessels and water taxis. During works access would be maintained as far as practicable. Transport for NSW (Maritime) would be consulted with regards to access impacts and agreed management measures would be included in a Marine Traffic Management Plan.

During the enabling works for the sheet pile wall installation, a crane mounted barge would install sheet piles in front of the Commissioners Steps. This area would be temporarily restricted for commercial vessels accessing the Commissioners Steps during these works. Prior to works Transport for NSW would be notified of restriction to access during work times.

During the operation of the OPT, cruise ships would continue to berth within the same location. The arrangement of cruise ships berthing would not change and therefore there would be no impact on surrounding ferry wharves within Circular Quay.

Transport movements

The movement of around four vessels between Circular Quay and either Glebe Island or the offshore disposal ground (see section 3.4.1) who have negligible influence in the context of the many commercial, recreational, tourist and other vessel movements that occur on Sydney Harbour each day. It would have no conflict on regular and timetabled services. All vessel movements through the harbour would need to comply with the standard safety and transport requirements set by the Harbour Master and Port Authority of NSW.

6.8.4 Safeguards and management measures

Table 36 lists the traffic, transport and access safeguards and management measures that would be implemented to account for the impacts identified in section 6.8.3.

Table 36: traffic, transport and access safeguards and management measures

Ref.	Impact	Environmental safeguard	Responsibility	Timing
40	Land transport and parking	A **Traffic Control Plan** would be prepared and implemented for the OPT in accordance with the Traffic Control at Work Sites manual (Roads and Maritime, 2018) and the Australian Standard 1742.3 (Manual of uniform traffic control devices, 2019). This would involve items such as installing appropriate wayfinding signage for alternative transport options where necessary. The Traffic Control Plan would also include pedestrian access management at the OPT and provision of diversion signs, and safe access around the OPT to avoid construction works.	Contractor	Pre-construction/construction
41	Land transport and parking	The **Traffic Control Plan** would be developed in consultation with and to the satisfaction of Port Authority of NSW.	Contractor	Pre-construction/construction
42	Land and water transport	Equipment and materials would be transported to site via boat and/or barge when possible to reduce land transport and impacts to local road networks.	Contractor	Construction
43	Water transport	Harbour master approval would be obtained under Clause 67ZN of the Ports and Maritime Administration Regulation 2012 prior to any disturbance of the seabed.	Contractor	Pre-construction/construction
44	Water Transport	Transport for NSW would be notified prior to enabling works for access restrictions to Commissioners Steps.	Contractor	Pre-construction

Ref.	Impact	Environmental safeguard	Responsibility	Timing
45	Marine works management	A **Marine Works Management Plan (MWMP)** would be developed by the contractor in consultation with the Harbour Master, Transport for NSW (Maritime) and other relevant stakeholders. The stakeholders would define specifics such as exclusion zones, methods of marking the zones, clearance distances, mooring plans, communication protocols, emergency and incident response procedures, contact details of all parties and responsible persons, and transit routes. The MWMP would be approved by the Harbour Master in advance of the works commencing. Harbour Master approval will also be required under Clause 67ZN of the Ports and Maritime Administration Regulation 2012 prior to any disturbance of the seabed.	Contractor	Pre-construction/construction
46	Water transport	A **Marine Traffic Control Plan** would be developed and implemented in consultation with the Harbour Master, Transport for NSW and other relevant stakeholders to accommodate the works, vessel movements and safety requirements. This plan would: • Ensure that vessel speeds would comply with the Harbour Master requirements within Circular Quay and Sydney Harbour. Vessels within the proposal footprint would also be restricted in speed. • Respond to the navigational requirements set out in the Port Information for Sydney Harbour & Botany Bay (Port Authority of NSW, 2015). • Include the requirement of the maritime navigational exclusion zone established before starting construction in accordance with the Harbour Master approval. • Include the required methods of communication with the Harbour Master to manage the additional vessel movements within the Shipping Channels. Shipping schedules would be forwarded and agreed in advance.	Contractor	Pre-construction/construction

6.9 Spoil, dredging and waste management

This section describes the spoil, dredging and waste management impacts from carrying out the works.

6.9.1 Method

The assessment considered the impacts associated with:

- Sediment spoil from dredging.
- The proposal's ability to respond to waste management and resource conservation plans, policies and guidelines.

The basis of assessment was to consider the hierarchy of avoiding waste generation and primary resource use in favour of reduction, reuse and recycling, consistent with the NSW *Waste Avoidance and Resource Recovery Act 2001*.

The sediment spoil would either be disposed on land (Option 1) or offshore (Option 2, see section 3.3.5). As identified in the sediment testing (see section 6.1.2).

6.9.2 Existing environment

Private contractors typically deal with recovered and recycled materials in Sydney. There are also licenced contractors who deal with forms of controlled and restricted wastes that need transporting to licenced facilities.

6.9.3 Potential impacts

Sediment generation

Approximately 20,000 m^3 of dredged material would be generated over 10 weeks (see section 3.3.1). As discussed in section 6.1, there is the potential for contaminants to be released into the marine environment during dredging, handling, and transportation and transfer mismanaged; especially when lifting the materials to land Glebe Island (see section 1.1).

There is also the potential for overspill while the materials are in transit either to Glebe Island or the Sydney Offshore Spoil Ground (see section 1.1). A Sediment and Water Quality Management Plan would be used to deal with this risk.

If disposed on land (see section 3.3.5), the dredged sediment would be kept on a barge while a polymer is added to reduce its water content. This would result in bulking the material (e.g. its overall volume would increase). Where possible prior to removal of sediment, the material would be waste classified and if ASS is present based on sampling data and confirmation from NSW EPA that the material meets general solid waste criteria (see Safeguard 48).

The sediment would also be tested to confirm its final waste classification and ASS content. This would ensure the dredged sediment would be disposed of at an appropriately licenced waste facility.

Under either disposal option (see section 1.1), there would be the risk of material over spill from the barges while in transport. Works would therefore be managed under a Sediment and Water Management Plan to reduce impacts (see Section 6.1).

Other waste generation and management

Other wastes would be limited to small quantities of common materials including small amounts of wood, paper, and metal, surplus building and packaging materials (e.g. pallets, crates, cartons, plastics, wrapping materials). It would also include small amounts of waste chemicals and oils (e.g. oil absorbent materials, oily rags, cartons) and domestic and food waste.

Landside ancillary facilities would be contained within a small compound on the OPT site that would include a small shipping container to store equipment and machinery. No significant landside storage of materials is anticipated at the OPT. During installation of mattresses for both options (see Section 3.3.6), concrete would be trucked to site pre-mixed where it would be pumping into the mattresses.

Materials would generally be barged to site, including fuels, oils and other required liquids which would be stored in bunded containers on the vessels. All waste removed from the site would be transferred by a licenced contractor to a licenced facility. Some materials and fuels would also be stored at the compound on Glebe Island within bunded containers.

6.9.4 Safeguards and management measures

Table 37 lists the spoil, dredging and waste management safeguards and management measures that would be implemented to protect the aquatic environment to account for the impacts identified in section 6.9.3.

Table 37: spoil, dredging and waste management safeguards and management measures

Ref.	Impact	Environmental safeguard	Responsibility	Timing
47	Waste	The SWMP would include measures to ensure the dredged material is correctly stored in the barges when they are being transported either to Glebe Island or offshore to limited overspill impacts.	Contractor	Pre-construction/ construction
48	Waste	Waste management, littering and general tidiness would be monitored during routine site inspections.	Contractor	Construction
49	Waste	Appropriate measures to avoid and minimise waste associated with the project should be investigated and implemented where possible.	Contractor	Construction
50	Waste	Waste would be classified before being disposed offsite to an appropriately licenced facility in accordance with Waste Classification Guidelines: Part 1 Classifying Waste (DECCW, 2014). Where necessary, this would include sampling and analysis. Where possible the material to be dredged will be classified prior to dredging based on sampling data and confirmation from NSW EPA that the dredged material meets general solid waste criteria. A waste classification report would include an unexpected finds protocol requiring further sampling and analysis should this occur.	Contractor	Construction
51	Waste	The dredged sediment would be kept on a barge while a polymer is added to reduce its water content if it is being disposed on land. The material transfer between the barge and quayside would be carefully managed to limit spill back into the marine environment. A pre and post hydrographic survey would be carried out to ensure the overall depth has not been impacted. The difference would be confirmed with Port Authority of NSW and if unacceptable additional levelling or dredging would be needed to prevent future operational performance.	Contractor	Construction

6.10 Hazards and risks

This section describes the potential hazards and risks associated with the proposal.

6.10.1 Method

The assessment considered hazards and risks relating to the provisions of the NSW *Work Health and Safety Act 2011*.

6.10.2 Existing environment

Since 2011, cruise ships have mainly berthed at the terminal under Azipod and bow thruster power only, rather than with the assistance of tugs. Recent hydrographic and diver surveys identified that scouring is occurring at both the southern and northern end of the OPT berth pocket. There is also evidence of loss of the existing scour protection, deposition of large rocks and slumping of an embankment into the berth pocket at the southern end due to scouring.

The observed scour and accretion can be attributed to:

- Significant increase in vessel size and changes in vessel power and berthing configurations since the construction of the berth in 1959.
- Use of Azipods and thrusters since 2011.

The identified scour and accretion issues pose potential hazards to vessel operations. This includes the potential for further decreasing the under-keel clearance for incoming cruise ships. There is a need for safe, efficient and reliable berthing to ensure the ongoing operation of the OPT

The OPT is currently managed in accordance with a hazards and safety management plan implemented by Port Authority of NSW.

6.10.3 Potential impacts

The following hazards and risks would be associated with the proposal:

- Construction materials, wastes, and other objects have the potential to fall from the vessels and landside works during construction. This has the potential to cause water pollution and risk to human health, including navigational safety risks for other boats in Circular Quay, Sydney Harbour and Glebe Island.
- Physical injury to construction workers and public walking within the area due to various hazards and risks associated with the construction activities.
- Extreme weather resulting in damage to vessels involved in dredging and piling works.
- Disturbance, loading and transport of contaminated sediment through Sydney Harbour to Glebe Island potentially resulting in a pollution risk from an accident or spillage.
- Loss of containment of other polluting materials (e.g. oils and diesels) from construction vessels.

6.10.4 Safeguards and management measures

Table 38 lists the hazard and risk safeguards and management measures that would be implemented to account for the impacts identified in section 6.10.3. These supplement the other safeguards and management measures described above to mitigate against some of the above hazards.

Table 38: hazard and risk safeguards and management measures

Ref.	Impact	Environmental safeguard	Responsibility	Timing
52	Hazards and risks	Marine spill kits would be kept within the construction and compound area.	Contractor	Construction
53	Hazards and risks	Emergency equipment such as first aid kits and flotation devices would be kept within the construction and compound area.	Contractor	Construction
54	Hazards and risks	**Work Safety Method Statements** or similar would be used to manage any health and safety risks associated with the works.	Contractor	Construction
55	Hazards and risks	A **Safety Plan** would be put in for extreme weather conditions this would involve measures to safely close-down the site, secure/remove all equipment and machinery and demobilise offsite.	Contractor	Construction
56	Hazards and risks	Barge loading activities would be closely monitored.	Contractor	Construction

6.11 Odour

This section describes the potential odour impacts associated with the proposal.

6.11.1 Method

A qualitative review of the duration and method of dredging activity and the proximity of sensitive receivers has been carried out to determine potential impacts.

6.11.2 Existing environment

The existing odour environment at the OPT is influenced by the harbour and marine transport activity, as well as commercial kitchens in nearby restaurants and bars.

The prevailing wind direction in the area is north-east (see section 6.1.2). Wind conditions during dredging would affect any generated odour.

There are limited sensitive residential receivers within near the dredging activity (see section 6.3.2); the closest of which is at the Rocks on George Street, about 160 m from the OPT site. Given the location of the OPT in Circular Quay, there would be transient sensitive receivers, such as tourists and locals using the numerous local commercial and recreational facilities.

6.11.3 Potential impacts

Overseas passenger terminal

During dredging, there would be the potential for organic matter and hydrocarbons in the sediment to become odorous on contact with the air (see section 6.1.2 for a summary of sediment chemistry). This has the potential to generate odour impacts near the dredging activity and while the material is being transported. The amount of odour generated would depend on several factors including the content and composition of the dredged materials, the dredging rate and loading times, and the prevailing wind direction and strength.

If dredging takes place under prevailing wind directions, any odour impacts would be most likely experienced by receivers to the south-west of the OPT, including recreational areas within Circular Quay.

Odour maybe generated periodically over the planned 10-week dredging program (see section 3.3.1). Once barges are fully loaded, they would move away from the area of Circular Quay and travel towards Glebe Island or the Sydney Offshore Spoil Ground. As any odour would be associated with the dredged materials, any potential impact would likely end once the material is removed from Circular Quay.

Transport movements

Odour impacts are also not expected when the dredged materials are being transported either to Glebe Island or offshore. Any perceptible odours from people in the vicinity of the material being transported would last for a very short time. Also, the wetting of the dredged material to prevent the generation of ASS (see section 6.1.3) would help reduce odour emissions.

6.11.4 Safeguards and management measures

Given the low potential for odour impacts, no specific odour safeguards or management measures are required for the proposal. However, the SWMP proposed under section 6.1 would include controls over the generation of acid sulfate soils from the dredged material to ensure the potential for odour impacts are managed.

6.12 Other impacts

The proposal is expected to have a negligible to minor impact in relation to:

- Air quality
- Greenhouse gasses
- Climate change adaptation.

The proposed works would generate negligible emissions from machinery. The number of heavy vehicles and plant would not be significant enough to generate a negative impact on air quality or have a significant contribution to local greenhouse gas emissions.

Works to install scour protection would contribute to improving the resilience of the OPT berth and quay wall against the impacts of climate change.

6.12.1 Existing environment and potential impacts

This section describes existing environment and potential impacts associated with the other environmental aspects where there is expected to be a negligible to minor impact. These are outlined in Table 39 below.

Table 39: other impacts

Environmental factor	Existing environment	Potential impacts
Air quality	The nearest Environment, Energy and Science air monitoring station to the proposal site is Cook and Phillip Sydney. This is categorised as part of the Sydney central-east region and has been temporarily set up since early September 2019. A review of the air quality data for month of November 2019[5] indicates the air quality is generally good-to-poor, considering the Air Quality Index (AQI) rating range of 34-149. Poor air quality is measured from 100 to 149 AQI. The poor AQI for November however is not representative of a typical month due to the significant bushfires occurring within New South Wales.	Temporary impacts may occur throughout construction from equipment and construction vehicle emissions. The potential for dust generation from the works is considered negligible as the dredged sediment would be waterlogged and would be kept damp, as required, during transport management.

[5] At time of writing, November 2019 was the most current month for which a full set of data was available.

Environmental factor	Existing environment	Potential impacts
Greenhouse gas	Greenhouse gas emissions remain a point of State and National policy. Emissions within the area of the OPT and the Rocks are dominated by vehicle movements emissions from vessels using Circular Quay.	Construction of the proposal would result in very minor greenhouse gas emissions via consumption of materials and use of required plant and equipment.
Climate change adaptation	The long-term use of the OPT as a cruise ship terminal is expected to continue.	The proposal includes climate change adaptation in its design by including protection from hydraulic impacts on the quay wall from scour protection, which will also improve the resilience of the structure from climate change related impacts.

6.12.2 Safeguards and management measures

Table 40 lists the safeguards and management measures that would be implemented to account for the impacts identified in section 6.11.1.

Table 40: other safeguards and management measures

Ref.	Impact	Environmental safeguard	Responsibility	Timing
57	Air quality	The CEMP would consider and address management measures for air quality during construction. The plan would outline procedures for work during various weather conditions.	Contractor	Construction

6.13 Cumulative impacts

Cumulative impacts relate to any combined impact resulting from multiple individual sources. These sources can occur in the present or future in comparison to the construction and operation of the proposal.

The consideration of cumulative impacts is required to assess this combined impact in the context of the region.

6.13.1 Study area

The study area included a search of significant development within 500-metres of the proposal footprint.

6.13.2 Past, present and future projects

The following databases were searched to identify any projects that may result in a cumulative impact with the proposal:

- Department of Planning, Industry and Environment major projects register
- Sydney and Regional Planning Panels Development Assessment register
- Infrastructure NSW projects
- City of Sydney development application register
- Key agency development including focussing on Transport for NSW and Sydney Trains.

Most projects involved minor alterations or would not generate impacts that would significantly affect the surrounding area by the time the proposed works are carried out. As such, only the projects outlined in Table 41 were considered to have the potential to have a cumulative impact in combination with the proposal.

Table 41: present and future projects

Project	Construction impacts	Operational impacts
Overseas passenger terminal site		
Sydney Opera House Concert Hall upgrade The upgrade involves the renovation of the Concert Hall in the Sydney Opera House. This includes implementing new theatre machinery and staging system. ***The renewal works are expected to begin in 2020.***	Construction impacts would be limited to Sydney Opera House staff and patrons only. As the works focus on the interior of the building, it is unlikely that there will be impacts to visitors of the wider Circular Quay. The number of visitors to the area may be reduced during this time as the Concert Hall will be closed. The delivery of construction materials and presence of heavy vehicles near the Sydney Opera House may impact the traffic and accessibility of the area.	No operational impacts are anticipated.
Walsh Bay Arts & Culture Precinct Construction on Wharf 4/5 began in 2018 and involved refurbishing the arts facilities, introducing new retail options and redesigning the general facilities. Pier 2/3 works commenced in 2019 and involves constructing new arts facilities and performance venues. ***The precinct is expected to open mid-2020.***	The works will be taking place in the wharf area in Walsh Bay, with most of the construction focused on the interior of the buildings. The number of visitors to the area may be reduced during this time as some of the theatres will be closed. Based on the timeframe, works won’t significantly overlap with the proposal. The delivery of construction materials and presence of heavy vehicles near Walsh Bay may impact the traffic and accessibility of the area.	No operational impacts are expected.

Project	Construction impacts	Operational impacts
Circular Quay Precinct Renewal NSW Government propose to upgrade Circular Quay ferry wharves. ***The renewal works are expected to take place in the future and not within the proposal programme***	Works would be within circular Quay, and construction impacts would include disruption to land and water-based traffic. The delivery of construction materials and presence of heavy vehicles would impact local traffic. There would be visual amenity and socio-economic impacts from noise, dust and closure of parts of the walkway. However, as the construction of the upgrade is not due to commence during the timing of the proposal there would be no cumulative construction impacts	No operational impacts are expected.
Glebe Island		
Western Harbour Tunnel and Warringah Freeway Upgrade Upgrades to the Warringah Freeway and new tunnel crossing of Sydney Harbour. Works would also include improved performance on the Anzac Bridge ***Not yet approved. Works are expected to commence late 2020.***	The works would generate traffic disruption impacts, marine traffic impacts and noise and air quality impacts on nearby residents.	No negative operational impacts are expected but would provide a positive impact for commuter travel time and connection across Sydney.
Glebe Island Concrete Batching Plant and Aggregate Handling Facility A new aggregate and concrete handling building facility adjacent to the proposed multi use facility proposal ***Not yet approved – construction start unknown***	The works would generate traffic disruption impacts, noise and air quality impacts on nearby residents.	The proposal would likely have visual, air quality and noise impacts on nearby residents

Project	Construction impacts	Operational impacts
Multi-User Facility (by Port Authority) A new multi-use facility at Glebe Island for storage of dry construction materials adjacent to berths 1 and 2 and the Proposal. ***Works are expected to commence mid-2020 and be operational in mid-2021.***	Construction works would be within Glebe Island adjacent to the nominal Proposal compound. Construction impacts would include disruption to traffic and delays for commuters. Works would also generate dust and noise impacts on residents adjacent to the site and workers on Glebe Island.	Key operational impacts are related to visual effects, noise and air quality.
WestConnex: Rozelle Interchange The third stage of WestConnex will link the M4 at Haberfield to the New M5 Motorway at St Peters. This comprises a new tunnel and interchange at Rozelle Bay. ***Tunnelling commenced in the 1st quarter of 2020 and works will continue until 2023.***	Works would mainly be within the Rozelle rail yards site. Construction impacts would include disruption to traffic and delays for commuters. Works would also generate dust and noise impacts on residents adjacent to the site and workers in the area.	No negative operational impacts are expected but would provide a positive impact for commuter travel time and connection across Sydney.
Sydney Metro West The new underground metro will connect Greater Parramatta with the Sydney CBD. The metro will extend under Sydney Harbour, through to new stations in the CBD, including a station in the Bays Precinct near the White Bay Power Station. ***Works are expected to commence late 2020, largely outside the proposal programme.***	Construction impacts associated with Sydney Metro West are expected to comprise traffic impacts from heavy vehicles, noise and dust effects.	No operational impacts are expected. Once in operation benefits would be provided in high speed public transport across Sydney.

6.13.3 Potential impacts

Table 42 outlines the possible cumulative impacts. Proposal activities at Glebe Island are being undertaken under an existing 2013 Part 5 approval.

Table 42: potential cumulative impacts

Environmental factor	Construction impacts
Socioeconomic	There are unlikely to be any cumulative socio-economic impacts as a result of the proposal and the other projects in the vicinity of the OPT due to the short program length and limited scale of the planned works.
Traffic and transport	There are unlikely to be any significant cumulative traffic and transport impacts as a result of the proposal and the other projects in the vicinity of the OPT, given the nature of the other projects and the minor amount of construction related traffic associated with the proposal due to the short program length and limited scale of the planned works.
Air quality	The Proposal would have negligible impacts on air quality and dust generation and therefore cumulative effects on air quality from other projects would be unlikely.
Noise	There are unlikely to be any significant cumulative noise impacts as a result of the proposal and the other projects in the vicinity of the OPT.

6.13.4 Safeguards and management measures

There are unlikely to be any significant cumulative impacts as a result of the proposal. Safeguards and management measures are therefore not considered necessary.

7 Environmental management

This Chapter describes how the proposal would be managed to reduce potential environmental impacts throughout detailed design, and construction. A framework for managing the potential impacts is provided. A summary of site-specific environmental safeguards is provided, and the licence and/or approval requirements required prior to construction are also listed.

7.1.1 Environmental management plans

Several safeguards and management measures have been identified in the REF to minimise adverse environmental impacts, including social impacts, which could potentially arise because of the proposal. Should the proposal proceed, these safeguards and management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

A construction environmental management plan (CEMP) will be prepared to describe the safeguards and management measures identified. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The CEMP will be prepared prior to construction of the proposal and must be reviewed and certified by Port Authority of NSW before starting any onsite work. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements.

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures outlined in this REF would be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed work on the surrounding environment. The safeguards and management measures are summarised in Table 43. In addition to the measures below the contractor would need to secure:

- Harbour Master approval under Clause 67ZN of the Ports and Maritime Administration Regulation 2012 (see Table 12) prior to any disturbance of the seabed.
- An excavation permit under section 140 of the NSW *Heritage Act 1977*.
- An environmental protection licence under Part 3.2 of the NSW *Protection of the Environment Operations Act 1997* would be required only for Option 1 (land disposal.

Offshore disposal under Option 2 would take place in Commonwealth Waters. The Australian Government Department of Agriculture, Water, and Environment (DAWE) would need to permit the ocean disposal under the *Environment Protection (Sea Dumping) Act 1981*.

Table 43: Summary of site-specific environmental safeguards

Ref	Impact	Environmental safeguard	Responsibility	Timing
General				
A	General	A **Construction Environmental Management Plan** (CEMP) would be prepared prior to construction. This would provide the safeguards and measures identified below and address pollution, contamination and disturbance to receivers that may arise during construction. As a minimum the CEMP would address the: • Any requirements associated with statutory approvals • Details of how the project will implement the identified safeguards outlined in the REF • Issue-specific environmental management plans • Roles and responsibilities • Communication requirements • Induction and training requirements • Procedures for monitoring and evaluating environmental performance, and for corrective action • Reporting requirements and record-keeping • Procedures for emergency and incident management • Procedures for audit and review. The endorsed CEMP will be implemented during the undertaking of the activity.	Contractor	Pre-construction
B	General	All businesses, residential properties and other key stakeholders (e.g. schools, local councils) affected by the activity will be notified at least 10 working days prior to commencement of the activity. The contractor would provide the information needed to support any notification and consultation requirements.	Port Authority of NSW/ contractor	Pre-construction
C	General	All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular	Contractor	Pre-construction

Ref	Impact	Environmental safeguard	Responsibility	Timing
		"toolbox" style briefings.		
1	Sediment and water	A **Sediment and Water Management Plan** (SWMP) would be prepared and implemented as part of the CEMP. The SWMP would outline all reasonably potential risks relating to sediment erosion and water pollution and describe how to address these risks throughout construction.	Contractor	Pre-construction/ construction
2	Sediment and water	The SWMP would include turbidity monitoring requirements that would be implemented before starting the dredging works and maintained throughout. The plan would involve the following steps and activities: Develop and submit a **Water Quality Monitoring Plan** to Port Authority of NSW at least one month before deploying instrumentation. Establish turbidity monitoring system to capture (baseline) data before starting work and while the work is taking place. As a minimum the system would comprise monitoring equipment, buoys, anchoring system, data management, timing, quality assurance and an equipment failure plan. Install and commission the water quality monitoring instrumentation at least 10 days before starting dredging. Operate the equipment for up to 14 days or as agreed with Port Authority of NSW after the completion of post dredge clearance survey. Fit a water sensor at each monitoring location to record turbidity. The sensors would be installed approximately 1 m below the surface. Deploy twin turbidity sensors at each monitoring location to allow the collection of two independent data sources. The two data sources shall undergo automatic processing noting that: • Any difference in turbidity readings within 20% then the average value shall be used • If the difference in turbidity readings is greater than 20%, then the minimum value shall be used. • Calibrate and clean water quality sensors as required, just prior to dredging and no longer than two-week intervals. • Ensure the water quality loggers provide continuous logging of data, with anti-fouling guards and sensor wiping apparatus to prevent interference to sensors from marine growth. • Carry out continuous water quality monitoring for each location and data shall be fed live onto a	Contractor	Pre-construction/ construction

Ref	Impact	Environmental safeguard	Responsibility	Timing
		secure website and processed for real-time viewing by key project personnel and Port Authority of NSW. • Ensure the water quality monitoring system provides automatic instantaneous notifications to identify when the water quality thresholds are met or exceeded. • Controls for sediment and rock debris. • Controls to avoid concrete pour spills. • Oil/fuel/chemical storage and spill management. • Machinery and engine maintenance schedule to minimise risk of oil/fuel leakage. • Response for accidental waste/material overboard (e.g. construction materials fallen into harbour).		
3	Sediment and water	Turbidity limits would be in accordance with Table 3.3.3 of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality Volume 1 (ANZECC, 2000) and (in the absence of local limits) the relative increase criteria is set out under Turbidity Water Quality Standards Criteria Summaries; A Compilation of State/Federal Criteria (USEPA, 1998) where relative to background concentrations the following would be achieved: • *Seven-day rolling average criterion*: no more than a 5 nephelometric turbidity units (NTU) increase • *24-hour rolling average criterion*: No more than a 10 NTU increase • *Instantaneous criterion*: No more than a 10% increase when background concentrations are above 50 NTU or above.	Contractor	Pre-construction/ construction
4	Sediment and water	Should the monitoring record an exceedance of the instantaneous criterion or detect an abnormal reading at the ‘near field’ monitor then: • Dredging works and any water discharge would stop • Work would only recommence once the near-field readings had stabilised/normalised over a 30-minute period and the there was also no exceedance of the instantaneous criterion for the same period.	Contractor	Pre-construction/ construction

Ref	Impact	Environmental safeguard	Responsibility	Timing
5	Sediment and water	Should the monitoring record an exceedance of the 24-hour or seven-day rolling average criteria then: • Dredging would stop if there were three exceedances of either criteria within a 24-hour period. • Work would only recommence once limits had dropped to below the associated criteria relative to the rolling average.	Contractor	Pre-construction/ construction
6	Sediment and water	A silt boom would be installed around the backhoe dredger bucket when dredging the harbour bed. The boom would only be removed when dredging work is complete or if required for maintenance once the sediment concentrations in the water column inside the silt boom had dropped to below the 24-hour rolling average criterion described in **safeguard 3** above.	Contractor	Construction
7	Sediment and water	A silt boom would also be placed around the vessel when unloading materials onshore if the option is taken to dispose of the material on land via Glebe Island. The material transfer between the barge and quayside would be carefully managed to limit any transfer loss into the marine environment.	Contractor	Construction
8	Sediment and water	An **Acid Sulfate Soil Management Plan** (ASSMP) would be prepared in line with the requirements of the Acid Sulphate Soils Management Advisory Committee Guidelines (ANZECC/ARMCANZ 2000) and implemented as part of the CEMP. Sediment would be kept damp to reduce potential oxidisation. This includes during the period when the sediment would be temporarily stored at Glebe Island or transported offsite. Sediment would be monitored during transit. Where required the sediments would be sprayed with sea water and kept moist to prevent drying out. It would also include the need for adequate sampling and testing prior to disposal in line with the wider requirements of **safeguard 50** below to classify waste before disposal in accordance with Waste Classification Guidelines: Part 1 Classifying Waste (DECCW, 2014). Where possible the material to be dredged will be classified prior to dredging based on sampling data and confirmation from NSW EPA that the dredged material meets general solid waste criteria.	Contractor	Detailed design/pre-construction

Ref	Impact	Environmental safeguard	Responsibility	Timing
9	Sediment and water	Weather forecasts would be frequently checked during construction. Should severe weather be forecasted, works would stop, and all equipment and materials would be removed from the construction area or secured.	Contractor	Construction
10	Water quality	A **Spill Management Plan** would be prepared, implemented as part of the CEMP and communicated to all staff working on site. Any spill, whether it occurred in water or on land and subsequently entered the water, must be immediately reported to Sydney Vessel Traffic Service (VTS). Aquatic spill kits are to be kept on site during construction.	Contractor	Construction
11	Water quality	All equipment and machinery would be maintained in good condition and regularly inspected visually for leaks.	Contractor	Construction
12	Water quality	Any fuels or chemicals stored on Glebe Island, at the OPT or on barges, would be stored in a bunded area to prevent any chemical leaks or spills entering the water.	Contractor	Construction
13	Water quality	Work involving barges and piling should take place during calm conditions and at night where possible to minimise scouring and other impacts.	Contractor	Construction
14	Aquatic biodiversity	A **Marine Ecology Management Plan** would be prepared as part of the CEMP. This would include, but not limited to, measures relating to the following activities: • Aquatic fauna management • Biological hygiene (e.g. prevention of noxious species spreading on and off site)	Contractor	Pre-construction
15	Biodiversity	If a previously unidentified threatened aquatic species is observed in the proposal footprint during construction works would temporarily stop until a suitably qualified expert has advised that works can recommence.	Contractor	Construction

Ref	Impact	Environmental safeguard	Responsibility	Timing
16	Biodiversity	Work would stop if large aquatic fauna is observed nearby.	Contractor	Construction
17	Biodiversity	Gradual start-up piling to allow undetected aquatic fauna to move away from the area.	Contractor	Construction
18	Pest species	Equipment and machinery would be locally sourced and/or procured from areas where the risk of introducing pest species is low. Regular inspection of machinery, materials and equipment would be carried out where needed to ensure the importation of pests or weeds to the area is prevented.	Contractor	Construction
19	Biodiversity	Positioning work barges, drilling and pile driving should occur during calm conditions.	Contractor	Construction
20	Noise	A **Construction Noise and Vibration Management Plan** would be prepared and implemented as part of the CEMP. This will specify the actual plant to be used and will include updated estimates of the likely levels of noise and the scheduling of activities. The Plan would include: • All potential significant noise and vibration generating activities associated with the activity • Feasible and reasonable mitigation measures to be implemented • A monitoring program to assess performance against relevant noise and vibration criteria. • Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures, and contingency measures to be implemented in the event of non-compliance with noise criteria.	Contractor	Pre-construction
21	Noise	Electric/hydraulic equipment would be used where possible using the smallest equipment as is practical. All plant and equipment used on site would be: • Maintained in a proper and efficient condition. • Operated in a proper and efficient manner. • All vehicles, plant and equipment would be turned off when not in use.	Contractor	Construction

Ref	**Impact**	**Environmental safeguard**	**Responsibility**	**Timing**
22	Noise	The offset distance between noisy plant and adjacent sensitive receivers would be maximised. Plant used intermittently would be throttled or shut down. Noise-emitting plant would be directed away from sensitive receivers where possible. Truck movements and haulage routes would be planned to avoid residential streets where possible.	Contractor	Construction
23	Noise	Non-tonal reversing beepers (or an equivalent mechanism) would be fitted and used on all mobile site-based vehicles, plant and equipment.	Contractor	Construction
24	Noise and vibration	All works would be scheduled with the aim of avoiding particularly noisy works (installing the sheet piling, stabilising the embankment, and dredging) after 10pm and before 6am, noting that these works will likely have to take place at night due to safety and operational reasons. Piling and particularly noisy works would be restricted and not undertaken between 12pm and 2pm.	Contractor	Pre-construction
25	Noise and vibration	Advanced warning of works and potential disruptions to the community would be provided. The notification may consist of a letterbox drop (or equivalent) detailing work activities, time periods over which these will occur, impacts and mitigation measures. This would be in accordance with the provisions in **Safeguard B** above.	Contractor/Port Authority of NSW	Pre-construction
26	Light spill	Direction of lighting would be controlled to limit light spill from nearby receivers such as residencies in the Rocks and take into consideration any reflective impacts from the water.	Contractor	Construction
27	Landscape character and visual amenity.	The shipping container at the OPT would be stored for the duration of the works and would be screened where possible to reduce visual impacts for pedestrians and ferry users accessing the area.	Contractor	Construction

Ref	Impact	Environmental safeguard	Responsibility	Timing
28	General socio-economic impacts	A **Communication Plan** would be prepared and implemented as part of the CEMP to help provide timely and accurate information to stakeholders prior to and during construction.	Contractor/Port Authority of NSW	Pre-construction
29	Social impacts	Access to neighbouring businesses would be maintained during construction, any temporary constraints to access would be communicated ahead of time.	Contractor/Port Authority of NSW	Pre-construction/ construction
30	Socio-economic impacts	The maritime exclusion zone would be clearly defined as part of the **Marine Works Management Plan** (see **Safeguard 45** below) and communicated to relevant stakeholders to delineate access restrictions for surrounding water users.	Contractor/Port Authority of NSW	Pre-construction/ construction
31	Socio-economic impacts	The works would be scheduled to maintain public access to Circular Quay and the wharf frontage where feasible and reasonable; especially during peak and event periods.	Contractor	Pre-construction/ construction
32	Non-Aboriginal heritage	A permit under section 140 of the NSW Heritage Act would be obtained prior to the commencement of dredging and scour protection works.	Port Authority NSW	Pre-construction
33	Non-Aboriginal heritage	The remains of the wharf on the harbour bed would be recorded before starting construction to help understand the site formation processes associated with the demolition of the wharf.	Contractor	Pre-construction
34	Non-Aboriginal heritage	An archaeologist would inspect, and record elements associated with the timbers before their removal to better-understand the construction techniques used.	Contractor	Construction

Ref	**Impact**	**Environmental safeguard**	**Responsibility**	**Timing**
35	Non-Aboriginal heritage	As part of the early works, and once the timbers on the harbour bed had been removed, a series of maritime archaeological test transects would be used to understand the potential for relics, patterning and dispersal of relics across the site. This information would be held as a record to support an application made under section 140 of the *Heritage Act 1997*, to secure permission to excavate or disturb land that would likely "result in the discovery, movement and/or destruction of [a heritage] relic". Dredging work would only be allowed to take place once the Heritage Council of NSW gives its permission under the Act.	Port Authority of NSW	Pre-construction
36	Non-Aboriginal heritage	If it is not possible to carry out the pre-construction investigations under **safeguard 35** above, then the contractor would work with Port Authority of NSW and a heritage specialist to develop an agreed sampling program of the dredged sediment to ensure a representative sample is collected to record and recover any remaining.	Port Authority of NSW/ contractor	Construction
37	Non-Aboriginal heritage	A **Standard Management Procedure for Unexpected Heritage Items** would be followed in the event of unexpected heritage items, skeletal remains, archaeological remains or relics are encountered. This would include an adequate stop-and-start work procedure and the need to engage a qualified heritage specialist to advise on the required action.	Contractor	Construction
38	Aboriginal heritage	A **Standard Management Procedure for Unexpected Heritage Items** would be followed the event of unexpected heritage items, skeletal remains, archaeological remains or relics are encountered. This would include an adequate stop-and-start work procedure and the need to engage a qualified heritage specialist to advise on the required action.	Contractor	Construction
39	Aboriginal heritage	Should any Aboriginal objects be identified at any stage of the project, an Aboriginal Heritage Impact Permit (AHIP) maybe required under Section 90 of the *National Parks and Wildlife Act 1974*. This would be obtained in accordance with the requirements of the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011) and the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010a).	Contractor and Port Authority	Construction

Ref	Impact	Environmental safeguard	Responsibility	Timing
40	Land transport and parking	A **Traffic Control Plan** would be prepared and implemented for the OPT in accordance with the Traffic Control at Work Sites manual (Roads and Maritime, 2018) and the Australian Standard 1742.3 (Manual of uniform traffic control devices, 2019). This would involve items such as installing appropriate wayfinding signage for alternative transport options where necessary. The Traffic Control Plan would also include pedestrian access management at the OPT and provision of diversion signs, and safe access around the OPT to avoid construction works.	Contractor	Pre-construction/construction
41	Land transport and parking	The **Traffic Control Plan** would be developed in consultation with and to the satisfaction of Port Authority of NSW.	Contractor	Pre-construction/construction
42	Land and water transport	Equipment and materials would be transported to site via boat and/or barge when possible to reduce land transport and impacts to local road networks.	Contractor	Construction
43	Water transport	Harbour master approval would be obtained under Clause 67ZN of the Ports and Maritime Administration Regulation 2012 prior to any disturbance of the seabed.	Contractor	Pre-construction/construction
44	Water Transport	Transport for NSW would be notified prior to enabling works for access restrictions to Commissioners Steps.	Contractor	Pre-construction
45	Marine works management	A **Marine Works Management Plan** (MWMP) would be developed by the contractor in consultation with the Harbour Master, Transport for NSW (Maritime) and other relevant stakeholders. The stakeholders would define specifics such as exclusion zones, methods of marking the zones, clearance distances, mooring plans, communication protocols, emergency and incident response procedures, contact details of all parties and responsible persons, and transit routes. The MWMP would be approved by the Harbour Master in advance of the works commencing. Harbour Master approval will also be required under Clause 67ZN of the Ports and	Contractor	Pre-construction/construction

Ref	Impact	Environmental safeguard	Responsibility	Timing
		Maritime Administration Regulation 2012 prior to any disturbance of the seabed.		
46	Water transport	A **Marine Traffic Control Plan** would be developed and implemented in consultation with the Harbour Master, Transport for NSW and other relevant stakeholders to accommodate the works, vessel movements and safety requirements. This plan would: • Ensure that vessel speeds would comply with the Harbour Master requirements within Circular Quay and Sydney Harbour. Vessels within the proposal footprint would also be restricted in speed. • Respond to the navigational requirements set out in the Port Information for Sydney Harbour & Botany Bay (Port Authority of NSW, 2015). • Include the requirement of the maritime navigational exclusion zone established before starting construction in accordance with the Harbour Master approval. • Include the required methods of communication with the Harbour Master to manage the additional vessel movements within the Shipping Channels. Shipping schedules would be forwarded and agreed in advance.	Contractor	Pre-construction/construction
47	Waste	The SWMP would include measures to ensure the dredged material is correctly stored in the barges when they are being transported either to Glebe Island or offshore to limited overspill impacts.	Contractor	Pre-construction/ construction
48	Waste	Waste management, littering and general tidiness would be monitored during routine site inspections.	Contractor	Construction
49	Waste	Appropriate measures to avoid and minimise waste associated with the project should be investigated and implemented where possible.	Contractor	Construction

Ref	Impact	Environmental safeguard	Responsibility	Timing
50	Waste	Waste would be classified before being disposed offsite to an appropriately licenced facility in accordance with Waste Classification Guidelines: Part 1 Classifying Waste (DECCW, 2014). Where necessary, this would include sampling and analysis. Where possible the material to be dredged will be classified prior to dredging based on sampling data and confirmation from NSW EPA that the dredged material meets general solid waste criteria. A waste classification report would include an unexpected finds protocol requiring further sampling and analysis should this occur.	Contractor	Construction
51	Waste	The dredged sediment would be kept on a barge while a polymer is added to reduce its water content if it is being disposed on land. The material transfer between the barge and quayside would be carefully managed to limit spill back into the marine environment. A pre and post hydrographic survey would be carried out to ensure the overall depth has not been impacted. The difference would be confirmed with Port Authority of NSW and if unacceptable additional levelling or dredging would be needed to prevent future operational performance.	Contractor	Construction
52	Hazards and risks	Marine spill kits would be kept within the construction and compound area.	Contractor	Construction
53	Hazards and risks	Emergency equipment such as first aid kits and flotation devices would be kept within the construction and compound area.	Contractor	Construction
54	Hazards and risks	**Work Safety Method Statements** or similar would be used to manage any health and safety risks associated with the works.	Contractor	Construction
55	Hazards and risks	A **Safety Plan** would be put in for extreme weather conditions this would involve measures to safely close-down the site, secure/remove all equipment and machinery and demobilise offsite.	Contractor	Construction

Ref	Impact	Environmental safeguard	Responsibility	Timing
56	Hazards and risks	Barge loading activities would be closely monitored.	Contractor	Construction
57	Air quality	The CEMP would consider and address management measures for air quality during construction. The plan would outline procedures for work during various weather conditions.	Contractor	Construction

8 Justification and conclusion

This Chapter provides the justification for the proposal considering its biophysical, social and economic impacts, the suitability of the site and whether the proposal is in the public interest. The proposal is also considered in the context of the objectives of the EP&A Act, including the principles of ecologically sustainable development as defined in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

8.1 Justification

Initial justification for the proposal was provided through an assessment of the existing wharf, which was identified as needing dredging due to the need for the OPT to operate as efficiently and safely as possible to ensure ongoing operation of the OPT. Recent investigation has identified that scouring is occurring and loss of existing scour protection.

Consideration of alternatives and options was then carried out, with the preferred design of the proposal selected to best achieve the objectives outlined in section 2.3, which include preventing erosion and damage of the embankment wall, maintaining stability, and providing sufficient depth in the berth pocket. This was compared to the option of doing nothing, installing only a sheet pile retaining wall at the southern end of the OPT berth, dredging and options for disposing the dredged materials. .

Potential environmental and social impacts resulting from construction of the proposal would be minimised through the safeguards and management measures outlined in Chapter 7.

The following sub-headings consider the proposal's justification in the context of the impacts and benefits of the proposal.

8.1.1 Social factors

The proposal would result in temporary social impacts whilst being built. Notably, this would include temporary disruption to private commercial vessel users at Commissioners Steps and Campbells Cove due to the requirement to temporarily close the wharf during works. Minor disruption to surrounding land uses would also occur. Noise and visual impacts would also be generated. However, all construction related impacts would be appropriately managed prior to and during construction.

8.1.2 Biophysical factors

As discussed in Chapter 6, no significant impacts have been identified. Minor impacts would be managed through the safeguards and management measures outlined in these sections.

8.1.3 Economic factors

The proposed works to the OPT berth would facilitate the continued safe berthing of cruise ships at the OPT, contributing to the local economy.

Design of the dredging and scour protection works has also incorporated measures to decrease the maintenance required for ongoing operations.

8.2 Objects of the EP&A Act

Table 44: Objects of the EP&A Act

Object	Comment
5(a)(i) To encourage the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.	Through the assessment in chapter 6, it has been identified that the proposal would not significantly impact on any natural or artificial resources. The proposal facilitates the continued use of the OPT as a cruise ship terminal.
5(a)(ii) To encourage the promotion and co-ordination of the orderly economic use and development of land.	The proposal facilitates the continued use of the OPT as a cruise ship terminal.
5(a)(iii) To encourage the protection, provision and co-ordination of communication and utility services.	There will be no impacts to communication or utility services.
5(a)(iv) To encourage the provision of land for public purposes.	The proposal facilitates the continued use of the OPT as a cruise ship terminal.
5(a)(v) To encourage the provision and co-ordination of community services and facilities.	There will be no impact to community services and facilities.
5(a)(vi) To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.	An assessment of impacts on the aquatic environment was carried out. The assessment concluded that no significant impact to aquatic ecology would be caused by the proposal.
5(a)(vii) To encourage ecologically sustainable development.	Ecologically sustainable development is considered in Sections 8.2.1 to 8.2.4 below.
5(a)(viii) To encourage the provision and maintenance of affordable housing.	This object is not relevant to the proposal

Object	Comment
5(b) To promote the sharing of the responsibility for environmental planning between different levels of government in the State.	This object is not relevant to the proposal
5(c) To provide increased opportunity for public involvement and participation in environmental planning and assessment.	Community consultation has not been undertaken as part of this REF.

8.2.1 The precautionary principle

The precautionary principle includes the premise that full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage.

Through the assessment of the potential impacts of the proposal in Chapter 6, it has been demonstrated that threats of serious or irreversible environmental damage do not exist for the proposal.

Notwithstanding, to account for the subjectivity of professional judgement applied in environmental assessment and modelling uncertainty, worst-case assumptions have been incorporated into the assessment, including the following:

- Specialist assessments of noise and vibration, aboriginal and non-aboriginal heritage have been completed.
- The worst-case assumption of all noise generating construction equipment operating at the same time, at its maximum output, at a location closest to the nearest of the sensitive receivers.
- Assessing impacts and including safeguards for impacts which are exceptionally unlikely to happen such as major spills.

8.2.2 Intergenerational equity

To achieve intergenerational equity, the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The proposal facilitates the continued use of the OPT as a cruise ship terminal, which generates significant economic benefits for State.

No potential impacts to future generations would be generated by the proposal.

8.2.3 Conservation of biological diversity and ecological integrity

Conservation of biological diversity and ecological integrity has been considered through the assessment of aquatic ecology provided in section 6.2.

Providing the safeguard measures are implemented, the proposal would not have a material or significant impact on biological diversity and ecological integrity within the proposal footprint or surrounds.

8.2.4 Improved valuation, pricing and incentive mechanisms

This principle includes integrating long-term and short-term economic, environmental, social and fairness considerations into decision-making. This principle requires that environmental resources should be appropriately valued.

Environmental, economic and social issues were considered in the rationale for the proposal and design options. Construction planning for the proposal would also be progressed in the most cost-effective way.

Safeguards and management measures detailed in Chapter 6, including avoiding, reusing, recycling, managing waste during construction and operation, would be implemented.

8.3 Conclusion

The proposed dredging works at the OPT is subject to assessment under Part 5 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration (where relevant) of conservation agreements and plans of management under the NPW Act, joint management and biobanking agreements under the BC Act, wilderness areas, critical habitat, impacts on threatened species, populations and ecological communities and their habitats and other protected fauna and native plants. It has also considered potential impacts to matters of national environmental significance listed under the Federal EPBC Act.

Several potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives but would still result in some minor impacts. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also have positive impacts of improving safety for cruise ships berthing at the OPT, improving the resilience of existing assets and socio-economic benefits of facilitating the continuation of cruise ship related tourism within the city. On balance the proposal is considered justified and the following conclusions are made.

Significance of impact under NSW legislation

The proposal would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces under Division 5.1 of the EP&A Act. A Species Impact Statement is not required. The proposal is subject to assessment under Division 5.1 of the EP&A Act. Consent from Council is not required.

9 Certification

This review of environmental factors provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal.

Insert name
Position title, eg Environmental Officer
Company name
Date:

10 References

Australian Bureau of statistics, http://www.abs.gov.au (accessed 15th November 2019)

City of Sydney, 2013, Our Villages – CBD and Harbour, http://www.cityofsydney.nsw.gov.au/learn/about-sydney/our-villages/cbd-and-harbour (accessed 15th November 2019)

Engell-Sorensen, K, et al (2000), Evaluation of the effect of noise from offshore pile-driving on marine fish, bioconsultant, John, Ewaldsvej 42-44, DK-8230, Abyhoj, Tech Rep. 1980-1-031rev 2. To SEARS, Slagterivej, 25, DK-4690, Haslev

Creese RG, Glasby TM, West G and Gallen C (2009) Mapping the habitats of NSW estuaries. Industry & Investment NSW Fisheries Final Report Series 113. Port Stephens, NSW

Department of Primary Industries (Fisheries) Policy and Guidelines for Fish Habitat Conservation and Management (2013)

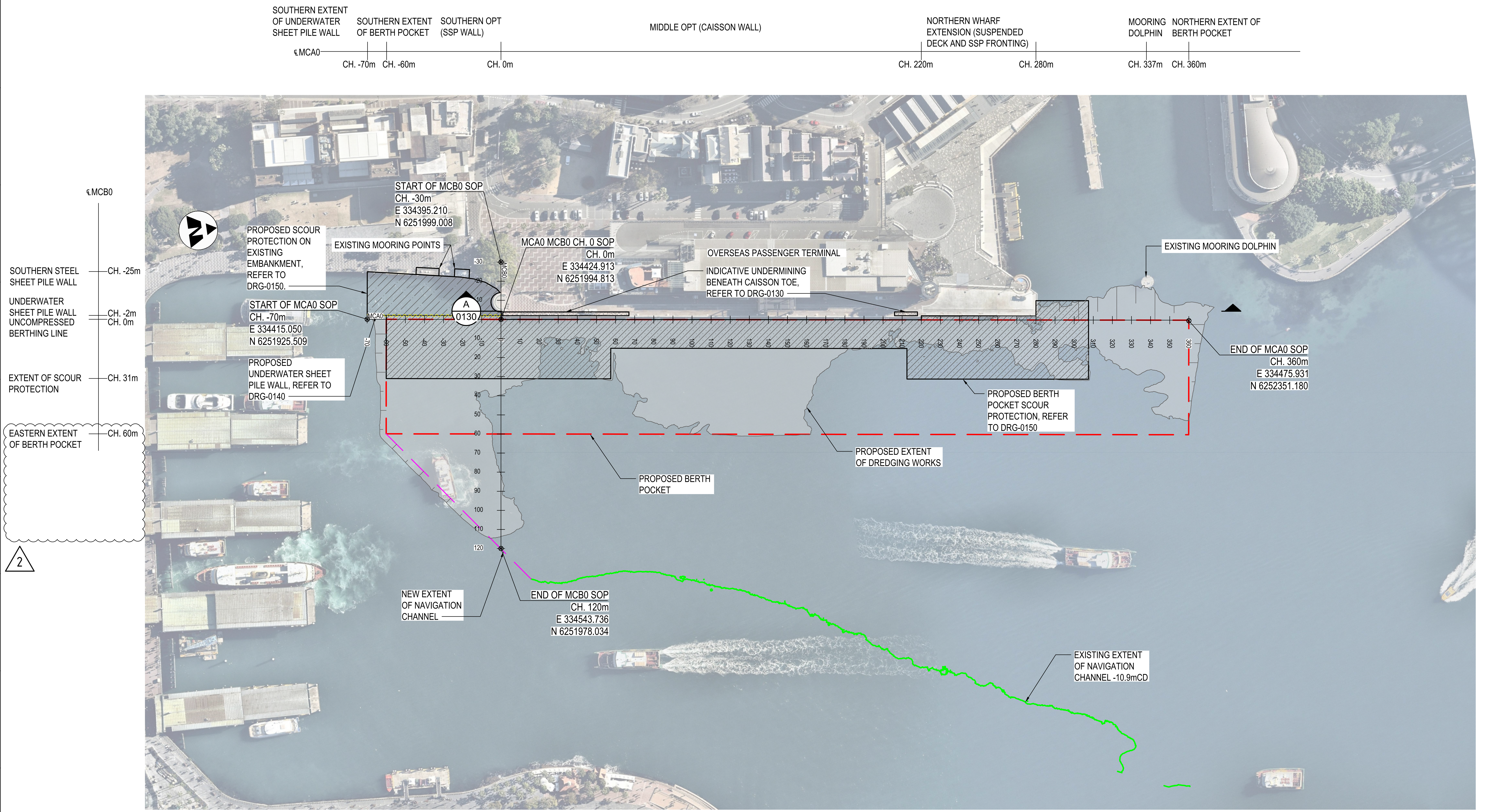
GHD, (2019) Circular Quay Investigation: Sediment Contamination Assessment Report

MetOcean Solutions, (2020) Hydrodynamic and Dredge Plume Modelling

NSW Heritage Office, (2001), Assessing Heritage Significance

NSW Heritage Office and Department of Urban Affairs and Planning (DUAP), (2002), Statements of Heritage Impact

Appendix A– Proposal Drawings



GENERAL ARRANGEMENT - PLAN

SACLE 1:1000

LEGEND:

- PROPOSED BERTH POCKET
- INDICATIVE AREA TO BE DREDGED
- PROPOSED BERTH POCKET SCOUR PROTECTION
- PROPOSED EMBANKMENT SCOUR PROTECTION
- INDICATIVE CAISSON TOE UNDERMINING

NOT FOR CONSTRUCTION

Scales: 0 — 25 — 50m A1 / A3 1:1000 / 1:2000

Design Model Version

Issue	Date	By	Chkd	Appd
0	21.02.20	JL	TD	JO
	ISSUED FOR REVIEW			
1	27.02.20	JL	TD	JO
	ISSUED FOR TENDER			
2	02.07.20	JL	TD	JO
	ISSUED FOR RE-TENDER			

Client: PORT AUTHORITY OF NEW SOUTH WALES

Job Title: OVERSEAS PASSENGER TERMINAL BERTHING INFRASTRUCTURE PROJECT

Scale at A1: AS SHOWN

Discipline: MARITIME

ARUP

Arup, Level 5, 151 Clarence St
Sydney, NSW, 2000
Tel +61 (02) 9320 9320 Fax +61 (02) 9320 9321
www.arup.com

CONSULT AUSTRALIA Member Firm
Arup Pty Ltd ABN 18 000 966 165

Drawing Title: GENERAL ARRANGEMENT

Drawing Status: Issued for Tender

Job No	Drawing No	Issue
263976-00	PGL-MADG-DRG-0110	2

Do not scale

© Arup

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

Appendix B– Consideration of Clause 228(2) Factors and Matters of National Environmental Significance

Clause 228(2) checklist

In addition to the requirements of the *Is an EIS required?* (DUAP 1995/1996) guideline and the *Marinas and Related Facilities EIS Guideline* (DUAP 1996) as detailed in the REF, the following factors, listed in clause 228(2) of the Environmental Planning and Assessment Regulation 2000, have also been considered to assess the likely impacts of the proposal on the natural and built environment.

Impact	Level of impact
a. Any environmental impact on a community?	
There would be noise impacts to residents during night-time works, which have been considered in section 6.3.4 of this REF.	Minor impacts with the implementation of the environmental safeguards noted in Table 43
b. Any transformation of a locality?	
Works are within the harbour. The operation of the OPT would remain the same.	No impact
c. Any environmental impact on the ecosystems of the locality?	
The proposal is unlikely to cause significant impact to any threatened aquatic or terrestrial species, populations or ecological communities or their habitats, as discussed in section 6.2.3 of this REF.	Minor impacts with the implementation of the environmental safeguards noted in Table 43.
d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	
There would be temporary visual impacts during the construction of the works from barges and backhoe dredgers at the OPT and Glebe Island, which have been considered in section 6.4.3 of this REF.	Minor impacts with the implementation of the environmental safeguards noted in Table 43.
e. Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?	
There would be an impact to the remains of buried material associated with Wharf No.7 within Campbell’s Cove, which have been considered in section 6.6.3 of this REF and Appendix F.	This is not considered to be a major impact as the remainder of the site located in Campbells Cove would remain unaffected including its heritage significance. A permit would be required from Heritage NSW prior to any construction works commencing.

Impact	Level of impact
f. Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)?	
Proposal footprint and compound are not located within or near any protected areas, and no threatened or key habitat is expected to occur locally, as discussed in section 6.2.3.	No impact
g. Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?	
The proposal is unlikely to cause significant impact to any threatened aquatic or terrestrial species, populations or ecological communities or their habitats, as discussed in section 6.2.3 of this REF.	Minor impacts with the implementation of the environmental safeguards noted in Table 43.
h. Any long-term effects on the environment?	
Potential impacts are considered temporary during construction works	Minor short-term impacts with the implementation of the environmental safeguards noted in Table 43.
i. Any degradation of the quality of the environment?	
The proposed works would reduce erosion impacts due to scour protection. The works are within a highly disturbed environment and whilst there is the potential for sediment plumes during dredging however, impacts are minor and temporary. These have been considered in section 6.1.3 of this REF.	Minor impacts with the implementation of the environmental safeguards noted in Table 43.
j. Any risk to the safety of the environment?	
A Marine Works Management Plan would be put in place in consultation with the Harbour Master to reduce risk of impacts and address safety concerns, as discussed in section 6.8.3 of this REF.	Potential impacts will be managed with the implementation of the environmental safeguards noted in Table 43.
k. Any reduction in the range of beneficial uses of the environment?	
During works pedestrian access to the area at the OPT and vessel use of some local pick-up and drop-off locations would be temporarily affected as discussed in section 6.8.3 of this REF. The proposal facilitates the continued beneficial use of the OPT as a cruise ship terminal.	Minor impacts with the implementation of the environmental safeguards noted in Table 43

Impact	**Level of impact**
l. Any pollution of the environment?	
In the event of a pollution accident causing pollution spills from machinery, this would be managed by a spill management plan with spill kits on site. No fuels or chemicals would be stored in the proposal footprint.	Minor impacts with the implementation of the environmental safeguards noted in Table 43
m. Any environmental problems associated with the disposal of waste?	
Waste and dredging material would be removed off site via barge either for disposal at a licenced waste management facility or offshore disposal outside of State Waters	No impact
n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply?	
Works include use of 10,000 m^2 of concrete for the scour protection mattress. This isn't considered significant in supply stocks.	No impact
o. Any cumulative environmental effect with other existing or likely future activities?	
During construction there are not expected to any material cumulative impacts due to the short program length and limited scale of the planned works.	Minor impacts with the implementation of the environmental safeguards noted in Table 43
p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?	
Works are proposed to protect the OPT from erosion. During construction works would only be carried out during calm conditions to reduce impacts from weather conditions.	Minor impacts with the implementation of the environmental safeguards noted in Table 43

Matters of national environmental significance

Under the environmental assessment provisions of the *Environment Protection and Biodiversity Conservation Act 1999*, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government Department of the Environment.

Impact	Level of impact
a. Any impact on a World Heritage property?	
There would be a temporary change in setting for the Sydney Opera House. This is not considered to be a significant impact as the presence of construction equipment and vessels in the OPT would be temporary and small scale in the context of the wider landscape.	Minor and temporary
b. Any impact on a National Heritage place?	
The Sydney Opera House and Sydney Harbour Bridge are National Heritage assets. There would be a temporary and minor change in setting during construction works at the OPT. This is not considered significant.	Minor and temporary
c. Any impact on a wetland of international importance?	
There are no wetlands of international importance within the surrounding area	No impact
d. Any impact on a listed threatened species or ecological communities?	
The proposal is unlikely to cause any impacts to any threatened aquatic or terrestrial species, populations or ecological communities or their habitats	No impacts
e. Any impacts on listed migratory species?	
Impacts on listed migratory species are highly unlikely due to the location of the works and the nature of the highly modified environments. . Although highly unlikely, should aquatic megafauna be observed in the vicinity of the works, any piling work would stop until they have left the locality.	No impacts

Impact	**Level of impact**
f. Any impact on a Commonwealth marine area?	
No impacts are considered likely as the works are not within a Commonwealth marine area	No impact
g. Does the proposal involve a nuclear action (including uranium mining)?	
Works are do not involve a nuclear action	No impact
Additionally, any impact (direct or indirect) on Commonwealth land?	
No works in the vicinity of Commonwealth land	No impact

Appendix C– Statutory Consultation Checklist

ISEPP consultation

Council related infrastructure or services

Issue	Potential impact	Yes/no	If 'yes' consult with	ISEPP clause
Stormwater	Are the works likely to have a *substantial* impact on the stormwater management services which are provided by council?	No		ISEPP cl.13(1)(a)
Traffic	Are the works likely to generate traffic to an extent that will *strain* the existing road system in a local government area?	No		ISEPP cl.13(1)(b)
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will this connection have a *substantial* impact on the capacity of any part of the system?	No		ISEPP cl.13(1)(c)
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a *substantial* volume of water?	No		ISEPP cl.13(1)(d)
Temporary structures	Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a *minor or inconsequential* disruption to pedestrian or vehicular flow?	No		ISEPP cl.13(1)(e)

Issue	**Potential impact**	**Yes/no**	**If 'yes' consult with**	**ISEPP clause**
Road & footpath excavation	Will the works involve more than *minor or inconsequential* excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	No		ISEPP cl.13(1)(f)

Local heritage items

Issue	Potential impact	Yes/no	If 'yes' consult with	ISEPP clause
Local heritage	Is there is a local heritage item (that is not also a State heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the item/area are more than *minor or inconsequential*?	Yes	See Appendix F Heritage Assessment No consultation required	ISEPP cl.14

Flood liable land

Issue	**Potential impact**	**Yes/no**	**If 'yes' consult with**	**ISEPP clause**
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a *minor* extent?	No		ISEPP cl. 15

Public authorities other than councils

Issue	**Potential impact**	**Yes/no**	**If 'yes' consult with**	**ISEPP clause**
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the *National Parks and Wildlife Act 1974*?	No		ISEPP cl.16(2)(a)

Issue	Potential impact	Yes/no	If 'yes' consult with	ISEPP clause
Marine parks	Are the works adjacent to a declared marine park under the *Marine Parks Act 1997*?	No		ISEPP cl.16(2)(b)
Aquatic reserves	Are the works adjacent to a declared aquatic reserve under the *Fisheries Management Act 1994*?	No		ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998*?	No		ISEPP cl.16(2)(d)
Bush fire prone land	Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional centre or group home in bush fire prone land?	No		ISEPP cl.16(2)(f)

Appendix D– Hydrodynamic Modelling

Hydrodynamic and Dredge Plume Modelling

Overseas Passenger Terminal

Report prepared for Port Authority NSW

June 2020

MetOcean SOLUTIONS

Document History

Versions

Version	Revision Date	Summary	Reviewed by
0.1	22/04/2020	Initial document created	Berthot
0.2	4/05/2020	Draft for internal review	Weppe
0.3	7/05/2020	Draft for client review	Berthot
0.4	30/06/2020	Draft for client review	Berthot

Distribution

Version	Date	Distribution
1.0	11/08/2020	Daniel Chakra - Port Authority New South Wales

Document ID:

MetOcean Solutions is a Division of Meteorological Services of New Zealand Ltd, MetraWeather (Australia) Pty Ltd [ACN 126 850 904], MetraWeather (UK) Ltd [No. 04833498] and MetraWeather (Thailand) Ltd [No. 0105558115059] are wholly owned subsidiaries of Meteorological Service of New Zealand Ltd (MetService).

Contents

1. Introduction 9
   1.1 Background 9
2. Sydney Harbour characterisation 10
3. Hydrodynamic model 11
   3.1 Model description 11
   3.2 Model Bathymetry 12
   3.3 Model Domain 12
   3.4 Vertical discretisation 15
   3.5 Vertical mixing/ turbulence closure 15
   3.6 Boundary condition 16
      3.6.1 Hydrodynamic forcing 16
      3.6.2 Atmospheric forcing 16
      3.6.3 River forcing 16
4. Model Validation 17
   4.1 Water Elevation 17
   4.2 Current Velocities 19
5. Hydrodynamic Modelling Results 23
6. Dredged Sediment Plume Modelling 28
   6.1 Proposed Dredging 28
      6.1.1 Dredging Scenarios 29
      6.1.2 Sediment Releases 30
   6.2 Sediment Dispersion Modelling 33
      6.2.1 OpenDrift Model description 33
      6.2.2 Particle release 35
      6.2.3 Post-processing 35
   6.3 Results 37
      6.3.1 Suspended Sediment Concentration 37

6.3.2 Sediment deposition 49

6.3.3 Tracer Concentration 54

7. Conclusions 59

8. References 61

List of Figures

Figure 1.1: Sydney Harbour – Circular Quay / Overseas Passenger Terminal (OPT)........... 9

Figure 3.1 Sydney Harbour – Circular Quay hydrographic survey data (Port Authority of New South Wales, Nov. 2019)..12

Figure 3.2 Triangular model mesh defined for the Sydney Harbour and Barangaroo site. Left panel shows the whole domain, while the middle and right panels show zooms into the Estuary near the city centre...13

Figure 3.3 Model Bathymetry for Sydney Harbour and Barangaroo site. Top panel shows the whole model domain, while the bottom panels show a zoom into the Estuary near the City centre..14

Figure 3.4 Map of the model domain showing the number of vertical levels used in the model (left). The cross section represented by the red line is shown on the right panel...15

Figure 4.1 Aerial image showing Sydney Harbour and the location of the two tidal gauge and the ADCP (PANSW) used to validate the hydrodynamic model. 17

Figure 4.2 Comparison of modelled (red) and measured total surface elevation at Silverwater Bridge (top) and HMAS Penguin (bottom) in July 2018. 18

Figure 4.3 Measured (blue) and modelled (red) near-surface (top), mid-depth (middle) and near-bottom total current speeds at Balls Head in July 2018. 20

Figure 4.4 Measured (blue) and modelled (red) near-surface (top), mid-depth (middle) and near-bottom total current direction at Balls Head in July 2018. 21

Figure 4.5 Measured (blue) and modelled (red) depth-averaged tidal current at Balls Head in July 2018. 22

Figure 4.6 Near -surface (top) and near -bottom (bottom) water velocities during peak flood flow on the 1st of July 2017 in Sydney harbour. 24

Figure 4.7 Near -surface (top) and near -bottom (bottom) water velocities during peak ebb flow on the 1st of July 2017 in Sydney harbour. 25

Figure 4.8 Near -surface (top) and near -bottom (bottom) water velocities during peak flood flow on the 1st of July 2017 near Sydney City centre..............................26

Figure 4.9 Near -surface (top) and near -bottom (bottom) water velocities during peak ebb flow on the 1st of July 2017 near Sydney City centre. 27

Figure 6.1: Position for numerical modelling sediment releases: Dredger position= locations 1 , 2 and 3, Barge/Pipe Disposal = location 4 30

Figure 6.2 Sources of a dredge plume for a Back Hoe Dredger (after Becker J. et al., 2015). 36

Figure 6.3 50th total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, for the scenario assuming **maximum** dredging rate over a 6 day period (BHD Dredging at location 1 (2 days), location 2 (2 days) and location 3 (2 days)- 1 disposal per day). Reference locations where TSS timeseries were extracted are shown as red dots. The TSS were masked below 5 mg/L..39

Figure 6.4 90th percentile total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, for the scenario assuming **maximum** dredging rate over a 6 day period (BHD Dredging at location 1 (2 days), location 2 (2 days) and location 3 (2 days)- 1 disposal per day). Reference locations where TSS timeseries were extracted are shown as red dots. The TSS were masked below 5 mg/L. 40

Figure 6.5 95th percentile total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, for the scenario assuming **maximum** dredging rate over a 6 day period (BHD Dredging at location 1 (2 days), location 2 (2 days) and location 3 (2 days)- 1 disposal per day). Reference locations where TSS timeseries were extracted are shown as red dots. The TSS were masked below 5 mg/L. 41

Figure 6.6 50th total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, for the scenario assuming **average** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). Reference locations where TSS timeseries were extracted are shown as red dots. The TSS were masked below 5 mg/L. 42

Figure 6.7 90th percentile total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, for the scenario assuming **average** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). Reference locations where TSS timeseries were extracted are shown as red dots. The TSS were masked below 5 mg/L. 43

Figure 6.8 95th percentile total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, for the scenario assuming **average** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). Reference locations where TSS timeseries were extracted are shown as red dots. The TSS were masked below 5 mg/L. 44

Figure 6.9 Timeseries of total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, at four reference sites (see red dots in Figure 6.8), for the scenario assuming **maximum** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). Scale is capped at 500mg/L. 45

Figure 6.10 Timeseries of total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, at four reference sites (see red dots in Figure 6.8), for the scenario assuming **average** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). Scale is capped at 500mg/L. 46

Figure 6.11 Timeseries of total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, at the three dredging locations (see red dots in Figure 6.1),for the scenario assuming **maximum** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)-. 47

Figure 6.12 Timeseries of total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, at the three dredging locations (see red dots in Figure 6.1), for the scenario assuming **average** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). Scale is capped at 500mg/L. 48

Figure 6.13 Final cumulative sediment deposition thickness [m] for the scenario assuming **maximum** dredging rate over a 6 day period (BHD Dredging at location 1 (2 days), location 2 (2 days) and location 3 (2 days)- 1 disposal per day). The deposition thicknesses were masked below 0.1 millimetres. The 10cm and 1 mm contours are shown in black and grey respectively. 50

Figure 6.14 Final cumulative sediment deposition thickness [m] for the scenario assuming **average** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). The deposition thicknesses were masked below 0.1 millimetres. The 10cm and 1 mm contours are shown in black and grey respectively. 51

Figure 6.15 Final cumulative sediment deposition thickness [m] and volume settled in dredge pocket for the scenario assuming **maximum** dredging rate over a 6 day period (BHD Dredging at location 1 (2 days), location 2 (2 days) and location 3 (2 days)- 1 disposal per day). The deposition thicknesses were masked below 0.1 millimetres. The 10cm and 1 mm contours are shown in black and grey respectively. 52

Figure 6.16 Final cumulative sediment deposition thickness [m] and volume settled in dredge pocket for the scenario assuming **average** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). The deposition thicknesses were masked below 0.1 millimetres. The 10cm and 1 mm contours are shown in black and grey respectively. 53

Figure 6.17 Mean normalized depth-averaged tracer concentration fields for the scenario assuming **maximum** dredging for 2 days at sites 1, 2 and 3 (top to bottom). Tracer concentration at each cell was normalized initial tracer concentration at discharge site (i.e. location of dredging). Note the colour scale is logarithmic. The 0.001, 0.01, and 0.1 normalized concentration contours are shown in grey, white and black respectively. 55

Figure 6.18 Mean normalized depth-averaged tracer concentration fields for the scenario assuming **average** dredging for 5.33 days at sites 1, 2 and 3 (top to bottom). Tracer concentration at each cell was normalized initial tracer concentration at discharge site (i.e. location of dredging). Note the colour scale is logarithmic. The 0.001, 0.01, and 0.1 normalized concentration contours are shown in grey, white and black respectively. 56

Figure 6.19 95th percentile of normalized depth-averaged tracer concentration fields for the scenario assuming **maximum** dredging for 2 days at sites 1, 2 and 3 (top to bottom). Tracer concentration at each cell was normalized initial tracer concentration at discharge site (i.e. location of dredging). Note the colour scale is logarithmic. The 0.001, 0.01, and 0.1 normalized concentration contours are shown in grey, white and black respectively. 57

Figure 6.20 95th percentile of normalized depth-averaged tracer concentration fields for the scenario assuming **average** dredging for 5.33 days at sites 1, 2 and 3 (top to bottom). Tracer concentration at each cell was normalized initial tracer concentration at discharge site (i.e. location of dredging). Note the colour scale is logarithmic. The 0.001, 0.01, and 0.1 normalized concentration contours are shown in grey, white and black respectively. 58

List of Tables

Table 6.1: BHD Production Estimates (Table 5 GHD 2020) 28

Table 6.2 Mean sediment distribution of Sediment Types considered in Table 6.1. (Type 1 = Clayey sand, Type 2 : Loose sand, Type 3: Very Soft Clay, Type 4: Firm Stiff Clay), based on spreadsheet data provided by Coffey. 31

Table 6.3 Sediment settling velocities considered for the simulations. 31

Table 6.4 BHD estimates for each sediment class considered. 32

1. Introduction

1.1 Background

Port Authority of New South Wales (PANSW) is currently planning to upgrade the Overseas Passenger Terminal berth at Circular Quay in order to accommodate for larger size cruise ships and better protect the structure against scour and undermining (Figure 1). As part of this project, dredging of the berth pocket will need to be undertaken and an assessment of the associated sediment dispersion during the dredging operation is required to inform a Review of Environmental Factors. PANSW will also require current data to be used in a ship simulator as well as current vector map to assist vessel pilots.

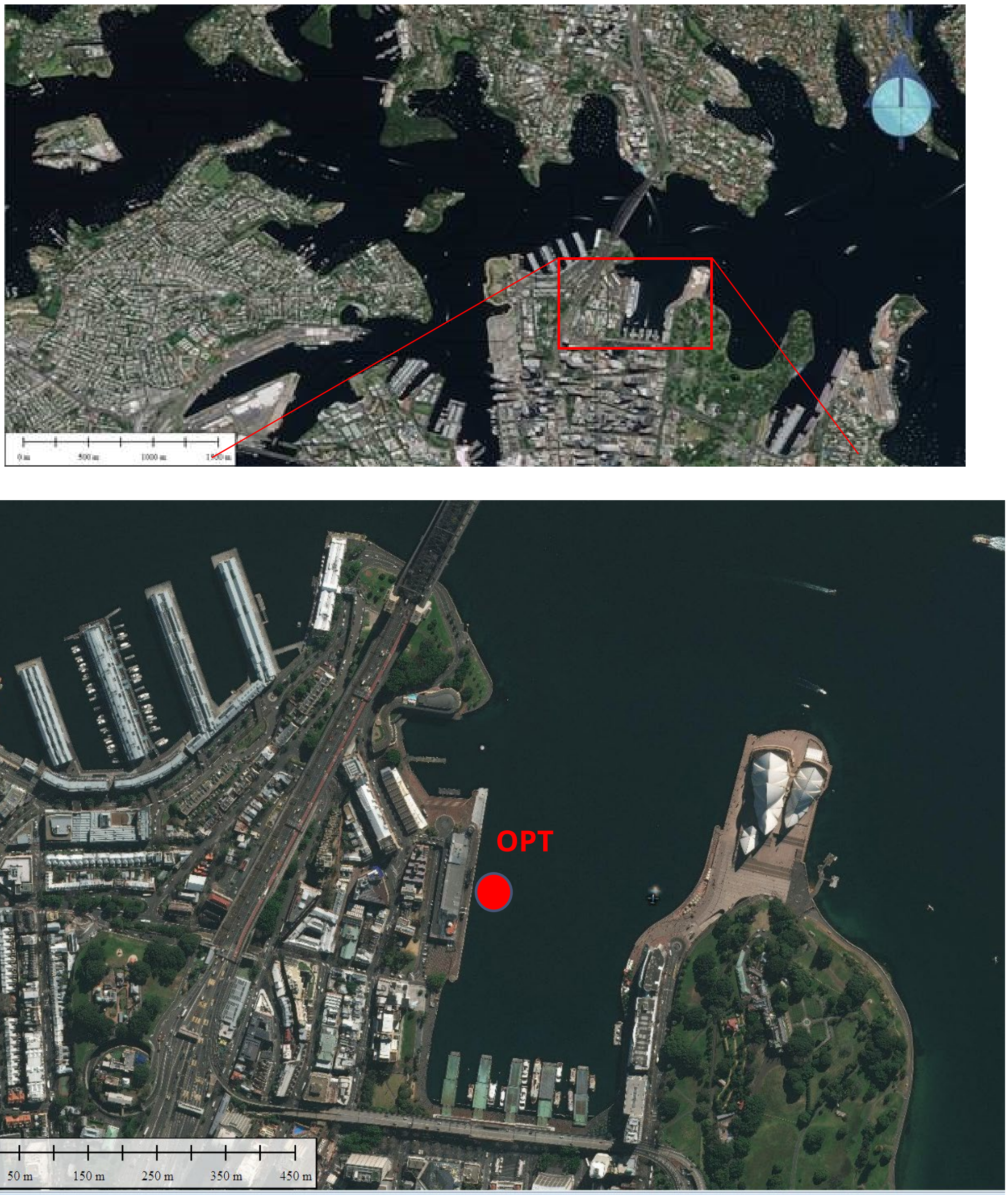


Figure 1.1: Sydney Harbour – Circular Quay / Overseas Passenger Terminal (OPT)

2. Sydney Harbour characterisation

The Sydney Harbour is an estuary situated on the East Coast of Australia in New South Wales. It is 30 km long, 3km wide near the entrance and 500 m wide near the Sydney Opera House. The estuary has a complex bathymetry: the mouth of the estuary has a depth of 30m whereas the main channel is around 15m deep with deeper pools up to 40 m. it is governed by semi-diurnal tides and freshwater flow from the Parramatta River (Xiao et al., 2020). During high river flow the Estuary becomes stratified. On the other hand during low/ normal condition is estuary can be classified as well-mixed estuary (Birch and Rochford, 2009). Wind has limited effect on the residual circulation within the Harbour (Das et al., 2000).

3.Hydrodynamic model

3.1 Model description

The 2D and 3D baroclinic hydrodynamics of the Sydney Harbour were modelled using the open-sourced hydrodynamic model SCHISM[1 2]. The benefit of using open-source science models is the full transparency of the code and numerical schemes, and the ability for other researchers to replicate and enhance any previous modelling efforts for a given environment.

SCHISM is a prognostic finite-element unstructured-grid model designed to simulate 3D baroclinic, 3D barotropic or 2D barotropic circulation. The barotropic mode equations employ a semi-implicit finite-element Eulerian-Lagrangian algorithm to solve the shallow-water equations, forced by relevant physical processes (atmospheric, oceanic and fluvial forcing). A detailed description of the SCHISM model formulation, governing equations and numerics, can be found in Zhang and Baptista (2008).

The SCHISM model is physically realistic, in that well-understood laws of motion and mass conservation are implemented. Therefore, water mass is generally conserved within the model, although it can be added or removed at open boundaries (e.g. through tidal motion at the ocean boundaries) and water is redistributed by incorporating aspects of the real-world systems (e.g. bathymetric information, forcing by tides and wind). The model transports water and other constituents (e.g. salt, temperature, turbulence) through the use of quadrilateral and triangular volumes (connected 3-D polyhedrons).

The finite-element triangular grid structure used by SCHISM has resolution and scale benefits over other regular or curvilinear based hydrodynamic models. SCHISM is computationally efficient in the way it resolves the shape and complex bathymetry associated with estuaries, and the governing equations are similar to other open-source models such as Delft3D and ROMS. SCHISM has been used extensively within the scientific community[3,4] where it forms the backbone of operational systems used to nowcast and forecast estuarine water levels, storm surges, velocities, water temperature and salinity[5].

---

[1] http://ccrm.vims.edu/schism/
[2] http://www.ccrm.vims.edu/w/index.php/Main_Page#SCHISM_WIKI
[3] http://www.stccmop.org/knowledge_transfer/software/selfe/publications
[4] http://ccrm.vims.edu/schism/schism_pubs.html
[5] https://tidesandcurrents.noaa.gov/ofs/creofs/creofs_info.html

3.2 Model Bathymetry

Bathymetry was sourced from a combination of sounding data and digitized electronic charts to provide suitable resolution for defining the salient bathymetric features and guiding grid resolution, including: General Bathymetric Charts of the Oceans (GEBCO) global dataset (Weatherall et al. 2015), Electronic Navigational Charts (ENCs), Wilson & Power (2018) Seamless bathymetry and topography datasets for Sydney Harbour and other available bathymetry surveys.

The dataset was also updated with a 1m gridded data set based on the latest Hydrographic surveys (up to November 2019) of Circular Quay obtained from the Port Authority of New South Wales (Figure 3.1).

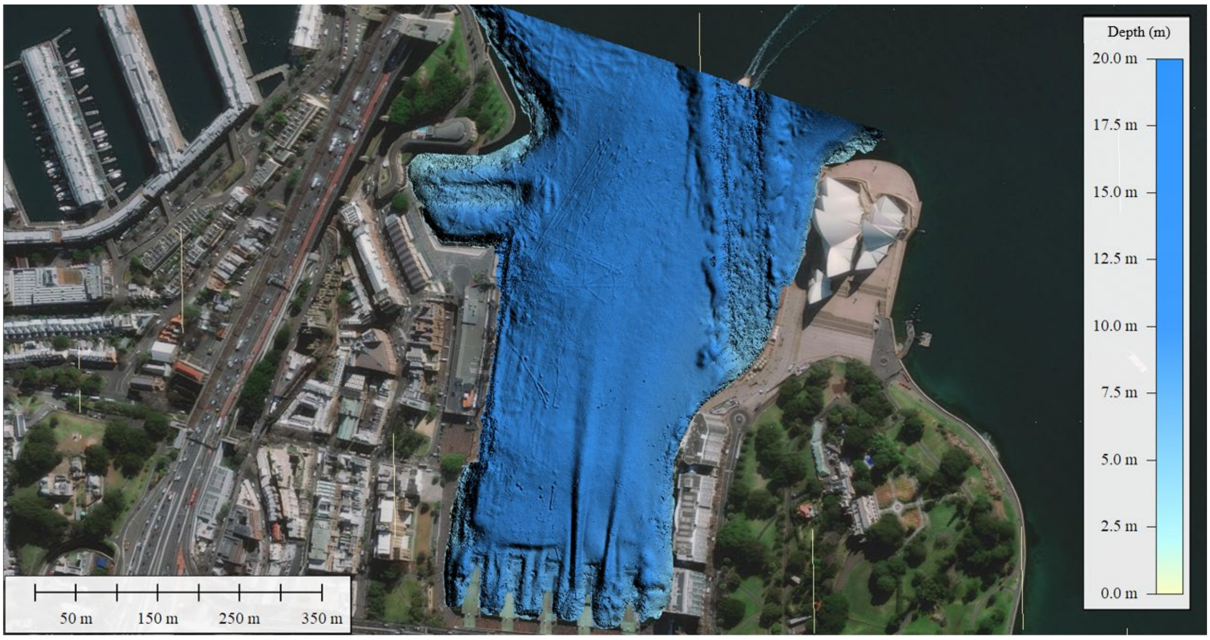


Figure 3.1 Sydney Harbour – Circular Quay hydrographic survey data (Port Authority of New South Wales, Nov. 2019)

3.3 Model Domain

The model domain covers the whole of Sydney Harbour, Middle Harbour, Lave Cove Rive and Parramatta River, and extend out into the Tasman Sea to the 100 metres depth contour. The model resolution was optimised to ensure replication of the salient hydrodynamic processes. The resolution near the offshore boundary was approximately 600 m, 20 m near the coast and reduced to 2m close the Barangaroo outfall location. The triangular elements of the model domain mesh are shown in Figure 3.2 and associated bathymetries are presented in Figure 3.3.

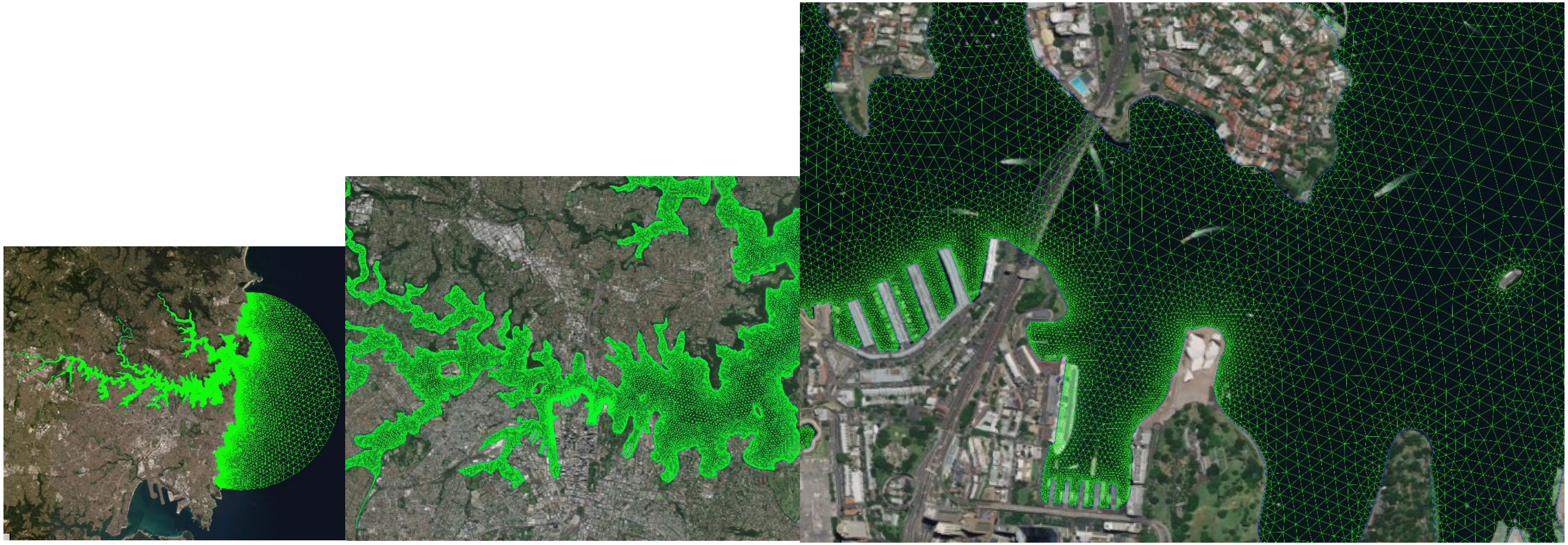


Figure 3.2 Triangular model mesh defined for the Sydney Harbour and Barangaroo site. Left panel shows the whole domain, while the middle and right panels show zooms into the Estuary near the city centre.

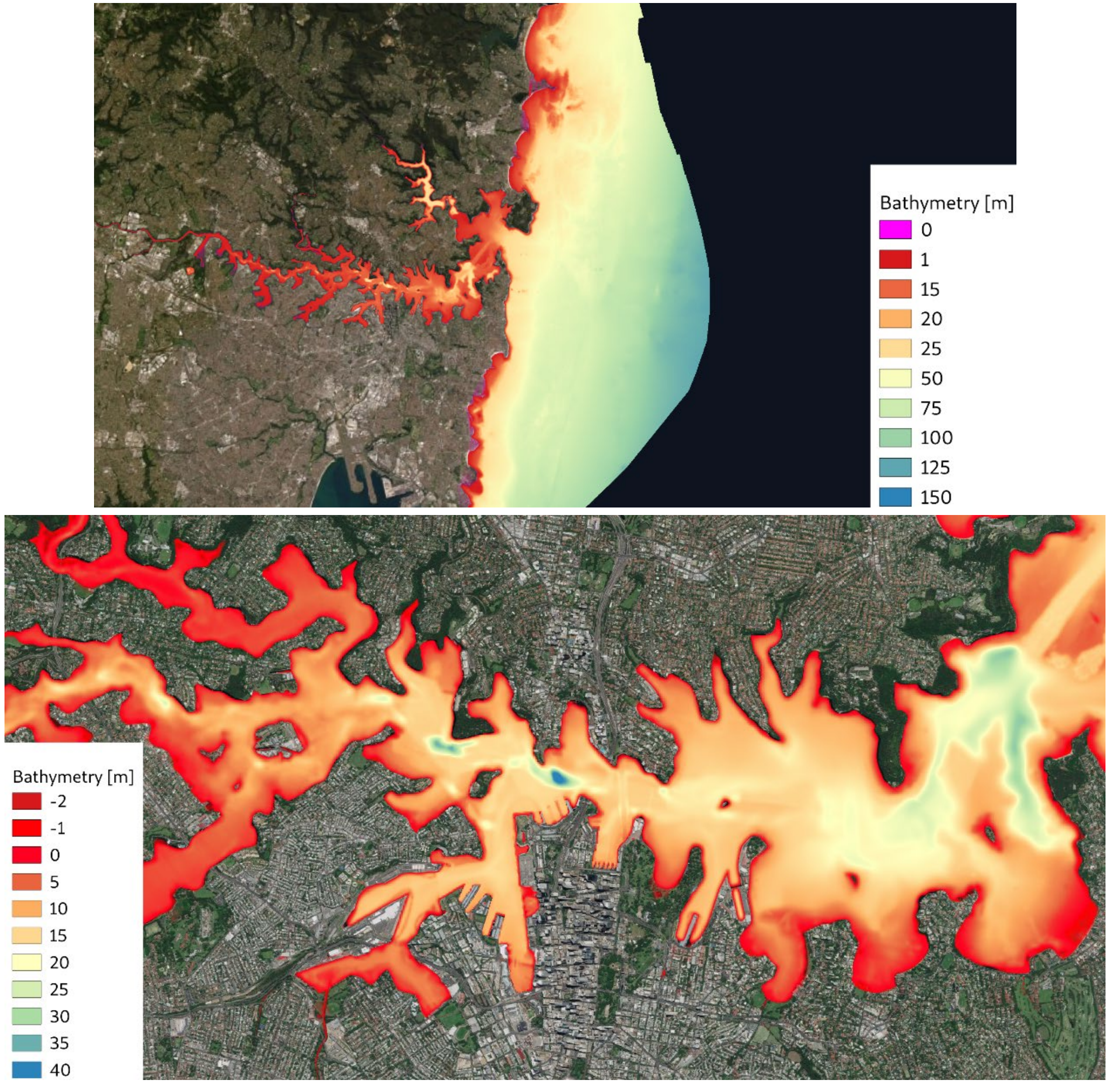


Figure 3.3 Model Bathymetry for Sydney Harbour and Barangaroo site. Top panel shows the whole model domain, while the bottom panels show a zoom into the Estuary near the City centre.

3.4 Vertical discretisation

The vertical discretisation of the water column consisted of a Localised Sigma Coordinate (LSC^2) system with Shaved Cell, a type of terrain-following layers described in Zhang et al. (2014).

For this study, the model was configured with bottom and surface vertical resolution (Figure 3.4). The vertical grid is constituted of sigma layer terrain-following coordinate with 15 layers in the shallow regions (<20 m) and up to 22 layers near the offshore boundary. A vertical section showing both the sigma layers and the water depths along a transect are presented in Figure 3.4.

The use of this type of vertical grid was dictated by the freshwater influence near the Parramatta river and the denser oceanic water flowing near the bottom of the as described in the literature (See section 2).

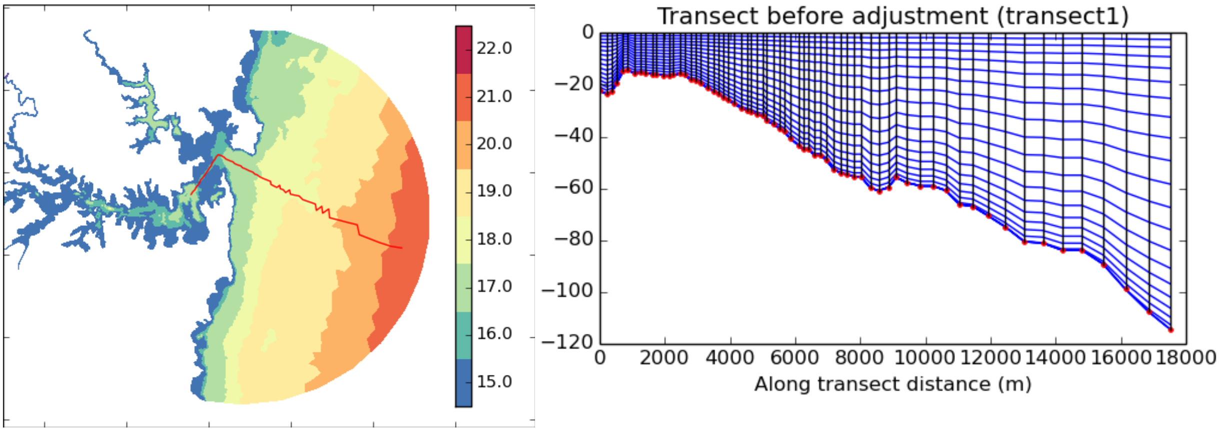


Figure 3.4 Map of the model domain showing the number of vertical levels used in the model (left). The cross section represented by the red line is shown on the right panel.

3.5 Vertical mixing/ turbulence closure

Vertical mixing was modelled using a *GLS* model with Kantha and Clayson (1994) stability function with minimum and maximum diffusivities set to 1×10^{-6} and 1 $m.s^{-1}$ respectively, following model validation and calibration. These values were adjusted as part of the model validation and calibration process.

The constant surface mixing length was held to the recommended default value of 0.1 (i.e. 10% of the uppermost sigma layer). However, variations of the mixing length were also examined during the validating and calibration processes.

Frictional stress at the seabed was approximated with a quadratic drag law, with the drag coefficient (*CD*) determined using a bottom roughness of 0.001 m. Detailed explanations of the determination of the drag coefficient are given in Zhang and Baptista (2008).

3.6 Boundary condition

3.6.1 Hydrodynamic forcing

Tidal elevation conditions for the SCHISM model were derived from data measured at Fort Denison. The water elevation measured at this site was used to force the offshore boundary uniformly.

Tidal velocities were derived from constituents from the (Oregon State University Tidal Inverse Software) Tasmania and Southern Australia Shelf grid. This model has a horizontal resolution of ~1/30° (Egbert and Erofeeva 2002). The tidal velocities were interpolated in 3D assuming a logarithmic profile.

The open-boundary salinity and temperature were prescribed from HYCOM hydrodynamic model at 3-hour interval (Chassignet et al., 2007).

3.6.2 Atmospheric forcing

The atmospheric forcing applied to the regional model domain were extracted from the Climate Forecast System Reanalysis (CFSR) from the National Center for Environmental Prediction (NCEP) (Saha et al. 2010) at the National Oceanic and Atmospheric Administration (NOAA). This included wind speed and direction, barometric pressure , humidity, air temperature and solar radiation.

3.6.3 River forcing

Three rivers were included in the model boundaries: The Parramatta river, the Duck River, Lane Cove river and Middle harbour creek. In this study only the Parramatta river was forced with hourly river discharge (Riverside Theatre site) obtained from Manly Hydraulics Laboratory (MHL) and Parramatta Council . The other rivers were forced using the mean annual flow based on available flow data from Birch & Rochford (2010), i.e. 0.3 $m^3.s^{-1}$ for the Duck River, 0.9 $m^3.s^{-1}$ for the Lane Cove River and 0.72 $m^3.s^{-1}$ for Middle Harbour Creek.

A constant salinity of 0 PSU was applied to all rivers. River temperature timeseries adopted at all rivers input boundary were based on available temperature timeseries from the Hawkesbury River near Laughtondale (40 Km north of Sydney), and whilst this estuary is directly north of the Parramatta River Estuary it is anticipated that the temperature variations will be of similar order of magnitude.

4. Model Validation

The hydrodynamic model was validated against water elevation and water velocity (Figure 4.1). Measured water elevation data available near the estuary entrance (HMAS Penguin) and near Parramatta river mouth (Silverwater bridge), were selected in order to provide a spatial variability over the model domain. Water velocity within the water column was available near Balls Head from ADCP data provided by Port Authority of New South Wales.

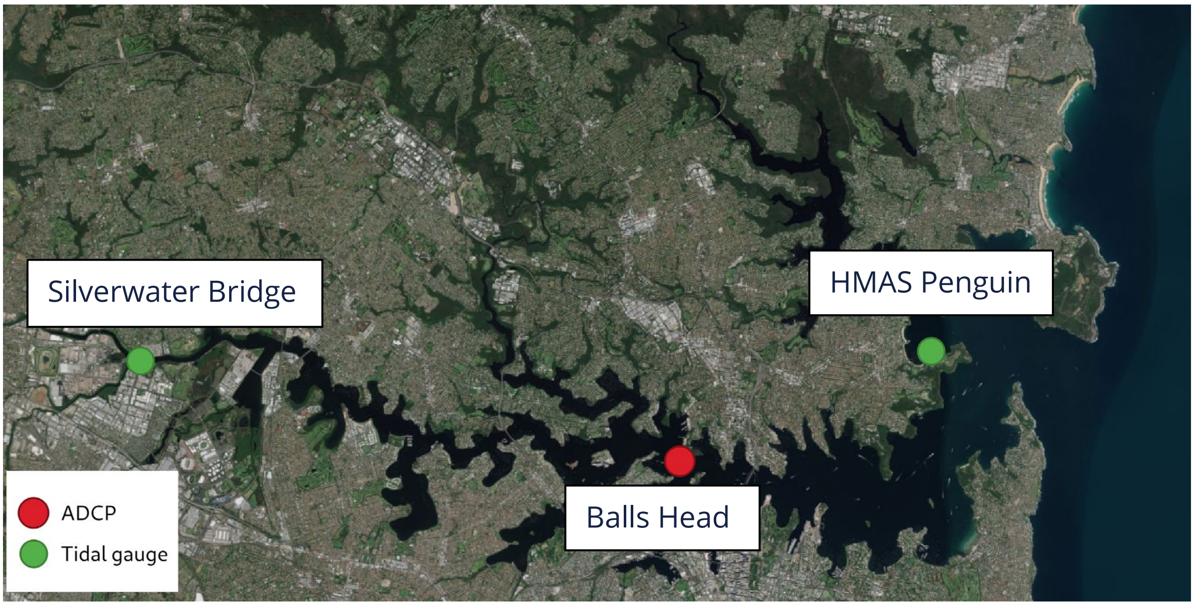


Figure 4.1 Aerial image showing Sydney Harbour and the location of the two tidal gauge and the ADCP (PANSW) used to validate the hydrodynamic model.

4.1 Water Elevation

Time series of measured water elevations have been processed and the residual elevations are separated from the tidal elevations.

Comparison of the modelled and measured time series of total surface elevations from the two tidal gauges (Silverwater Bridge and HMAS Penguin) are shown in Figure 4.2.

Comparisons show that the model successfully reproduces the propagation of the tidal wave through the estuary, with good agreement between both amplitudes and phases of the principal tidal constituents.

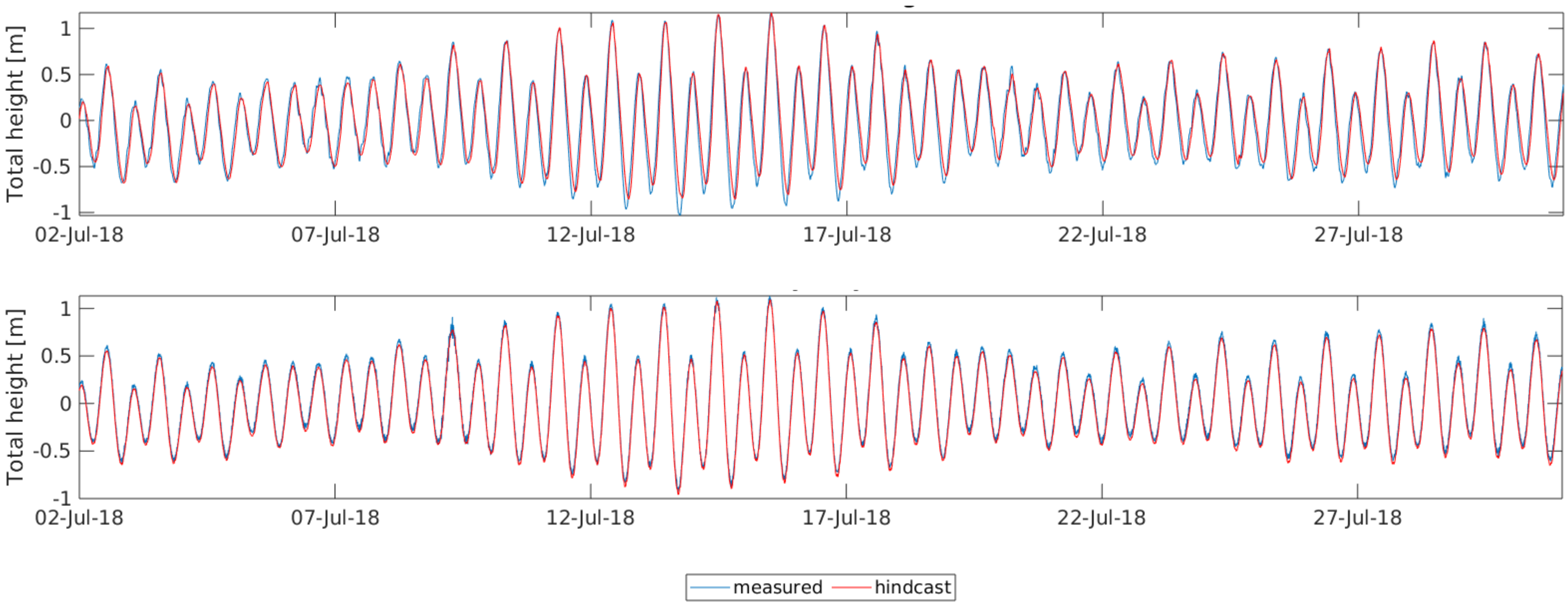


Figure 4.2 Comparison of modelled (red) and measured total surface elevation at Silverwater Bridge (top) and HMAS Penguin (bottom) in July 2018.

4.2 Current Velocities

The direct comparison of the near-surface, mid-depth and near-bottom total current speeds and direction near Balls Head are presented in Figure 4.3 and Figure 4.4, respectively.

The comparisons between measured and modelled depth-average tidal currents Balls Head are shown on Figure 4.5 .

Results shows that the modelled current speed and direction are in good agreement with the measured data. It is noted that the model slightly underestimate the current velocity near the seabed.

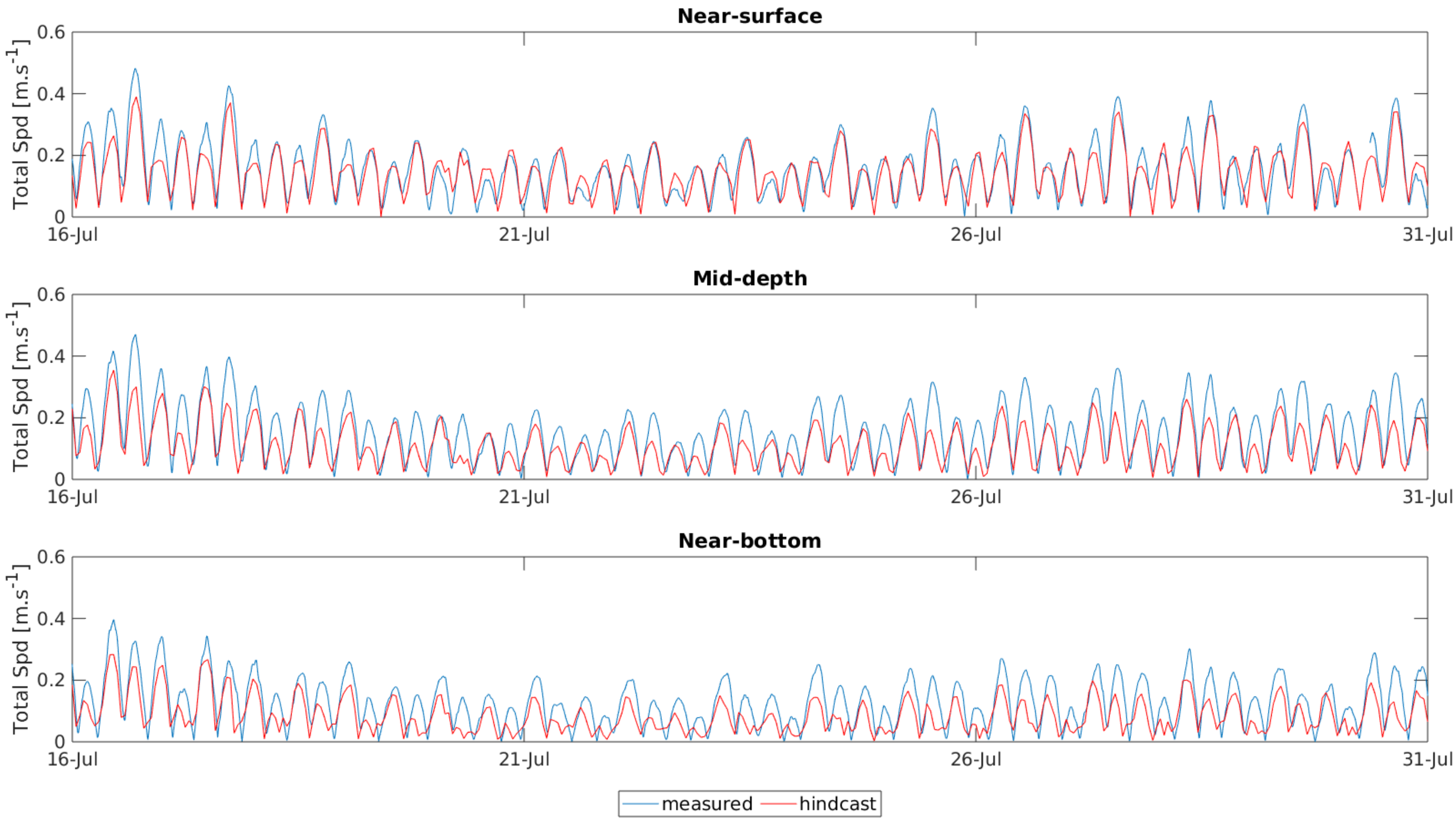


Figure 4.3 Measured (blue) and modelled (red) near-surface (top), mid-depth (middle) and near-bottom total current speeds at Balls Head in July 2018.

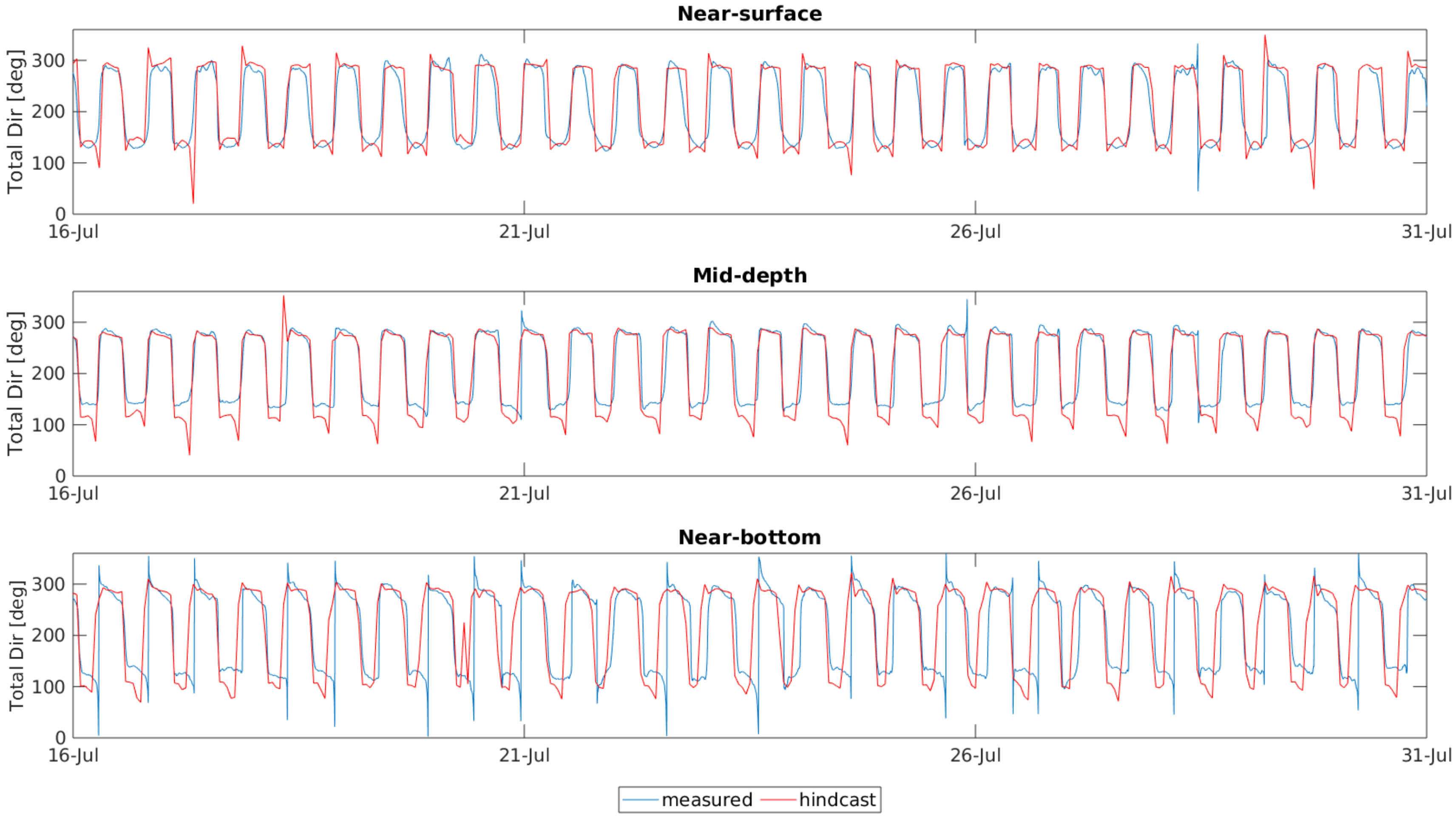


Figure 4.4 Measured (blue) and modelled (red) near-surface (top), mid-depth (middle) and near-bottom total current direction at Balls Head in July 2018.

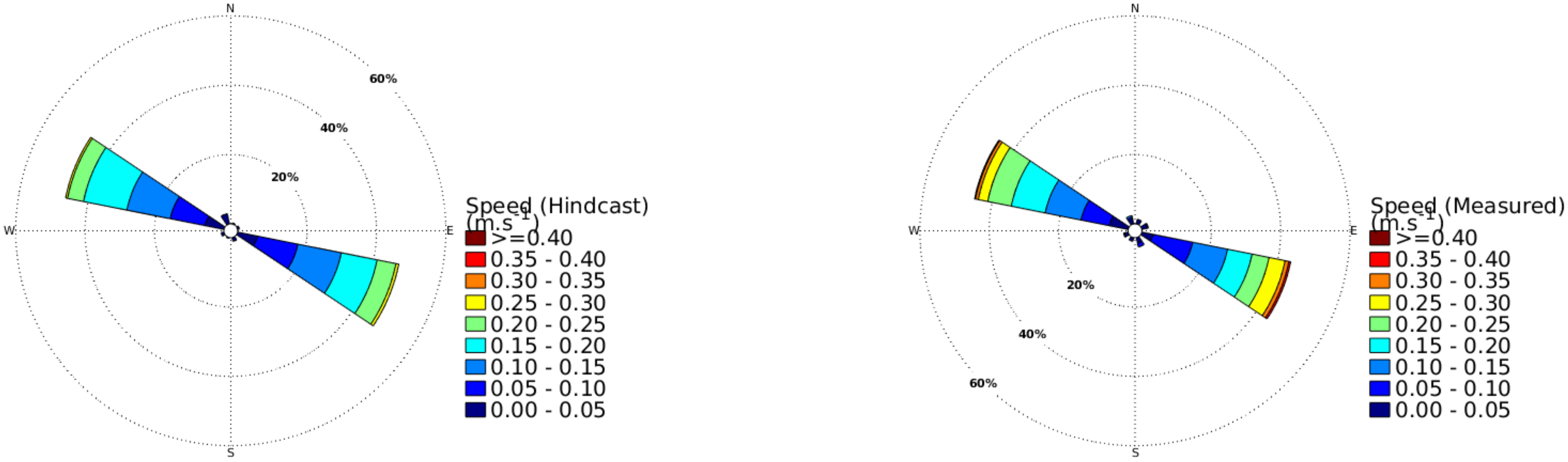


Figure 4.5 Measured (blue) and modelled (red) depth-averaged tidal current at Balls Head in July 2018.

5. Hydrodynamic Modelling Results

A snapshot of the near-surface and near-seabed water velocities in July 2017 during peak ebb and peak flood can be seen in Figure 4.6 and Figure 4.7. A zoom near the city centre and Barangaroo site is presented in Figure 4.8 and Figure 4.9. This highlights the stronger velocities occurring near Goat Island and near the Sydney Harbour Bridge.

The difference between surface and bottom velocities is shown in Figure 4.8 and Figure 4.9. It is noted that near-bottom velocities are higher than near-surface velocities during peak flood at some locations.

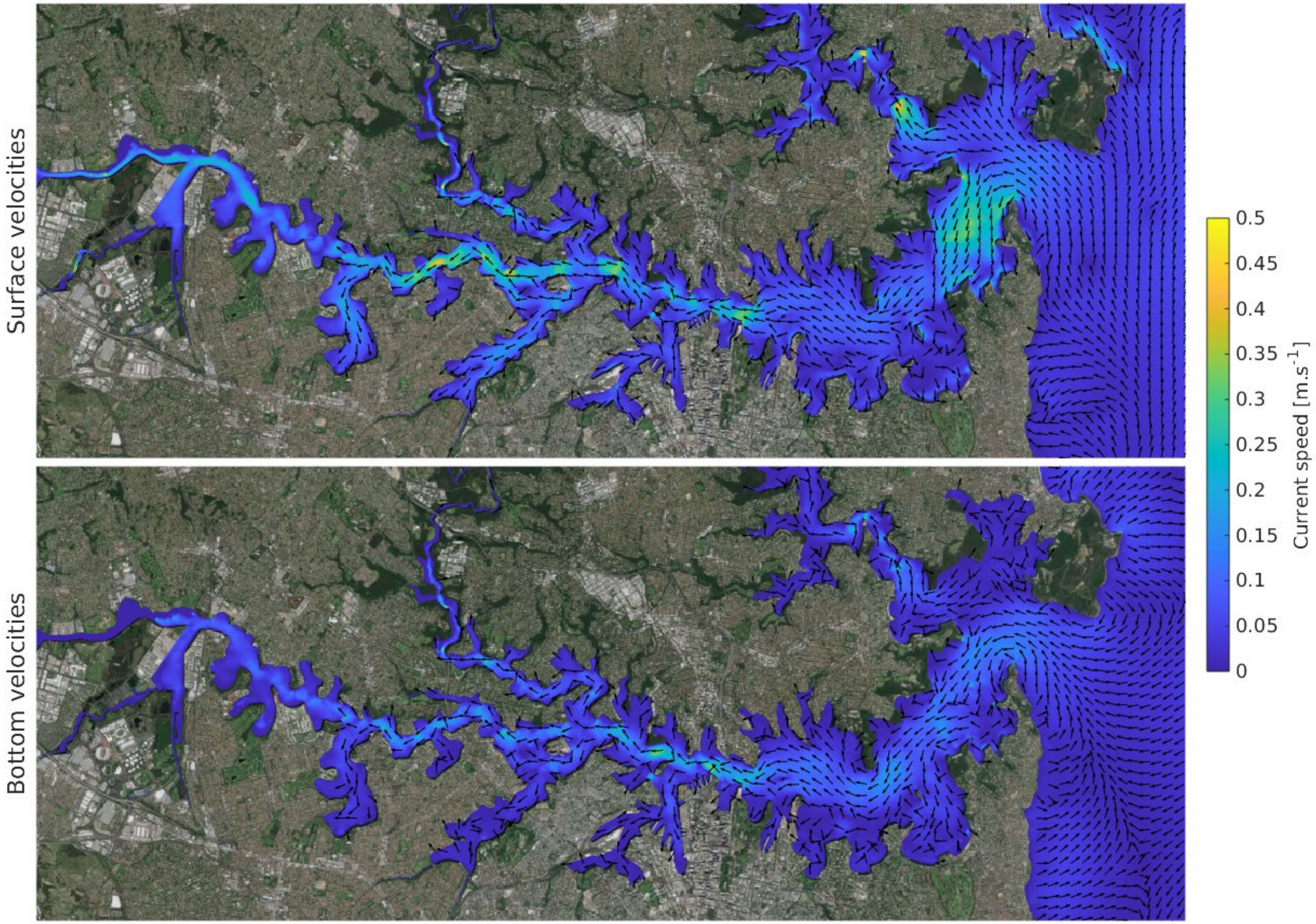


Figure 4.6 Near -surface (top) and near -bottom (bottom) water velocities during peak flood flow on the 1st of July 2017 in Sydney harbour.

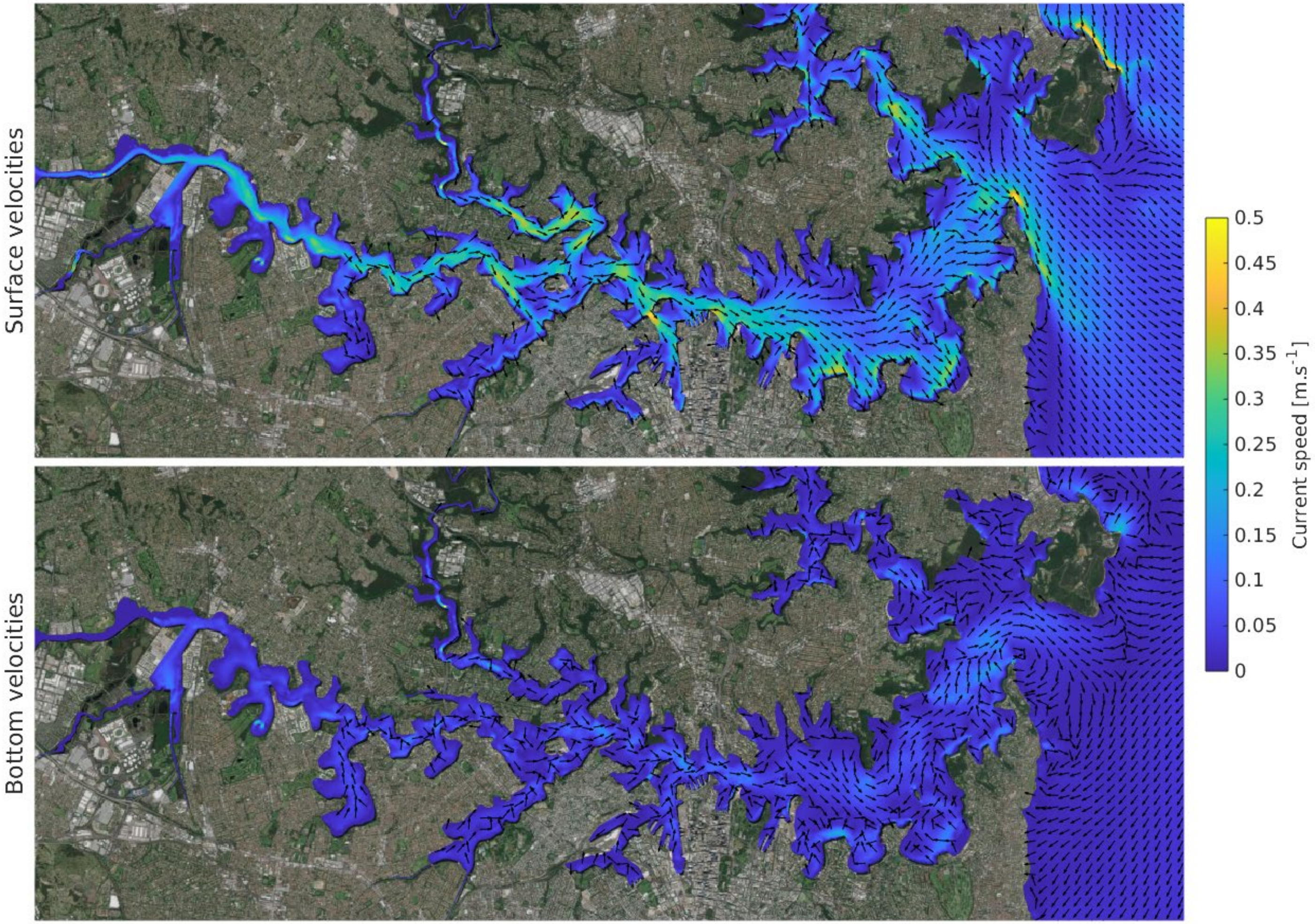


Figure 4.7 Near -surface (top) and near -bottom (bottom) water velocities during peak ebb flow on the 1st of July 2017 in Sydney harbour.

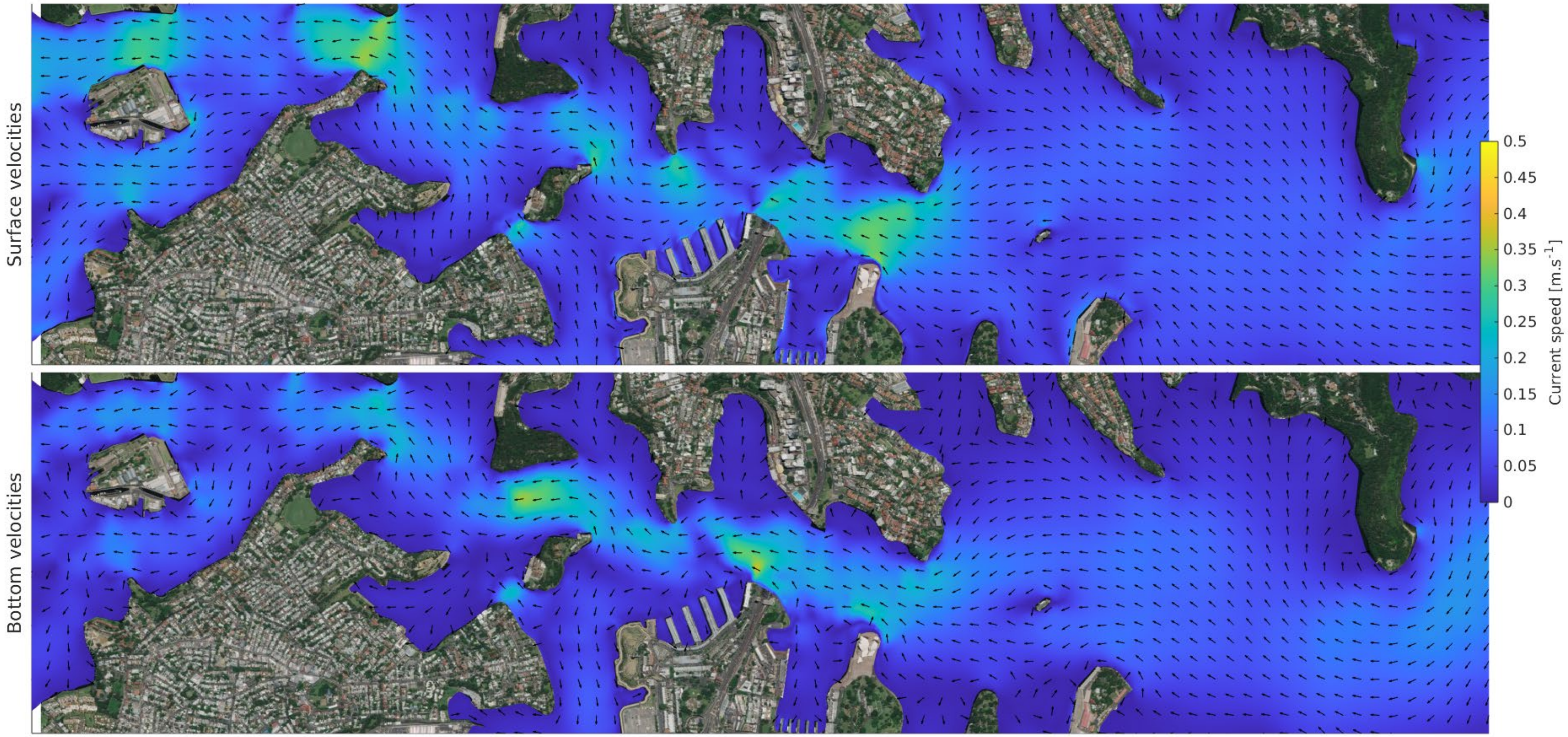


Figure 4.8 Near -surface (top) and near -bottom (bottom) water velocities during peak flood flow on the 1st of July 2017 near Sydney City centre..

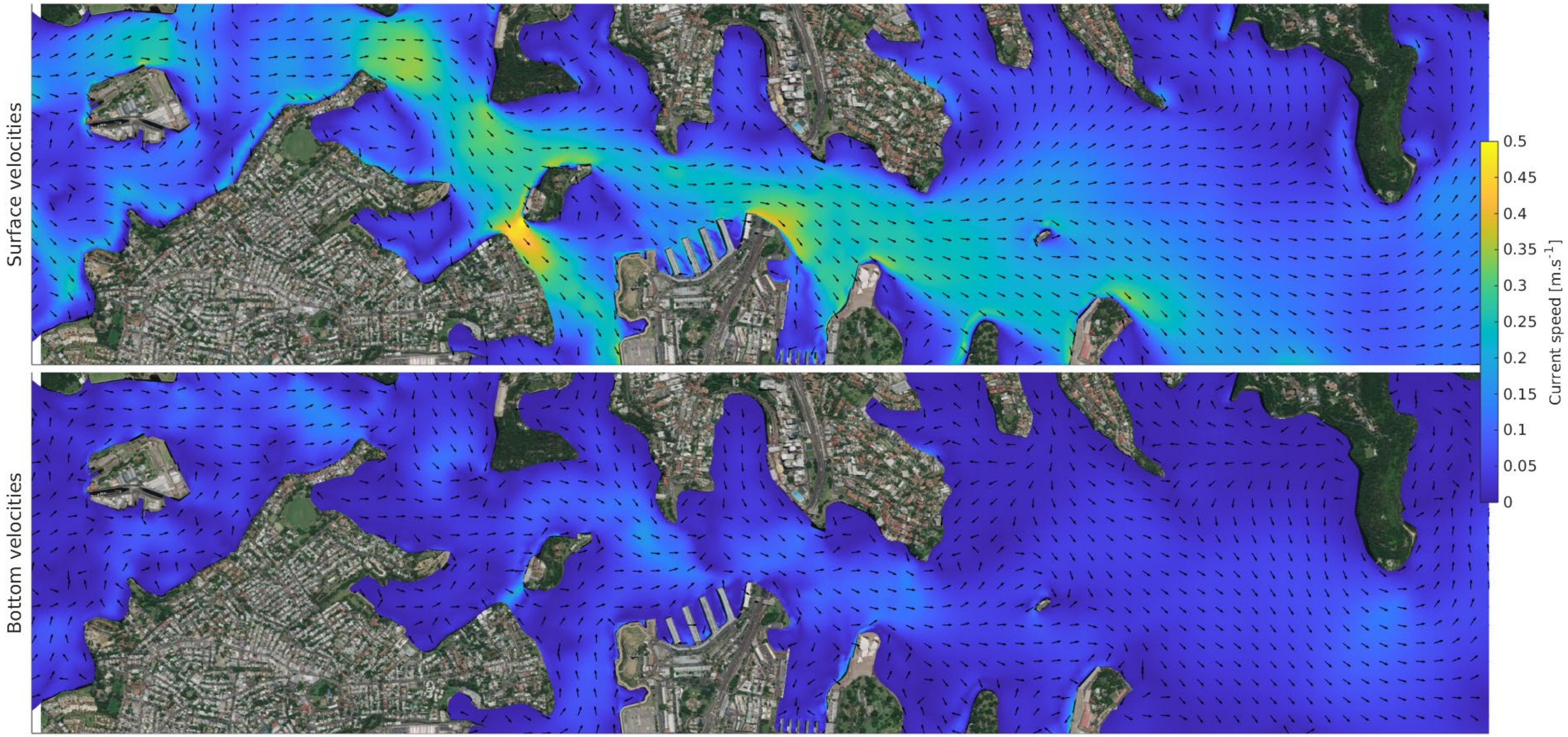


Figure 4.9 Near -surface (top) and near -bottom (bottom) water velocities during peak ebb flow on the 1st of July 2017 near Sydney City centre.

.

6. Dredged Sediment Plume Modelling

6.1 Proposed Dredging

GHD has undertaken a preliminary dredging and disposal strategy assessment to inform the plume dispersion numerical modelling (GHD 2020a). Following consideration of the potential impacts and construction costs associated with onshore disposal, PANSW requested that GHD prepare a revised strategy which considers in-harbour relocation of sediments (GHD 2020b).

GHD's report (2020b) provides likely plant and equipment selections, dredging methodologies and order of magnitude estimates of production rates and associated rates for release of fines.

Two dredging equipment options have been proposed: one with a BackHoe Dredger (BHD) and barge and another with a Cutter Suction Dredger (CSD). However, based on input from potential dredging contractors and concerns regarding potential impacts to water quality, the BHD option was retained as the proposed option and is the one modelled in this study. The dredging rate and release of sediments during the dredging operation have been estimated and are provided in Table 6.1. It is noted that silt curtains may be used to mitigate the plume dispersion during the dredging campaign however these are not considered in the modelling.

Material	Assumed gross quantities incl OD (m^3)*	Max-Prod/wk for turbidity input (m^3/wk)**	Av- Prod/wk including stand-by (m^3/wk)	Duration, including all dredging delays and standby (wks)	Fines at seabed from bucket (kg/m^3)	Fines to water column from bucket (kg/m^3) ***	Fines to water column at seabed during placement (kg/m^3)	Average Rate for dredging excludes mob and demob. ($/$m^3$) ****
Clayey SAND	9,396	25,000	9,000	0.96	14	23	126	
Loose SAND	3,758	27,000	9,000	0.39	4	9	70	
Very soft CLAYS	5,638	20,000	7,000	0.81	36	60	375	
Firm-stiff CLAYS	620	25,000	7,000	0.09	34	51	95	
AMOUR	590	5,000	1,000	0.55	n/a	n/a	n/a	
Totals	20,000			2.81				$200

Notes (continued on following page):

- * All quantities are inclusive of over-dredging

Table 6.1: BHD Production Estimates (Table 5 GHD 2020)

6.1.1 Dredging Scenarios

The information provided GHD 2020b were used to define dredging scenario to be modelled, in consultation with GHD and ARUP. The following scenarios were considered:

Dredging frequency:

- Scenario 1: Dredging non-stop at maximum working rate.

This scenario corresponds to the longest gap between cruise vessels (occurs in July) and assesses the longest possible "continuous" plume generating dredging activities. Scenario 1 would be completed in 6 days at the maximum rate. Whilst this may not be a realistic scenario it is considered a "worst case" for plume dispersion modelling.

- Scenario 2: Dredging non-stop at average working rate (no modelled stoppages). The average working rate already include some standby allowance (GHD 2020b).

This scenario will be completed in 2.26 weeks, approximately 16 days.

Dredger position:

In both scenarios considered, the total dredging time is split into three equal time periods during which the dredger is successively positioned at location 1, then 2 then 3 (see locations in Figure 6.1).

- Scenario 1: BHD Dredging at location 1 (2 days), location 2 (2 days) and location 3 (2 days)- 1 disposal per day
- Scenario 2: BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days) -1 disposal every 2.66 days

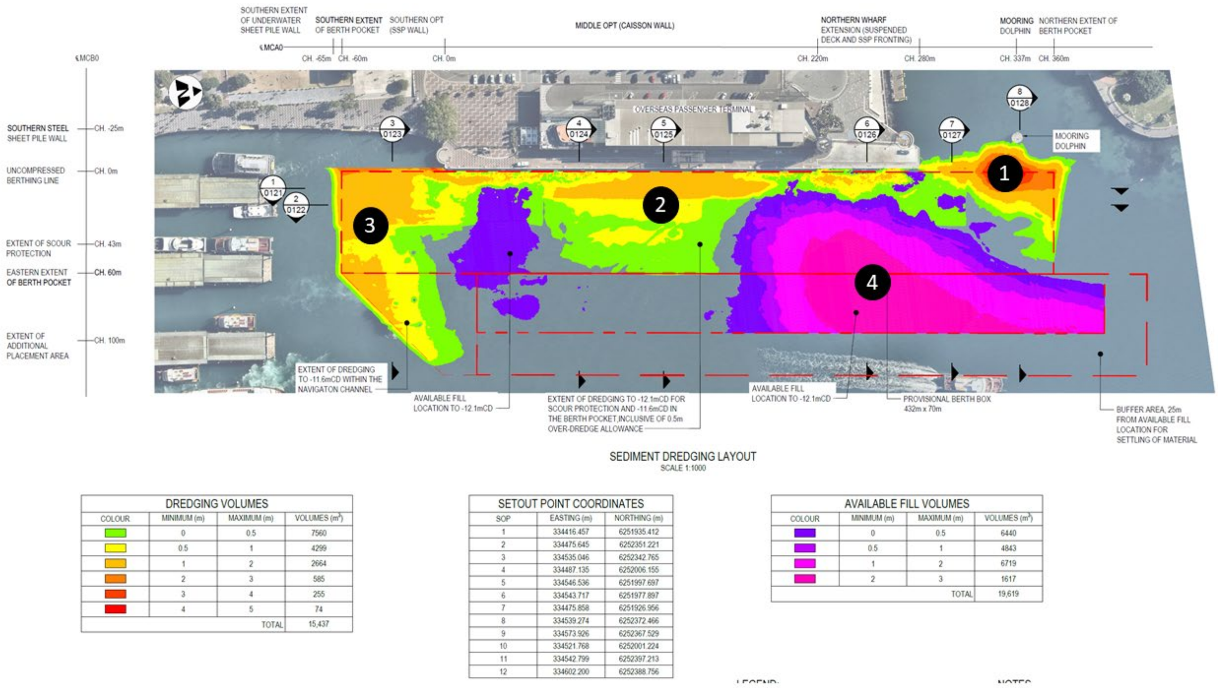


Figure 6.1: Position for numerical modelling sediment releases: Dredger position= locations 1 , 2 and 3, Barge/Pipe Disposal = location 4

6.1.2 Sediment Releases

Coffey's geotechnical and Geophysical investigation report (2019) provides data on the particle size distribution of the sediment to be dredged. The relative proportions of gravel, sand, silt and clay for each of sediment "types" considered in Table 6.1 are summarized in Table 6.2. These were obtained by averaging the distributions of individual sample considered for each Sediment Type considered in Table 6.1: Type 1 = Clayey sand, Type 2 : Loose sand, Type 3: Very Soft Clay, Type 4: Firm Stiff Clay.

For each sediment class, we assumed a representative median size d_{50} in middle of the size range to determine the associated settling velocities used in the simulations. For clay we used the upper limit of the size range at 2 µm. Settling velocities were computed equations by Van Rijn (1993). The slowest settling velocity was limited to 0.2 mm/s for the clay fraction to account for the expected flocculation of the fine cohesive sediment (Table 6.3).

These sediment distributions of Table 6.2 were used to convert the source terms *per type* (Table 6.1) to source term *per sediment class.* This was undertaken by summing the contributions of each *type* to the sand, silt and clay sediment *classes*. Results are summarized in Table 6.4. Note the gravel class is shown in the table but was not included in the simulation due to its fast settling and low proportion.

Table 6.2 Mean sediment distribution of Sediment Types considered in Table 6.1. (Type 1 = Clayey sand, Type 2 : Loose sand, Type 3: Very Soft Clay, Type 4: Firm Stiff Clay), based on spreadsheet data provided by Coffey.

	Samples considered	**Cobbles (>6cm)**	**Gravel (>2mm)**	**Sand (0.06-2.00 mm)**	**Silt (2-60 µm)**	**Clay (<2 µm)**
Type 1	VC03,VC07,VC12,VC01	0.00	1.25	67.00	8.25	23.5
Type 2	VC01	0.00	0.00	72.00	8	20
Type3	VC02,VC10	0.00	0.00	39.00	32	29
Type4	VC08	0.00	0.00	48.00	19	33

Table 6.3 Sediment settling velocities considered for the simulations.

	Gravel (>2mm)	**Sand (0.06-2.00 mm)**	**Silt (2-60 µm)**	**Clay (<2 µm)**
Representative d50 [microns]	2000	130	31	2
Settling velocity (Van Rijn) [m/s]	1.94E-01	9.20E-03	6.06E-04	2.00E-04

Table 6.4 BHD estimates for each sediment class considered.

	Assumed gross quantities incl OD	Max-Prod/wk for turbidity input 24/7	Av- Prod/wk including stand-by	Duration, including all dredging delays and standby	Fines at seabed from bucket	Fines to water column from bucket	Fines to water column at seabed from Disposal
	(m3) to remove	(m3/wk)	(m3/wk)	(wks)	kg/m3	kg/m3	kg/m3
Clay	4799.28	25325.00	8255.00	0.57	25.75	41.44	183.71
Silt	2997.77	15372.50	5032.50	0.39	19.46	31.51	154.05
Sand	11497.50	55990.00	18600.00	1.28	42.62	69.77	326.67
Cobble	117.45	312.50	112.50	0.01	0.18	0.29	1.58

6.2 Sediment Dispersion Modelling

6.2.1 OpenDrift Model description

The dispersion of sediment discharged in the harbour during the dredging operations was simulated using the ocean trajectory modelling framework OpenDrift[6] (Dagestad K.F et al. 2018) .OpenDrift is an open-source Python-based framework for Lagrangian particle tracking developed by the Norwegian Meteorological Institute, where it is notably used operationally for emergency response for oil spill and search and rescue events. The framework is highly modular and can be used for any type of drift calculations in the ocean or atmosphere. A number of modules have already been developed, including an oil drift module (see Röhrs et al., 2019), a stochastic search-and-rescue module, a pelagic egg module, a plastic drift module.

The sediment dispersion simulations described in the study were undertaken using a modified version of the generic OceanDrift3D[7] module that allows specification of settling velocities.

The sediment dispersion modelling consists of a trajectory tracking scheme applied to discrete particles in time and space-varying 3D oceanic currents.

$$\frac{dx_p}{dt} = \tilde{u}(x,y,z,t) + u_t$$

$$\frac{dy_p}{dt} = \tilde{v}(x,y,z,t) + v_t$$

$$\frac{dz_p}{dt} = w_t + w_s$$

(6.1 a,b,c)

where (x_p, y_p, z_p) are particle 3D coordinates, $\tilde{u}_{(x,y,z,t)}$, $\tilde{v}_{(x,y,z,t)}$ are horizontal ocean currents, (u_t, v_t, w_t) are the diffusion components representing turbulent motions, and w_s is the sediment settling velocity.

[6] https://github.com/OpenDrift/opendrift

[7] https://github.com/OpenDrift/opendrift/blob/master/opendrift/models/oceandrift3D.py

In the horizontal plane, particles were advected by ocean currents using a 4th order Runge-Kutta tracking scheme, and subject to additional displacement by horizontal diffusion.

In the OpenDrift framework, the horizontal diffusion is included by applying an uncertainty to the horizontal current magnitudes. The magnitude of the current uncertainty was estimated using the general diffusion equation (eqn 2.2)

$$\int_{t}^{t+\Delta t} u_t . dt = \sqrt{6. K_{u,v}. \Delta t} \ . \theta(-1,1) \qquad (3.2)$$

where $\theta(-1,1)$ is a random number from a uniform distribution between -1 and 1, Δt is the time-step of the model in seconds (900 sec. used here) and $K_{u,v}$ is the *horizontal* eddy diffusivity coefficient in $m^2 \cdot s^{-1}$.

In the vertical plane, particles are subject to both vertical settling (w_s) and diffusive displacement (w_t) due to vertical turbulent motion through the water column. In OpenDrift, the vertical mixing process is parameterised in using a numerical scheme described in Visser (1997) which is similar to equation 6.2 when using a constant vertical diffusion coefficient K_z (as employed here).

The horizontal and vertical diffusion are included in the dispersion modelling account for the mixing and diffusion caused by sub grid scale turbulent processes, such as eddies, that are not explicitly resolved by the hydrodynamic models.

For dispersion at oceanic scales, (Okubo, 1974; Okubo, 1971) proposed that $k_{u,v}$ varies approximately as equation 2.3, which is close to the general 4/3 power law often considered for atmospheric (Richardson, L.F, 1962) and oceanic diffusions (Batchelor (1952), Stommel, 1949)) (equation 2.4).

$$k_{u,v} = 0.103. L^{1.15} \qquad (3.3)$$

$$k_{u,v} = \alpha. L^{4/3} \qquad (3.4)$$

where *L* is the horizontal scale of the mixing phenomena and *α* indicates proportionality.

These equations relate the magnitude of the eddy diffusivity $k_{u,v}$ to the length scale of the phenomena and this 4/3 power relationship was found to be relevant over a large range of scale (10m to 1000km) (Okubo, 1974; Okubo, 1971). A similar relationship was found by List et al. (1990) in coastal waters.

In the present study, since high resolution flows are available (Section 3), the amount of added diffusion should be limited. A generic horizontal coefficient of 0.02 m^2/s was applied which is consistent with a length scale of order 20-40 m. The spatial scales of the vertical turbulent motions within the water column are one or several orders of magnitude smaller than horizontal ones. The vertical diffusion coefficient was set to a value of 1 cm^2/s.

6.2.2 Particle release

BHD dredging consists in removing seabed sediment using a backhoe mounted on a barge (see Figure 6.2). The sources of sediment suspension when using a BHD include:

- Near seabed disturbance when loading the bucket, and
- Across the water column as the bucket is lifted to the barge.

To reproduce these processes, particles were released both in a 2m layer thick above the seabed and randomly across the water column. Particle loading was determined according the source terms magnitudes provided in Table 6.4 for each sediment classes (columns 5 and 6).

The suspended sediment plume expected during the sediment disposal were reproduced by seeding particles randomly across the water column, with mass loading according to Table 6.4 (column 7). The disposal operation was assumed to last 10 minutes and happen every 1 or 2.33 days depending on the scenario considered in deeper waters off the berth pocket (position 4 in Figure 6.1).

Individual simulations were undertaken for each sediment class and results were then combined to obtain the total sediment TSS plume and deposition fields. All simulations started on the 1st of July (2017) which is the typical winter month during which dredging is expected to occur and completed when all released particles had settled following the end dredging and disposal operations. The total number of particles released per simulation, and per sediment class, averaged around 220,000. This amounts to a total of 660,000 particles when combining the different sediment classes.

The sediment plume modelling was supplemented by a set of passive tracer simulations to assess the dispersal patterns of potential pollutants within the dredged sediment. The passive tracers were released at each dredging site over 2 days or 5.33 days consistent with the maximum and average dredging scenarios. Particles were released randomly across the water column and tracked for an additional 14 days after the end of the sediment release.

6.2.3 Post-processing

The total suspended sediment concentration and cumulative deposition fields were reconstructed from the particle clouds on a 3.2 km by 1.8 km frame centred on the dredging locations with a grid cell resolution of 10 m. Suspended sediment concentration were computed at three 2m-thick levels in the water column, i.e. surface, mid-depth and nearbed.

TSS and deposition magnitudes were obtained by counting the number of suspended and deposited particles, which each carry a given sediment mass, in each grid cell. The total suspended sediment mass per cell [kg] was then normalized by the cell surface area [m^2], and vertical depth band [m] to obtain sediment concentration in [kg/m^3]. These were converted to [mg/L] which is a more common unit in a dredging context. Statistics were derived from the obtained time-varying TSS fields. The report presents the 50th , 90th and 95th percentile TSS at each level in the water column.

The deposition thickness was obtained by normalizing the total deposited mass per cell by the cell surface area. The sediment mass/m2 were then converted to volume using a wet volumic mass of 2400 kg/m^3. The newly deposited sediment is expected to be less compact that *in-situ* sediment due to compact due to incorporation of water between deposited grains. A bulking coefficient of 1.5 was applied to predicted deposition thicknesses. This means 1m^3 of dredged *in-situ* sediment will create a 1.5 m^3 deposition volume.

For the tracer concentration assessment, gridded timeseries of depth-averaged tracer concentrations were computed over a larger grid 7.3 km by 4.4 km, with a grid cell resolution of 20 m. These were then normalized by the tracer concentration at discharge location (i.e. dredging site).

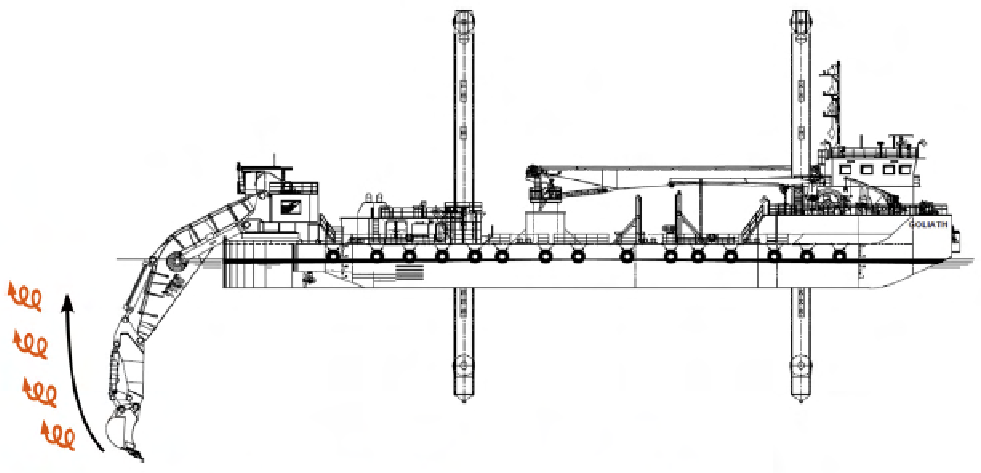


Fig. 6. Sources of a dredge plume for a Backhoe Dredger(BHD).

Figure 6.2 Sources of a dredge plume for a Back Hoe Dredger (after Becker J. et al., 2015).

6.3 Results

The section presents the results of the dredging plume simulations considering scenarios outlined in Section 6.1.1.

- **maximum** dredging rate over a 6 day period (BHD Dredging at location 1 (2 days), location 2 (2 days) and location 3 (2 days)- 1 disposal per day)
- **average** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day)

6.3.1 Suspended Sediment Concentration

The 50th , 90th and 95th percentile TSS concentration fields obtained of the **maximum** dredging rate scenario are provided in Figure 6.3 to Figure 6.5. The 50th , 90th and 95th percentile TSS concentration fields obtained of the **average** dredging rate scenario are provided in Figure 6.6 to Figure 6.8. TSS timeseries extracted at four references sites (e.g. see red dots in Figure 6.3) are provided in Figure 6.9 **maximum** dredging rate scenario and in Figure 6.10 for the **average** dredging rate scenario.

The TSS footprints indicate locally elevated TSS levels in the vicinity of the dredging sites, with a local hotspot at the disposal location. The nearbed TSS are generally larger than surface and mid-water levels since they include the contribution of the nearbed source term (due to the bucket on the seabed), as well as sediment released through the water column which eventually reach that bottom layer. The sediment plumes eventually connect with the ambient harbour flows out of the basin and get dispersed in the east-west axis, though with reduced TSS levels.

TSS levels expectedly larger for the shorter scenario with the **maximum** dredging rate. Largest 95th percentile TSS are typically of order 500mg/L or more close to the dredging at the surface level. Near the seabed levels in excess of 500mg/L are mostly confined within the dredge pocket except for the maximum dredging rate where the high TSS concentration can extend to Walsh Bay. Timeseries of TSS at four reference sites indicates discrete peaks above ~500+mg/L but these are very short-lived and levels fall back down very rapidly (Figure 6.9, Figure 6.10). Similar TSS levels are reached during the **average** rate scenario but over much more compact areas, in the close vicinity of the dredging location and disposal.

We note that the disposal-related TSS plume is not always evident in the 90th and 95th percentile TSS maps. This is due to the short disposal discharge, which elevates TSS levels on shorter timescales that the continuous dredging along the quay.

Figure 6.11 and Figure 6.12 shows the timeseries of total suspended sediment concentrations [mg/L] at the three dredging locations (Figure 6.1) and therefore illustrate the persistence of the TSS concentration levels at these locations. Typically, the TSS concentration drop back down to a level less than 50m/L within less than a day for both the **maximum** dredging rate scenario and the **average** dredging rate scenario.

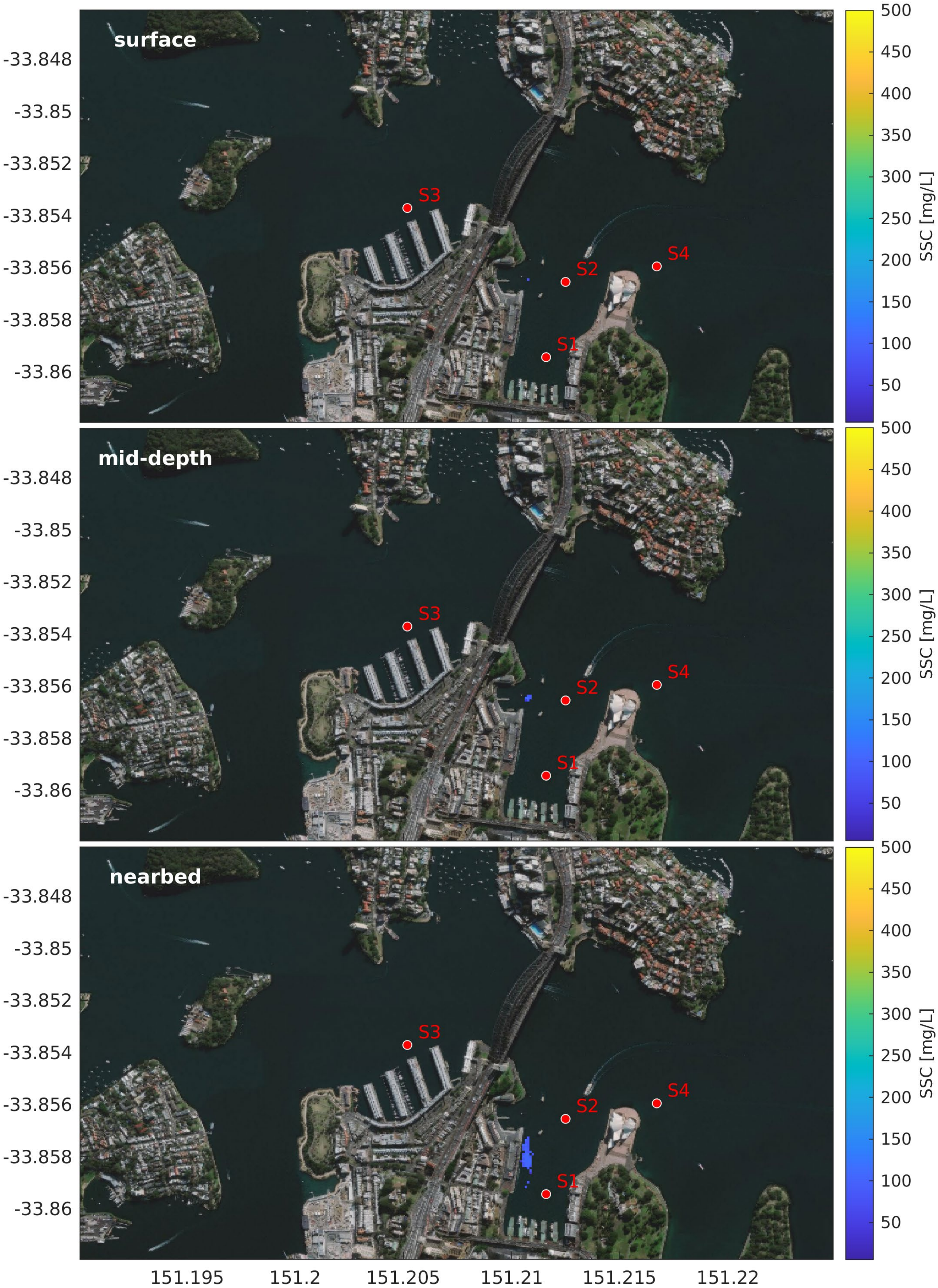


Figure 6.3 *50th total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, for the scenario assuming* ***maximum*** *dredging rate over a 6 day period (BHD Dredging at location 1 (2 days), location 2 (2 days) and location 3 (2 days)- 1 disposal per day). Reference locations where TSS timeseries were extracted are shown as red dots. The TSS were masked below 5 mg/L.*

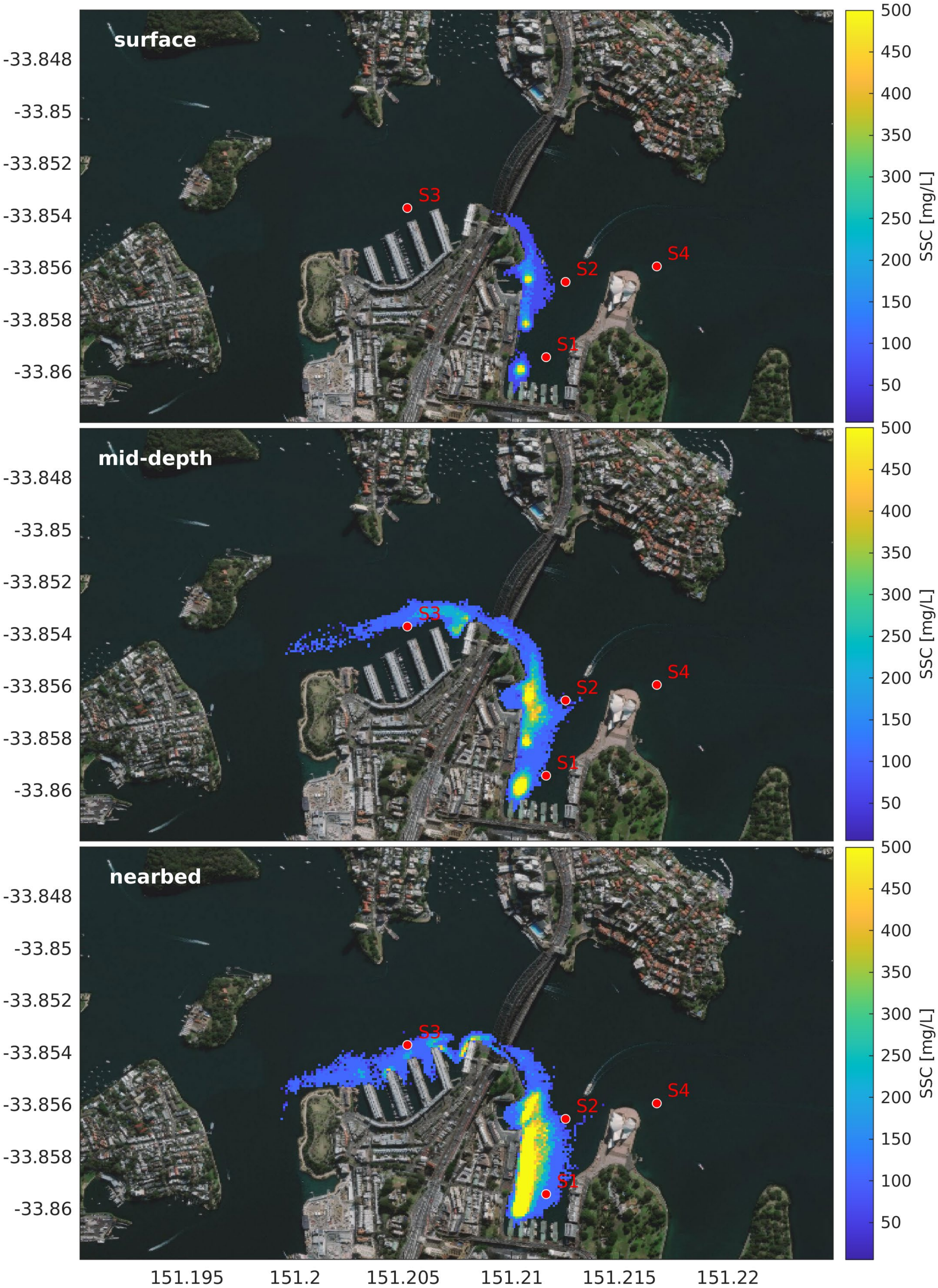


Figure 6.4 *90th percentile total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, for the scenario assuming **maximum** dredging rate over a 6 day period (BHD Dredging at location 1 (2 days), location 2 (2 days) and location 3 (2 days)- 1 disposal per day). Reference locations where TSS timeseries were extracted are shown as red dots. The TSS were masked below 5 mg/L.*

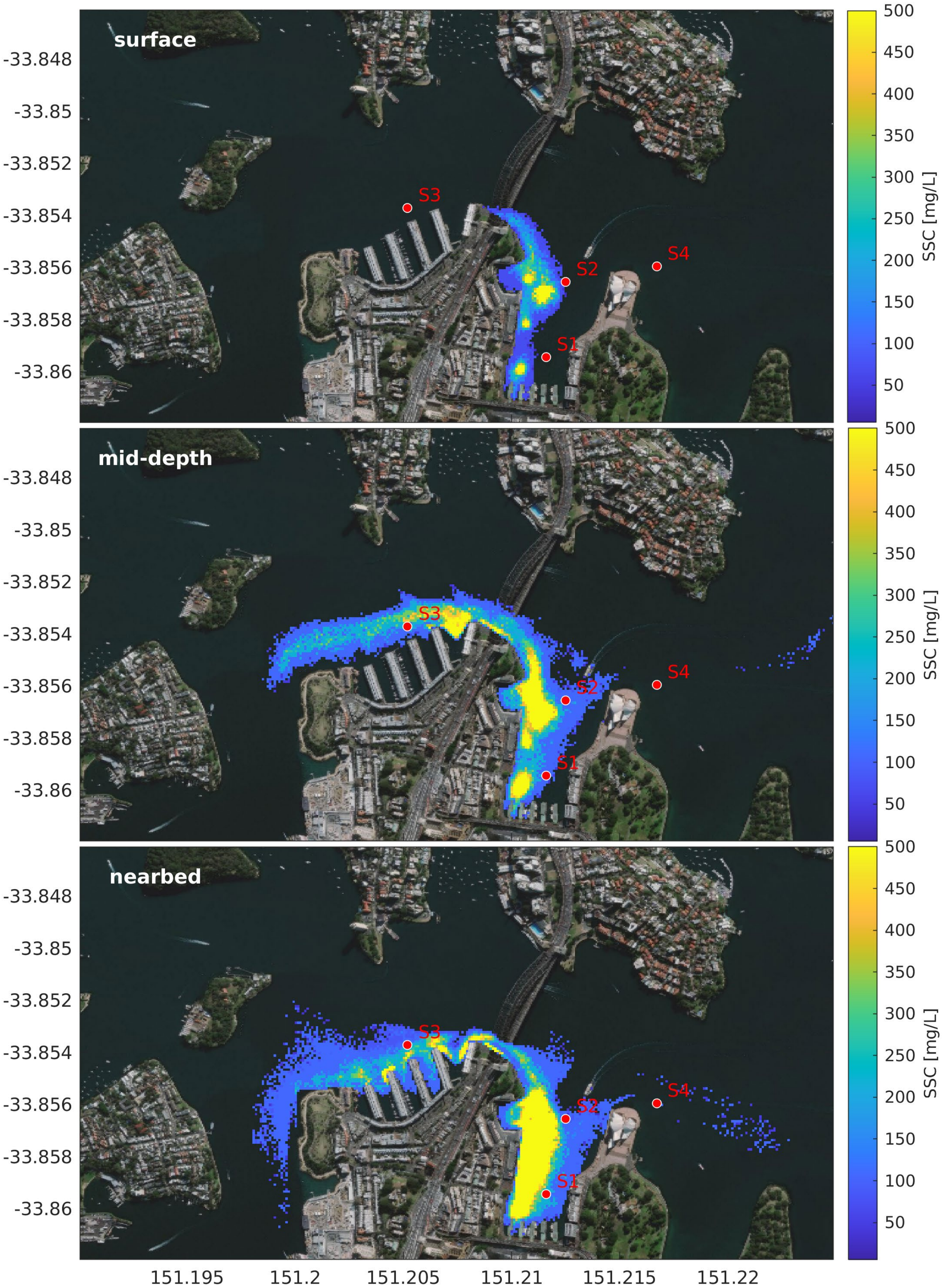


*Figure 6.5 95th percentile total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, for the scenario assuming **maximum** dredging rate over a 6 day period (BHD Dredging at location 1 (2 days), location 2 (2 days) and location 3 (2 days)- 1 disposal per day). Reference locations where TSS timeseries were extracted are shown as red dots. The TSS were masked below 5 mg/L.*

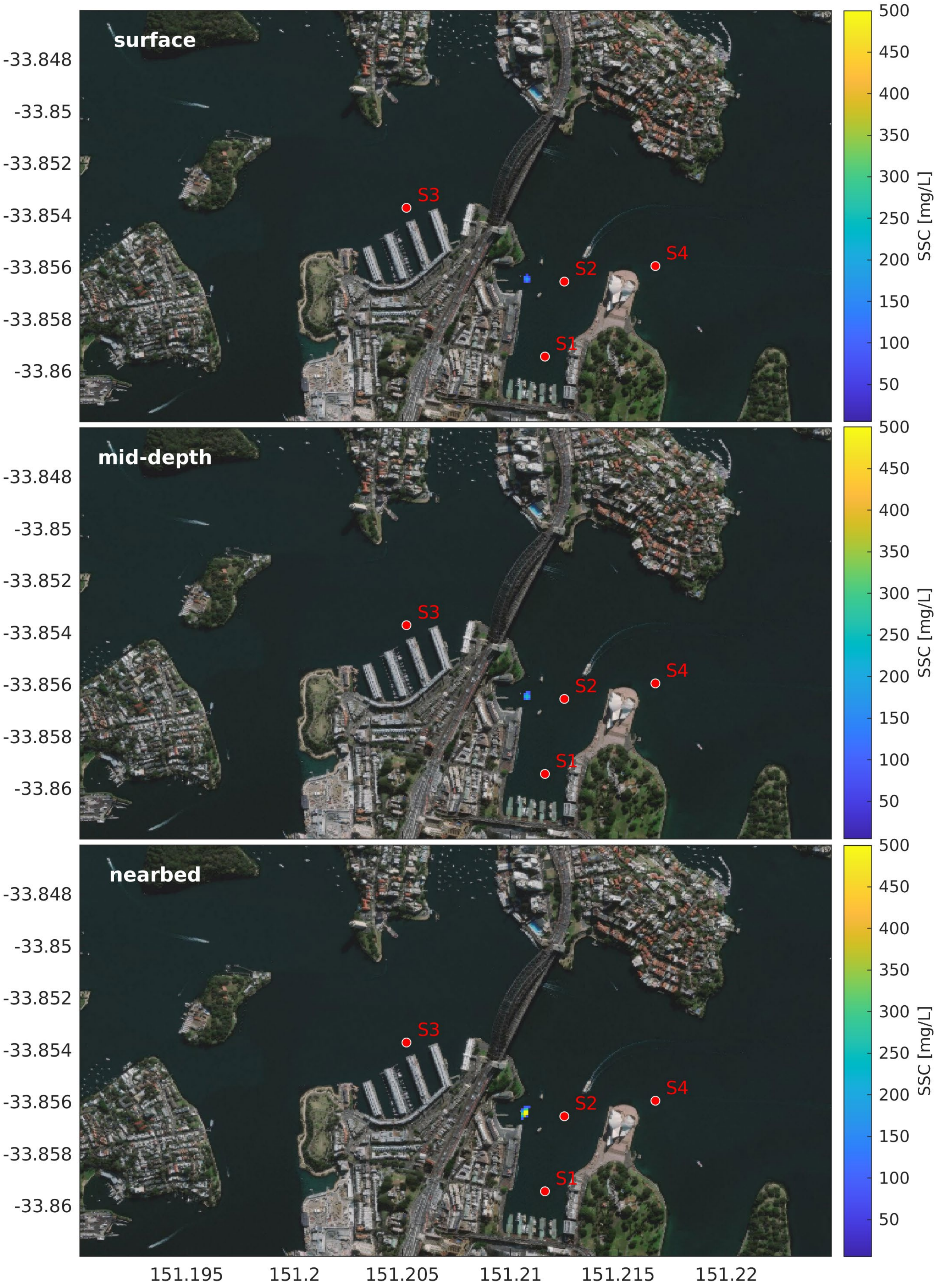


Figure 6.6 *50th total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, for the scenario assuming* ***average*** *dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). Reference locations where TSS timeseries were extracted are shown as red dots. The TSS were masked below 5 mg/L.*

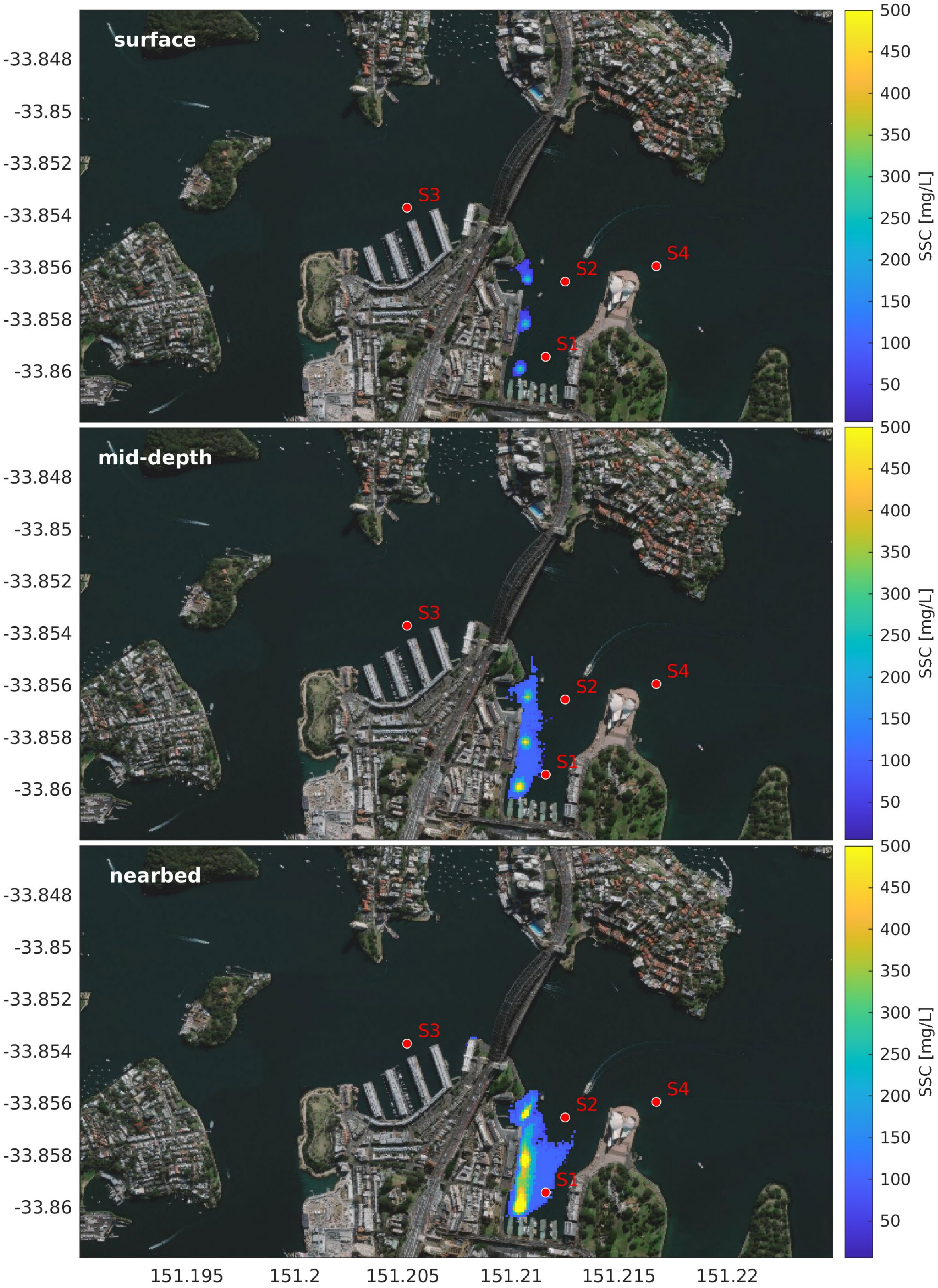


Figure 6.7 *90th percentile total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, for the scenario assuming **average** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). Reference locations where TSS timeseries were extracted are shown as red dots. The TSS were masked below 5 mg/L.*

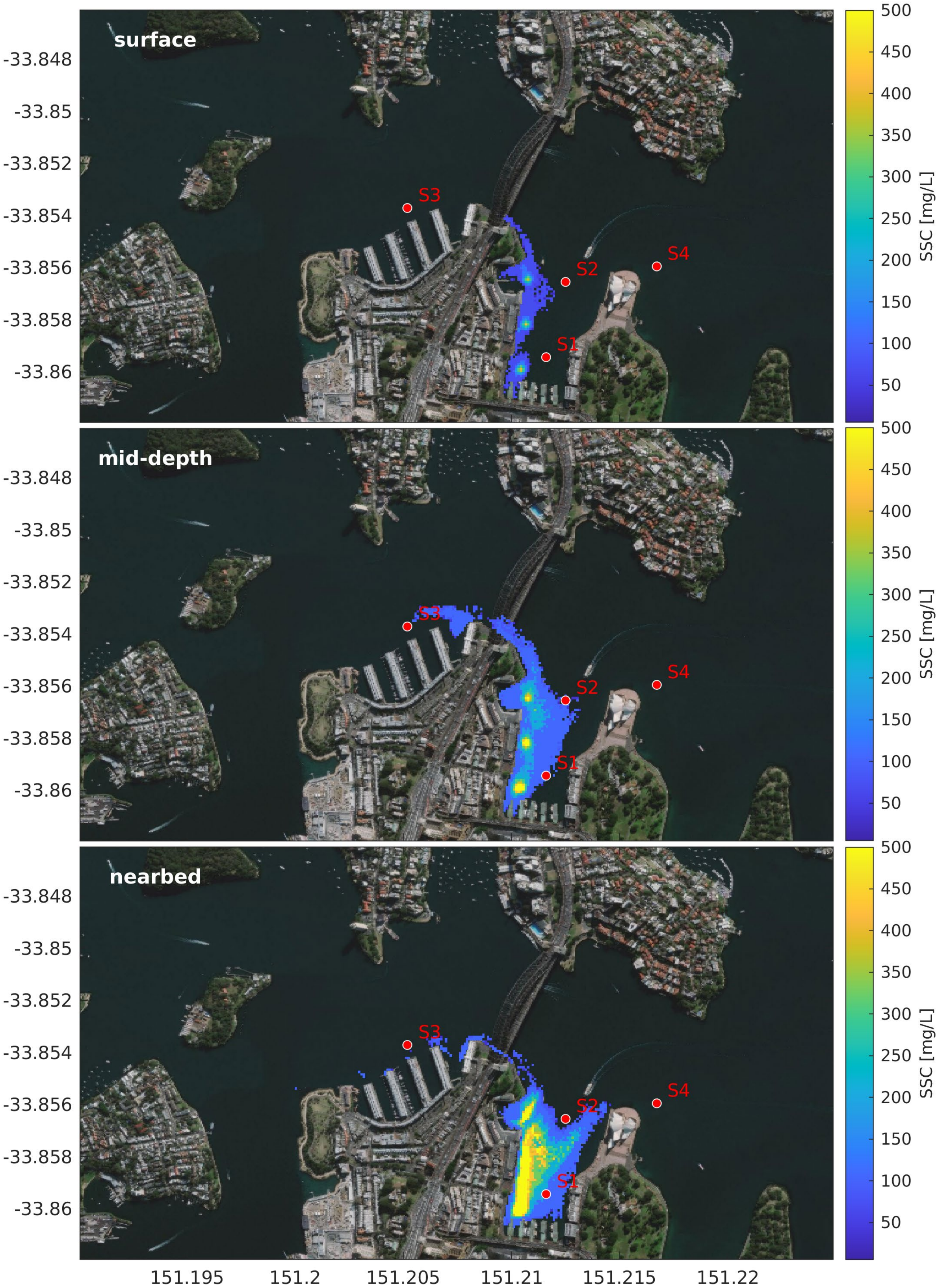


Figure 6.8 *95th percentile total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, for the scenario assuming **average** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). Reference locations where TSS timeseries were extracted are shown as red dots. The TSS were masked below 5 mg/L.*

*Figure 6.9 Timeseries of total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, at four reference sites (see red dots in Figure 6.8), for the scenario assuming **maximum** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). Scale is capped at 500mg/L.*

Figure 6.10 Timeseries of total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, at four reference sites (see red dots in Figure 6.8), for the scenario assuming ***average*** *dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). Scale is capped at 500mg/L.*

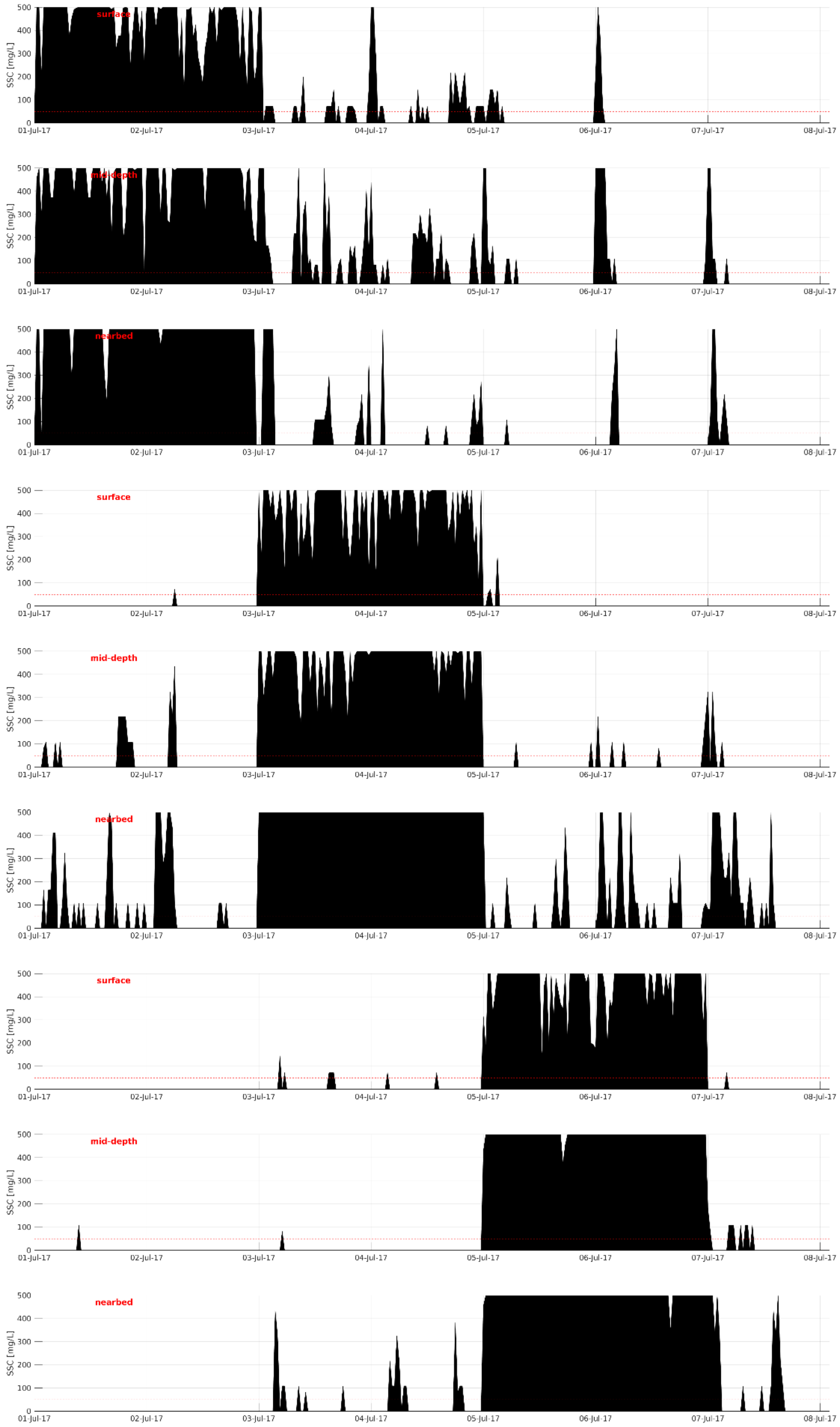


Figure 6.11 Timeseries of total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, at the three dredging locations (see red dots in Figure 6.1),for the scenario assuming ***maximum*** *dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)-.*

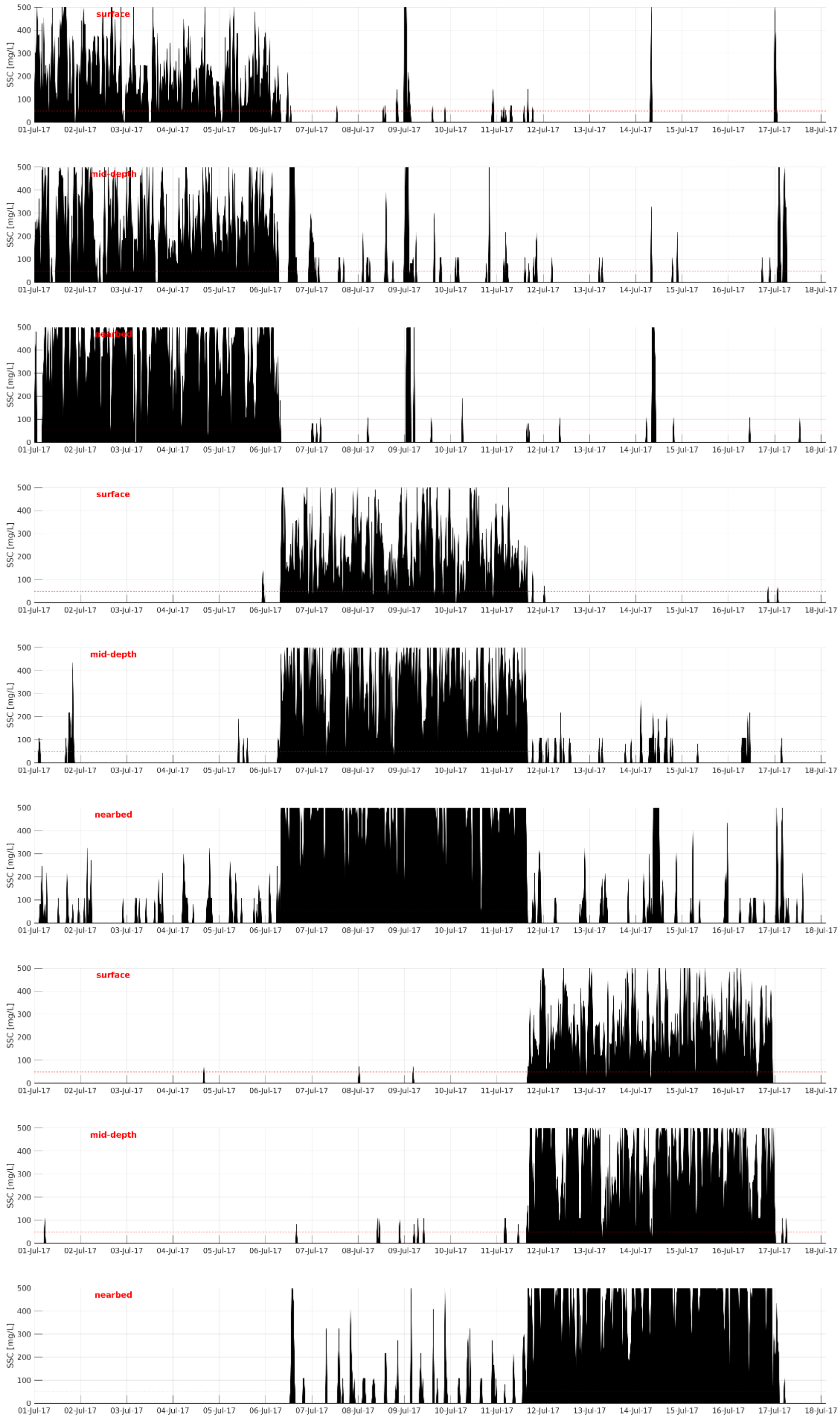


*Figure 6.12 Timeseries of total suspended sediment concentrations [mg/L] at surface, mid water and nearbed levels, at the three dredging locations (see red dots in Figure 6.1), for the scenario assuming **average** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). Scale is capped at 500mg/L.*

6.3.2 Sediment deposition

Final cumulative sediment deposition thickness maps obtained for the **maximum** and **average** dredging rate scenario are provided in Figure 6.13 and Figure 6.14, respectively.

Largest deposition thicknesses occur in the vicinity of the dredging and disposal locations with distinct mounds. Local deposition footprints patterns are similar for both scenarios. Beyond Circular Quay, the longer sediment discharge at reduced rate during the **average** rate scenario generally results in the sediment being spread over slightly larger areas. For example, the 1 mm deposition contour for the **average** dredging rate scenario can extend slightly further than for the **maximum** dredging rate (e.g. off Walsh Bay), but it is also more irregular closer to the release sites.

Figure 6.15 and Figure 6.16 present the final cumulative sediment deposition thickness [m] and volume settled in the dredge pocket for the scenario for the **maximum** and **average** dredging rate scenario, respectively. It is assumed that the sediment which deposit directly within the dredged pocket would be removed as the dredging progress through the berth pocket.

It is noted that the model does not consider the effects of prop wash from vessels which will greatly reduce sediment deposition within operational berth areas since material will be resuspended by high velocity prop-wash currents and will settle out in quieter areas of the harbour

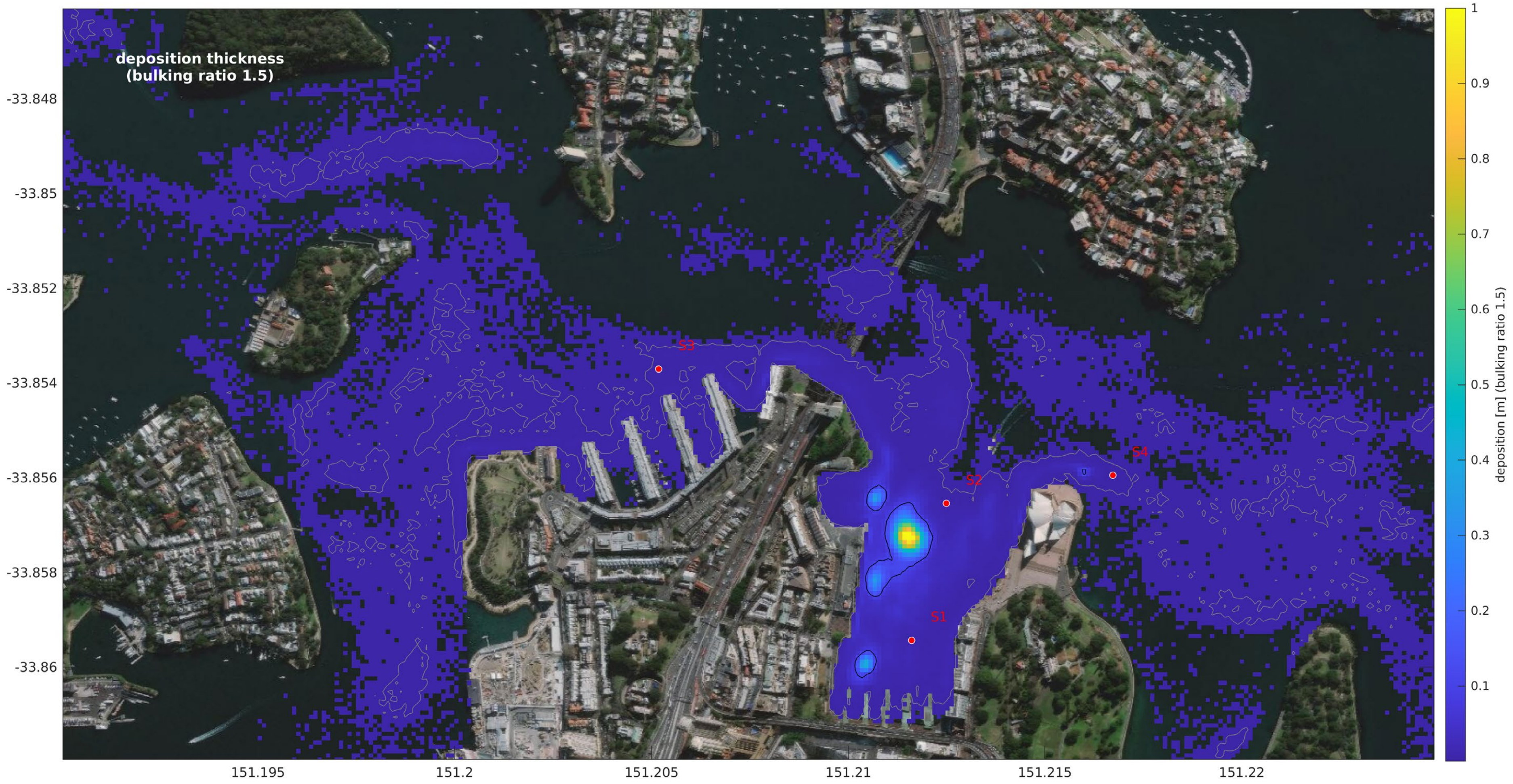


*Figure 6.13 Final cumulative sediment deposition thickness [m] for the scenario assuming **maximum** dredging rate over a 6 day period (BHD Dredging at location 1 (2 days), location 2 (2 days) and location 3 (2 days)- 1 disposal per day). The deposition thicknesses were masked below 0.1 millimetres. The 10cm and 1 mm contours are shown in black and grey respectively.*

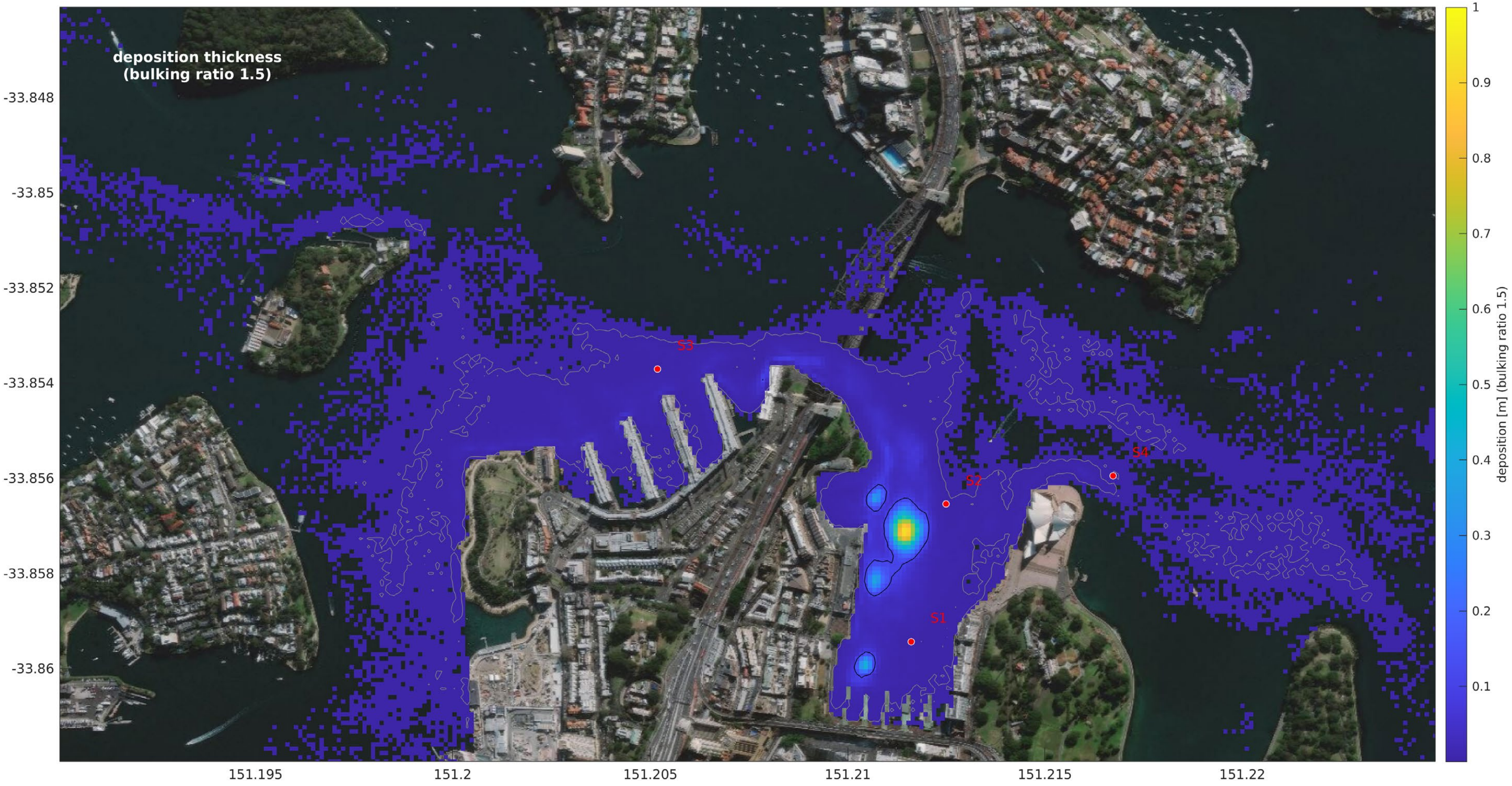


*Figure 6.14 Final cumulative sediment deposition thickness [m] for the scenario assuming **average** dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). The deposition thicknesses were masked below 0.1 millimetres. The 10cm and 1 mm contours are shown in black and grey respectively.*

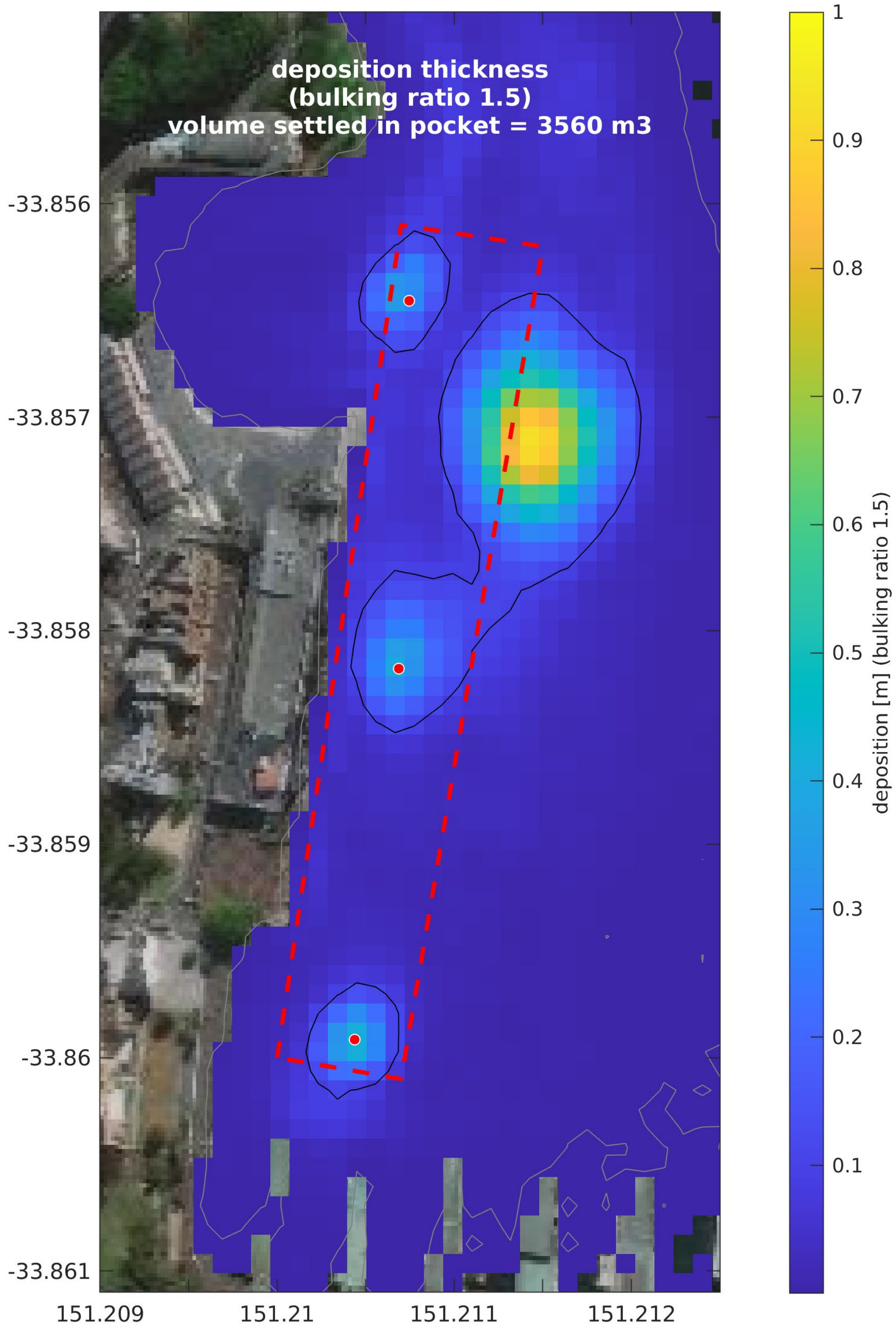


*Figure 6.15 Final cumulative sediment deposition thickness [m] and volume settled in dredge pocket for the scenario assuming **maximum** dredging rate over a 6 day period (BHD Dredging at location 1 (2 days), location 2 (2 days) and location 3 (2 days)- 1 disposal per day). The deposition thicknesses were masked below 0.1 millimetres. The 10cm and 1 mm contours are shown in black and grey respectively.*

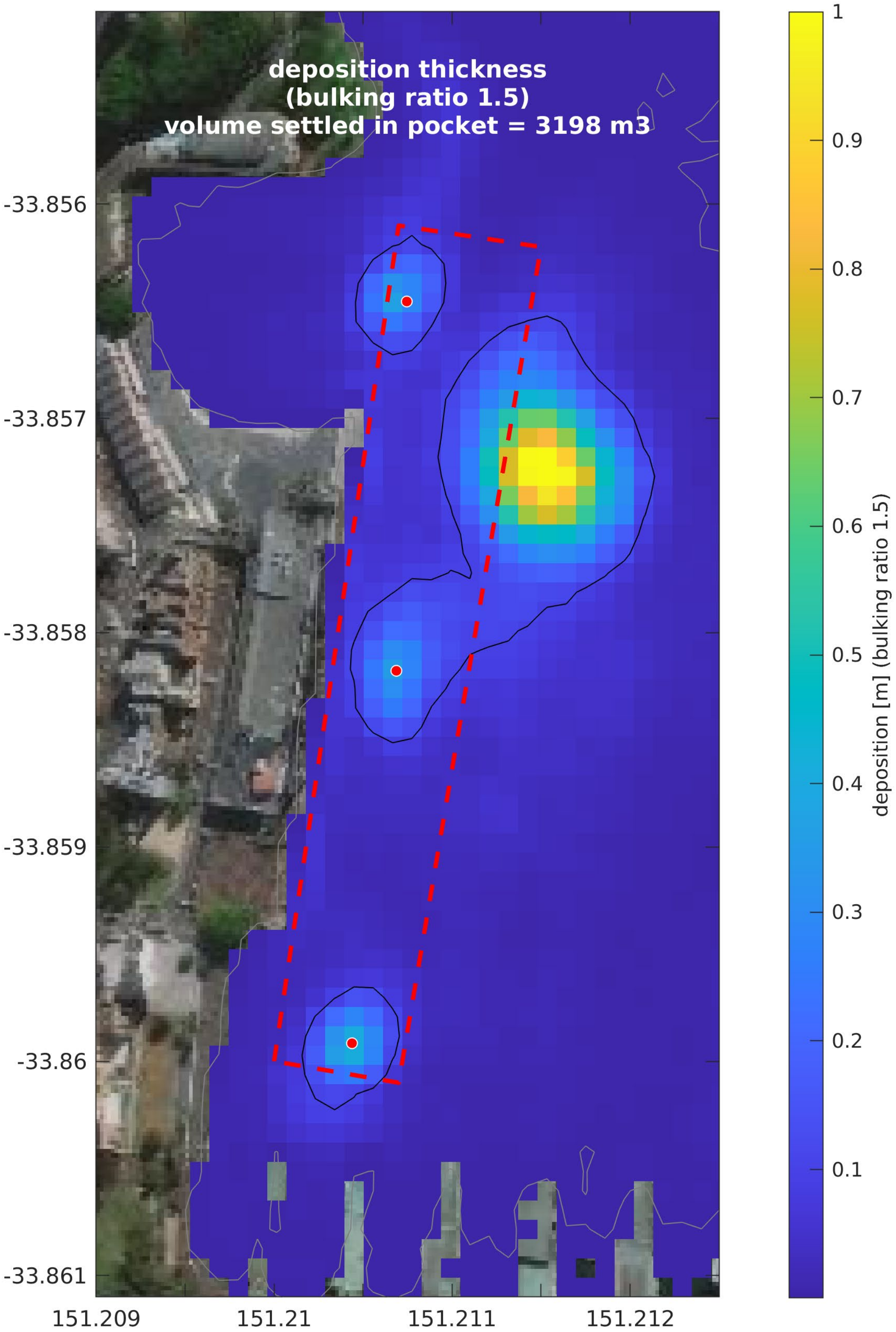


Figure 6.16 Final cumulative sediment deposition thickness [m] and volume settled in dredge pocket for the scenario assuming ***average*** *dredging rate over a 16 day period (BHD Dredging at location 1 (5.33 days), location 2 (5.33 days) and location 3 (5.33 days)- 1 disposal per 2.66 day). The deposition thicknesses were masked below 0.1 millimetres. The 10cm and 1 mm contours are shown in black and grey respectively.*

6.3.3 Tracer Concentration

The mean normalized depth-averaged tracer concentration fields are shown in Figure 6.17 and Figure 6.18. The 95th percentile levels are shown in Figure 6.19 and Figure 6.20. The results are presented in terms of concentration ratio with the tracer release at the dredging location, that is, for example a concentration ratio of 1e-2 indicates a tracer concentration level at that location 100 times smaller than released during the dredging.

The 95th levels presented illustrate the concentration level that are exceeded only 5% of the time with the time periods considered 16-19 days considered (depending on the scenario considered).

The normalized depth-averaged tracer concentration is obtained by a) computing the particle concentration at each cell, and b) normalizing by the particle concentration at the discharge location i.e. here dredging locations. This normalized tracer concentration quantifies the relative dilution of the initial concentration at the discharge location and can provide some guidance on the dispersion of potential passive pollutants bound to the dredged sediment. The analysis has been done for each dredging site release, i.e. site 1 , 2 and 3 (Figure 6.1).

Maps indicate that the tracer typically spreads within the Circular Quay around the dredging location and connects with the east-west harbour flows. There are some local concentration hotspots in some of the bays north of Circular Quay, notably in Lavender Bay.

The mean and 95th tracer concentration are generally larger and footprint contours more extended for the **average** rate scenario than for the **maximum** rate scenario. This can be attributed to the longer discharge period during the **average** rate scenario which release comparatively more tracer through the simulation and thus allows a relative concentration build-up.

Note the locally elevated tracer concentration levels observed along some coastlines are due to the shallower water depths. This result in larger concentrations relative to nearby deeper waters even though the actual amount of tracer material is comparable.

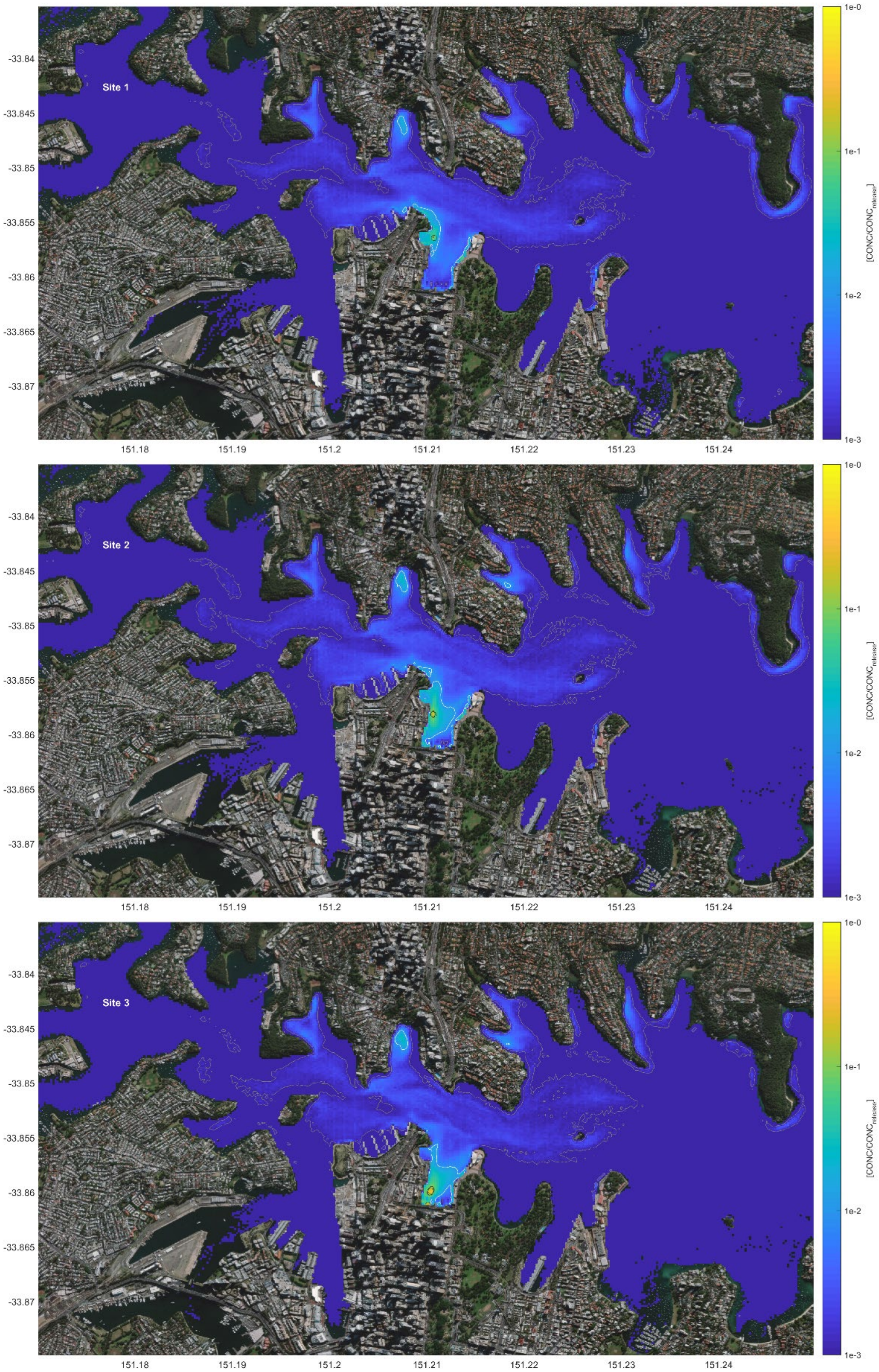


Figure 6.17 Mean normalized depth-averaged tracer concentration fields for the scenario assuming ***maximum*** *dredging for 2 days at sites 1, 2 and 3 (top to bottom). Tracer concentration at each cell was normalized initial tracer concentration at discharge site (i.e. location of dredging). Note the colour scale is logarithmic. The 0.001, 0.01, and 0.1 normalized concentration contours are shown in grey, white and black respectively.*

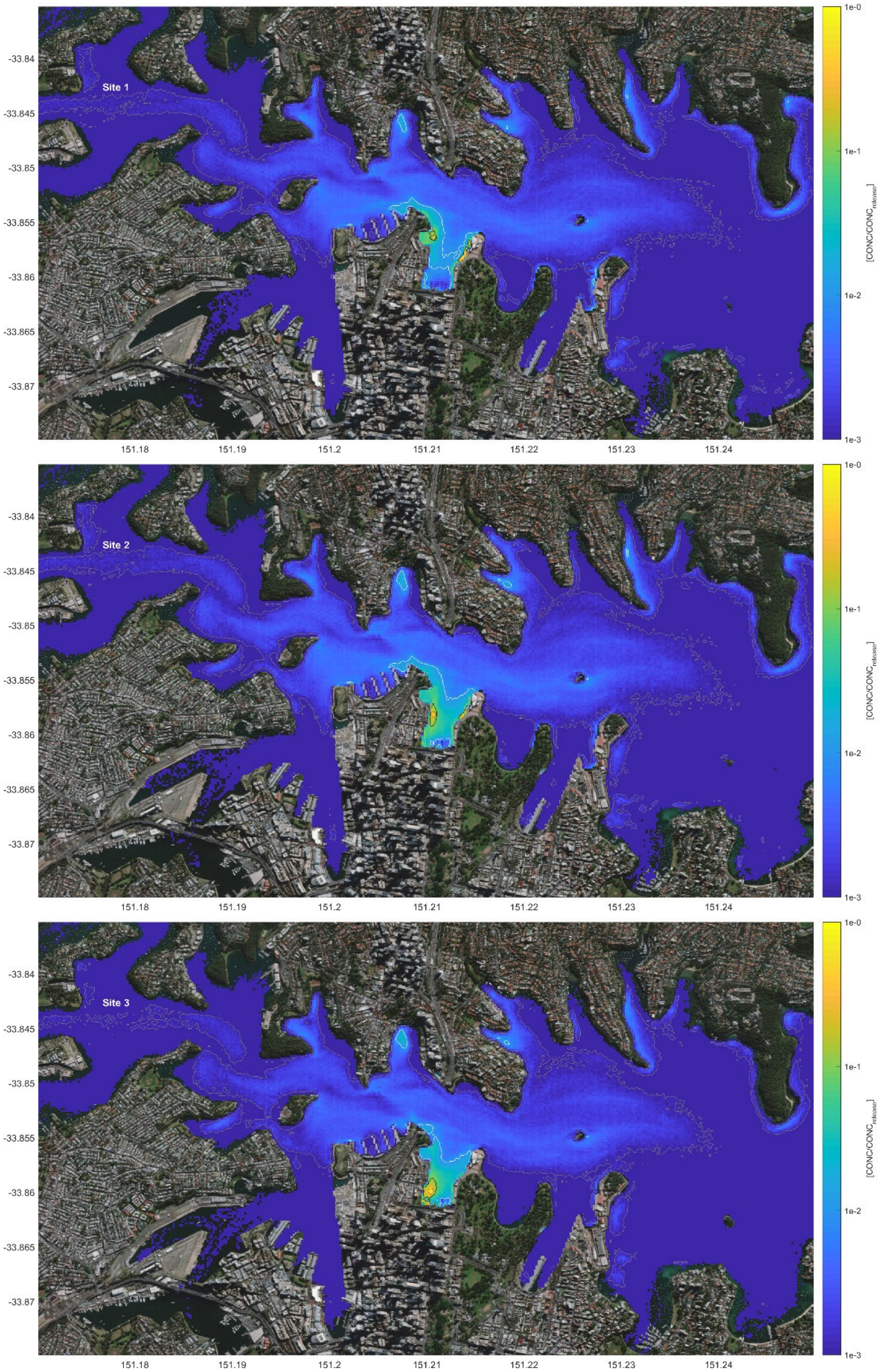


Figure 6.18 Mean normalized depth-averaged tracer concentration fields for the scenario assuming ***average*** *dredging for 5.33 days at sites 1, 2 and 3 (top to bottom). Tracer concentration at each cell was normalized initial tracer concentration at discharge site (i.e. location of dredging). Note the colour scale is logarithmic. The 0.001, 0.01, and 0.1 normalized concentration contours are shown in grey, white and black respectively.*

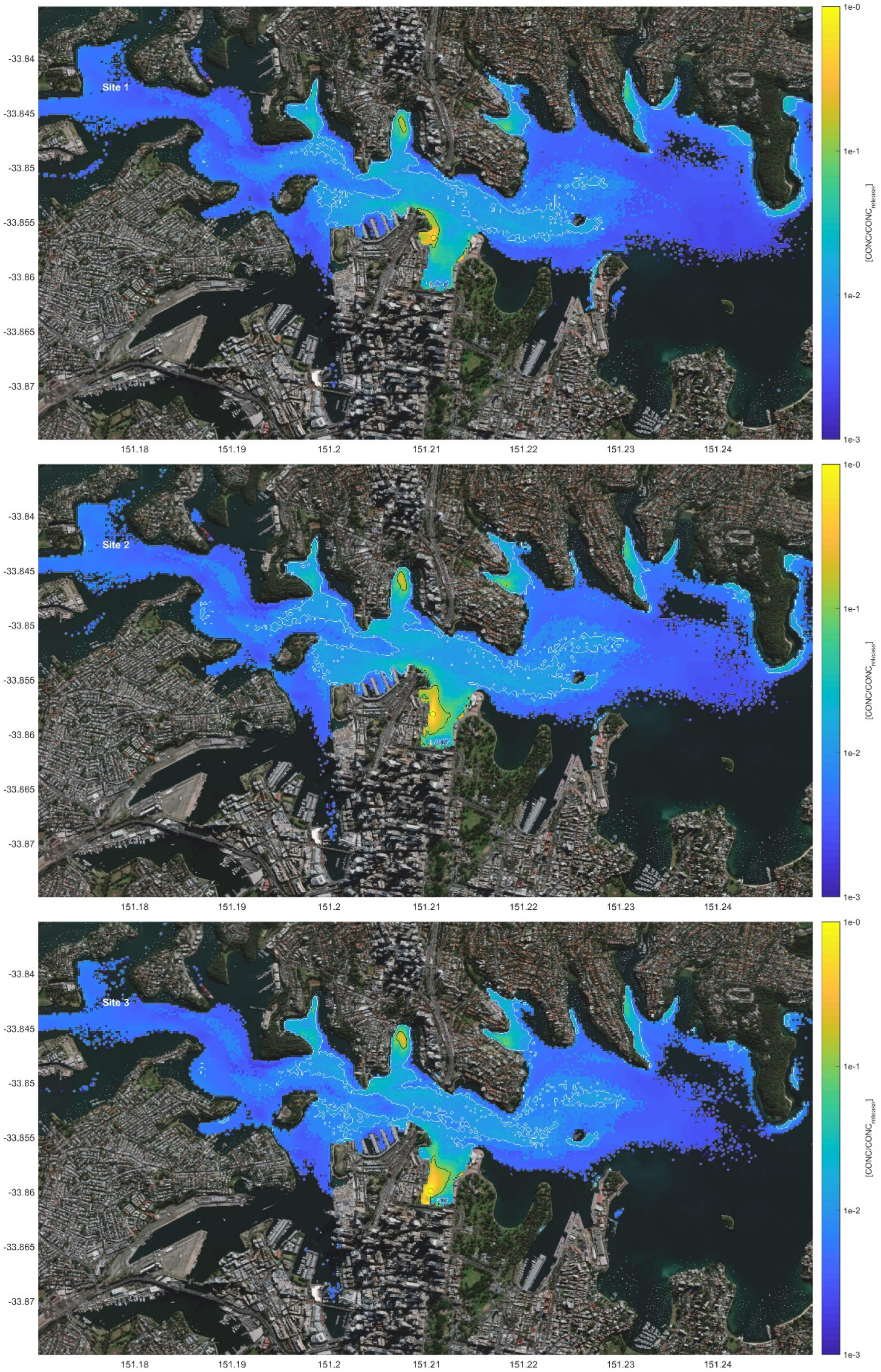


*Figure 6.19 95th percentile of normalized depth-averaged tracer concentration fields for the scenario assuming **maximum** dredging for 2 days at sites 1, 2 and 3 (top to bottom). Tracer concentration at each cell was normalized initial tracer concentration at discharge site (i.e. location of dredging). Note the colour scale is logarithmic. The 0.001, 0.01, and 0.1 normalized concentration contours are shown in grey, white and black respectively.*

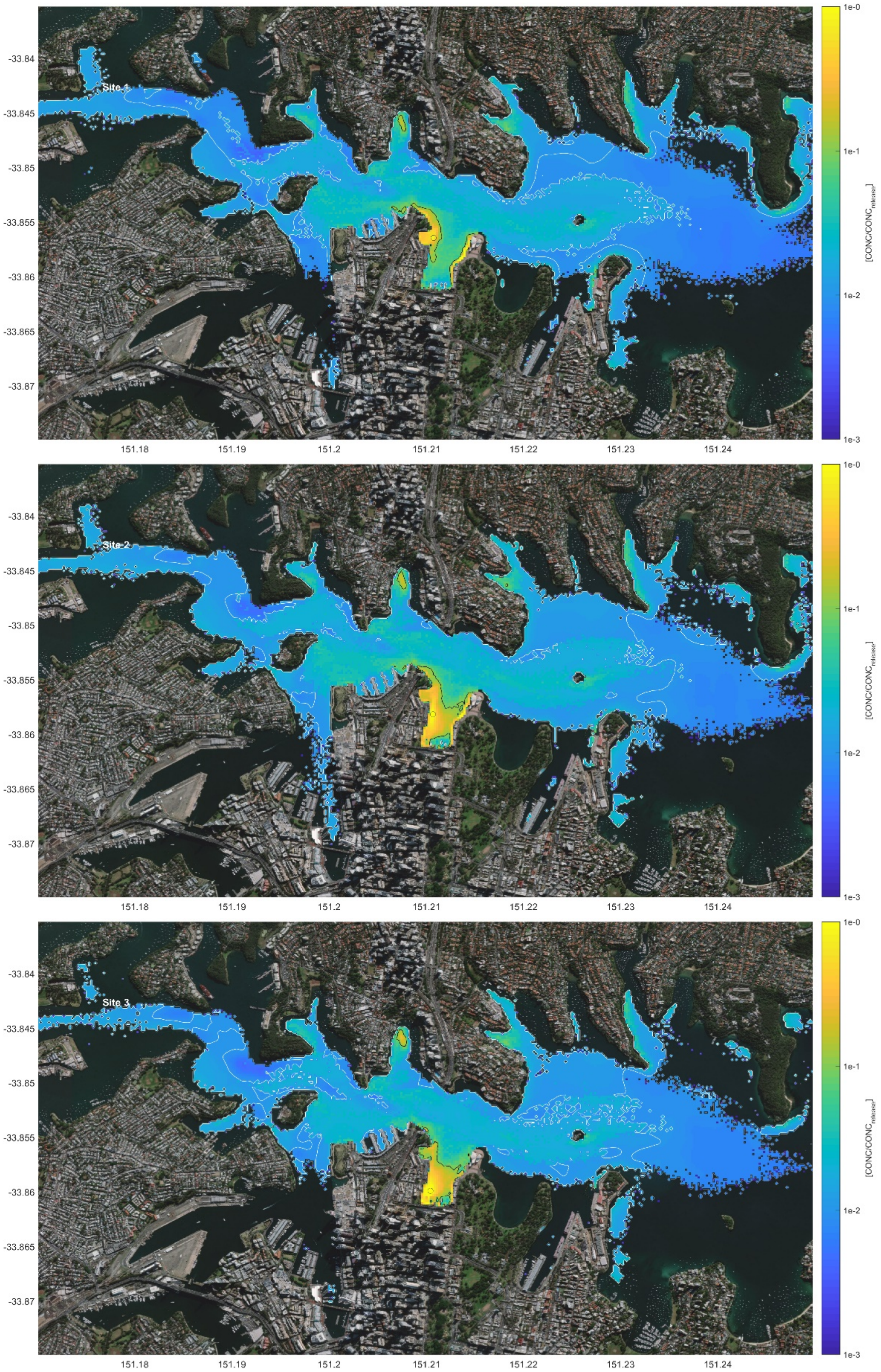


*Figure 6.20 95th percentile of normalized depth-averaged tracer concentration fields for the scenario assuming **average** dredging for 5.33 days at sites 1, 2 and 3 (top to bottom). Tracer concentration at each cell was normalized initial tracer concentration at discharge site (i.e. location of dredging). Note the colour scale is logarithmic. The 0.001, 0.01, and 0.1 normalized concentration contours are shown in grey, white and black respectively.*

7. Conclusions

Hydrodynamic and dredge plume modelling has been undertaken to support the proposed dredging of the Overseas Passenger Terminal berth pocket.

MetOcean Solution Sydney Harbour SCHISM hydrodynamic model was used to prepare hydrodynamic current database for the assessment of the dispersion of the dredged sediments. The model bathymetry was updated with the latest hydrographic survey for Circular Quay/Sydney Cove from PANSW. Validation of the model has been undertaken and showed that the model captures well the propagation of the tidal wave within the estuary.

Following review of proposed dredging program and available sediment data, the dredging scenarios to be modelled were selected in consultation with GHD and ARUP and includes dredging with a Backhoe Dredger and disposal in a deeper area off the berth pocket. Two scenarios were selected to be modelled: one with dredging occurring non-stop at a **maximum** working rate and one with dredging non-stop at an **average** working rate (which already include some standby allowance). The dredger position was successively position at three locations throughout the simulations. Modelled sediments fractions were based on the analysis from Coffey (2019) and splits in three sediment classes, i.e. clay, silt and sand.

Modelling was undertaken using the hydrodynamic data from the SCHISM model from a typical winter month and the OpenDrift Lagrangian particle tracking model. Individual simulations were undertaken for each sediment class and results were then combined to obtain the total sediment TSS plume and deposition fields. The sediment plume modelling was supplemented by a set of passive tracer simulations to assess the dispersal patterns of potential pollutants within the dredged sediment.

The 50th , 90th and 95th percentile TSS concentration fields were determined for the maximum and average dredging rate scenario. TSS timeseries were also extracted at four references sites.

The TSS footprints indicate locally elevated TSS levels in the vicinity of the dredging sites, with a local hotspot at the disposal location. The TSS levels are generally larger at the seabed than at the surface and mid-water levels. The sediment plumes eventually connect with the ambient harbour flows out of the basin and get dispersed in the east-west axis, though with reduced TSS levels. TSS levels expectedly larger for the shorter scenario with the maximum dredging rate.

It is noted that once the dredging stop, the TSS concentrations at that location drop back to a level less than 50m/L within less than a day.

Final cumulative sediment deposition thickness maps were obtained for the maximum and average dredging rate scenario. Largest deposition thicknesses occur in the vicinity of the dredging and disposal locations with distinct mounds. Beyond Circular Quay, the longer sediment discharge at reduced rate during the average rate scenario generally results in the sediment being spread over slightly larger areas.

The Mean and 95th percentile normalized depth-averaged tracer concentration fields were calculated based on the release at each of the three dredger positions. Maps indicate that the tracer typically spreads within the Circular Quay around the dredging location and connects with the east-west harbour flows, some local high concentration patches are observed in some of the bay along north of Circular Quay.

It is noted that silt curtains may be used to mitigate the plume dispersion during the dredging campaign. While these curtains are not considered in the modelling, It is expected they will limit the sediment dispersion into the harbour and will assist in containing the plume and associated sedimentation within Circular Quay/Sydney Cove.

8. References

Birch, G., and Rochford, L. (2009). Stormwater metal loading to a well-mixed/stratified estuary (Sydney Estuary, Australia) and management implications. Environ. Monit. Assess. *169*, 531–551.

Caires, S., and Sterl, A. (2005). 100-year return value estimates for ocean wind speed and significant wave height from the ERA-40 data. J. Clim. *18*, 1032–1048.

Chassignet, E.P., Hurlburt, H.E., Smedstad, O.M., Halliwell, G.R., Hogan, P.J., Wallcraft, A.J., Baraille, R., and Bleck, R. (2007). The HYCOM (hybrid coordinate ocean model) data assimilative system. J. Mar. Syst. *65*, 60–83.

Coffey 2019 Port Authority of NSW OPT Berth Deepening Investigations Geotechnical and Geophysical Investigations Report

Das, P., Marchesiello, P., and Middleton, J.H. (2000). Numerical modelling of tide-induced residual circulation in Sydney Harbour. p.

GHD 2020a Overseas Passenger Terminal – Berthing Infrastructure Project, Preliminary Dredging and Disposal Strategy, Draft Report Rev b, dated 26th January 2020, prepared by GHD for PANSW

GHD 2020b Overseas Passenger Terminal – Berthing Infrastructure Project, Preliminary Dredging and In-Harbour Relocation Strategy, Draft Report Rev b, dated 25th February 2020, prepared by GHD for PANSW

Kantha, L.H., and Clayson, C.A. (1994). An improved mixed layer model for geophysical applications. J. Geophys. Res. *99*, 25235–25266.

Umlauf, L., and Burchard, H. (2003). A generic length-scale equation for geophysical turbulence models. J. Mar. Res. *61*, 235–265.

Van Rijn, L.C. (1993). Principles of sediment transport in rivers, estuaries and coastal seas (Aqua publications Amsterdam).

Xiao, Z.Y., Wang, X.H., Song, D., Jalón-Rojas, I., and Harrison, D. (2020). Numerical modelling of suspended-sediment transport in a geographically complex microtidal estuary: Sydney Harbour Estuary, NSW. Estuar. Coast. Shelf Sci. *236*, 106605.

Zhang, Y.L., and Baptista, A.M. (2008). A semi-implicit Eulerian-Lagrangian finite element model for cross-scale ocean circulation. Ocean Model. *21*, 71–96.

Zhang, Y., Ateljevich, E., Yu, H.-C., Wu, C., and Yu, J. (2014). A new vertical coordinate system for a 3D unstructured-grid model. Ocean Model. *85*.

Appendix E– Noise and Vibration Assessment

Port Authority of New South Wales

Overseas Passenger Terminal Berthing Infrastructure Project – Dredging and Scour Protection

Noise & Vibration Assessment

263976-00-RPT-0011

Issue 1 | 17 September 2020

Job number 263976

Ove Arup & Partners Ltd
63 St Thomas Street
Bristol BS1 6JZ
United Kingdom
www.arup.com

ARUP

Document Verification

ARUP

Job title		Overseas Passenger Terminal Berthing Infrastructure Project – Dredging and Scour Protection			**Job number** 263976
Document title		Noise & Vibration Assessment			**File reference**
Document ref		263976-00-RPT-0011			
Revision	**Date**	**Filename**	263976-00-RPT-0011 OPT REF Noise Technical Assessment.docx		
Draft 1	15 April 2020	**Description**	First draft		
			Prepared by	Checked by	Approved by
		Name	Ida Larrazabal	Glenn Wheatley	Glenn Wheatley
		Signature			
Draft 2	13 Aug 2020	**Filename**	263976-00-RPT-0011 OPT REF Noise Technical Assessment.docx		
		Description	Draft 2		
			Prepared by	Checked by	Approved by
		Name	Ida Larrazabal	Glenn Wheatley	Glenn Wheatley
		Signature			
Issue 1	17 Sep 2020	**Filename**	263976-00-RPT-0011 - Issue 1 Noise Technical Assessment.docx		
		Description	Issue 1		
			Prepared by	Checked by	Approved by
		Name	Ida Larrazabal	Glenn Wheatley	Glenn Wheatley
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			

Issue Document Verification with Document ✓

Contents

Page

1 Introduction 1

1.1 Reference documents 1

2 Existing environment 3

2.1 Sensitive receivers 3
2.2 Noise Monitoring Locations 8

3 Assessment criteria 10

3.1 Construction noise criteria 10
3.2 Construction traffic criteria 13
3.3 Construction vibration criteria 14

4 Construction site noise assessment 19

4.1 OPT activities 19
4.2 Glebe Island activities 22
4.3 Assessment methodology 23
4.4 Noise prediction results 25

5 Construction traffic assessment 32

5.1 OPT 32
5.2 Glebe Island 32

6 Construction vibration assessment 33

7 Assessment summary 34

7.1 OPT 34
7.2 Glebe Island 37

8 Mitigation measures 38

8.1 Standard Mitigation Measures 38
8.2 Additional Construction Mitigation Measures 39

9 Conclusions 40

Appendices

Appendix A

Glossary

1 Introduction

This acoustic assessment report summarises the noise and vibration assessment of and the associated impacts from the dredging works and scour-protection installation of the Overseas Passenger Terminal (OPT) along with the Glebe Island (GI) compound site to support the REF submission.

No changes to the everyday operation of the OPT are proposed, nor additional external mechanical plant, therefore no assessment of operational noise emissions is required.

1.1 Reference documents

The assessment has been carried out in accordance to the following policy and guidelines;

- NSW Interim Construction Noise Guideline [1]
- NSW Assessing vibration – a technical guideline [2]
- BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting [3]
- BS 7385-1:1990 - Evaluation and measurement for vibration in buildings. Guide for measurement of vibrations and evaluation of their effects on buildings [4]
- German Standard DIN 4150 - Part 3 'Structural vibration in buildings - Effects on Structure' (DIN 4150-3) [5]
- NSW Road Noise Policy [6]
- NSW Environmental Criteria for Road Traffic Noise [7]
- SEPP (Infrastructure) 2007 [8]
- AS 2436:2010 Guide to noise and vibration control on construction, demolition and maintenance sites [9]
- BS 5228 – 1: 2009 Code of practice for noise and vibration control on construction and open sites. Noise [10]
- NSW Construction Noise and Vibration Guideline [11]
- Environmental Planning and Assessment (Covid-19 Development – Construction Work Days) Order 2020 [12]

The background noise levels are taken from previous noise assessment reports:

- Overseas Passenger Terminal Wharf Extension: Construction Noise and Vibration Assessment by AECOM, 14 May 2014 [13]
- Interim Exhibition Facility, Glebe Island, White Bay and Wharves 4 and 5, Noise Impact Assessment 610.11854-R1 by SLR Consulting Australia Pty Ltd, 2012 [14]

The traffic volumes are taken from the following reports:

- Overseas Passenger Terminal, Sydney – Master Plan Traffic Report, Taylor Thomson Whitting (TTW) NSW Pty Ltd, June 2013 [15]
- White Bay Cruise Terminal Environmental Impact Statement by JBA Urban Planning Consultants Pty Ltd, 2010 [16]

2 Existing environment

2.1 Sensitive receivers

Sensitive receivers which may be affected by the proposed project were identified for the Circular Quay and Glebe Island works in accordance with the ICNG [1]. Assessment of residential and non-residential receivers presented in this report is isolated to the reasonably most-affected receivers.

2.1.1 Circular Quay

Residential receivers located within similar environments and with comparable relationship to surrounding noise sources have been grouped into Noise Catchment Areas (NCAs), also shown in Figure 1 and described in Table 1.

Table 1: NCAs and description

NCA	Description	Noise environment
NCA 1	Eastern Circular Quay	Background controlled by road traffic along Cahill Expressway, ambient levels controlled by local road traffic and surrounding local activity from entertainment venues or commercial premises.
NCA 2	Western Circular Quay	Generally controlled by local intermittent road traffic, local activity and natural surrounds

Residential receivers with the potential to be impacted by the proposed construction at the Overseas Passenger Terminal in Circular Quay are listed in Table 2. The reasonable most-affected non-residential sensitive receivers are listed in Table 2. All identified receivers are also shown in Figure 1.

Table 2: Residential receivers for OPT works

Receiver ID	Address	No. of floors	Approximate distance to site [m]
R1	1-3 Macquarie Street, Sydney	12	260
R2	3-7 Macquarie Street, Sydney	12	260
R3	61-69 Macquarie Street, Sydney	15	270
R4	8 Hickson Road, Dawes Point	6	160
R5	54 Gloucester Street, The Rocks	2	250
R6	2 Phillip Street, Sydney	27	320

Table 3: Reasonably most-affected non-residential sensitive receivers for OPT works

Receiver ID	Name	Address	No. of floors	Approximate distance to site [m]
Commercial				
C1	Northern Commercial Premises (Quay Restaurant, The Squire's Landing)	Overseas Passenger Terminal, The Rocks	3	<10
C2	Southern Commercial Premises (Cruise Bar, Yuki's at the Quay)	Overseas Passenger Terminal, The Rocks	3	<10
C3	Park Hyatt	7 Hickson Road, The Rocks	5	110
C4	Opera Bar	Sydney Opera House, Macquarie Street, Sydney	1	320
C5	Holiday Inn Old Sydney	55 George Street, The Rocks	5	130
Educational Facilities				
E1	APM College of Business and Communication, Torrens University Australia, William Blue	1-5 Hickson Road, The Rocks	5	70
E2	Julian Ashton Art School	117 George Street, The Rocks	3	140
Passive Recreation Area				
PR1	First Fleet Park	George Street, The Rocks	0	130
PR2	Hickson Road Reserve	Hickson Road, The Rocks	0	140
PR3	Foundation Park	Gloucester Walk, The Rocks	0	200
Cultural				
H1	Australian Steam Building	1-5 Hickson Road, The Rocks	5	70
H2	Cadman's Cottage	110 George Street, The Rocks	2	70
H3	Museum of Contemporary Art	136-140 George Street, The Rocks	6	50
H4	The Rocks Discovery Museum	Kendall Lane, The Rocks	3	130
H5	Susannah Place	58/64 Gloucester Street, The Rocks	2	260

Receivers

Receiver Type

- Commercial
- Cultural
- Education
- Passive Recreation
- Residential
- Site Boundary
- NCA

Metres

0 60 120 240

Rev	Date	By	Chkd	Appd

ARUP

6th Floor, 3 Piccadilly Place
Manchester M1 3BN
Tel+44(0161) 228 2331 Fax+44(0161)228 6879
www.arup.com

Client
Port Authority of NSW

Project Title
Overseas Passenger Terminal Berthing Infrastructure and Capital Dredging Works

Drawing Title
Noise sensitive receiver locations for OPT site

Scale at A4

Role

Suitability

Arup Job No	Rev
263976	**1**

Name

Figure 1: Noise sensitive receiver locations surrounding the OPT site and NCAs

2.1.2 Glebe Island Site

Residential receivers located within similar environments and with comparable relationship to surrounding noise sources have been grouped into Noise Catchment Areas (NCAs), also shown in Figure 2 and described in Table 4.

Table 4: NCAs and description

NCA	Description	Noise environment
NCA 1	Pyrmont	Generally controlled by local intermittent road traffic, local activity and natural surrounds
NCA 2	Balmain	Generally controlled by local intermittent road traffic, local activity and natural surrounds
NCA 3	White Bay Cruise Terminal	Generally controlled by local intermittent road traffic, local activity, activity from White Bay Cruise Terminal and Sydney Harbour Boat Storage, and natural surrounds

Residential receivers with the potential to be affected by construction works occurring at the Glebe Island compound site were identified. The identified receivers are representative of the residential areas in Pyrmont and Balmain that are nearest to the site. The approximate distance from the site was determined for each receiver and is presented in Table 5 and Figure 2.

Table 5: Reasonably most-affected residential receivers for the GI site

Receiver ID	Address	Approximate distance to Glebe Island site [m]
R1	24 Refinery Drive, Pyrmont	230
R2	1-25 Bowman Street, Pyrmont	320
R3	81 Point Street, Pyrmont	520
R4	40 Stephen Street, Balmain	490
R5	1 Buchanan Street, Balmain	510

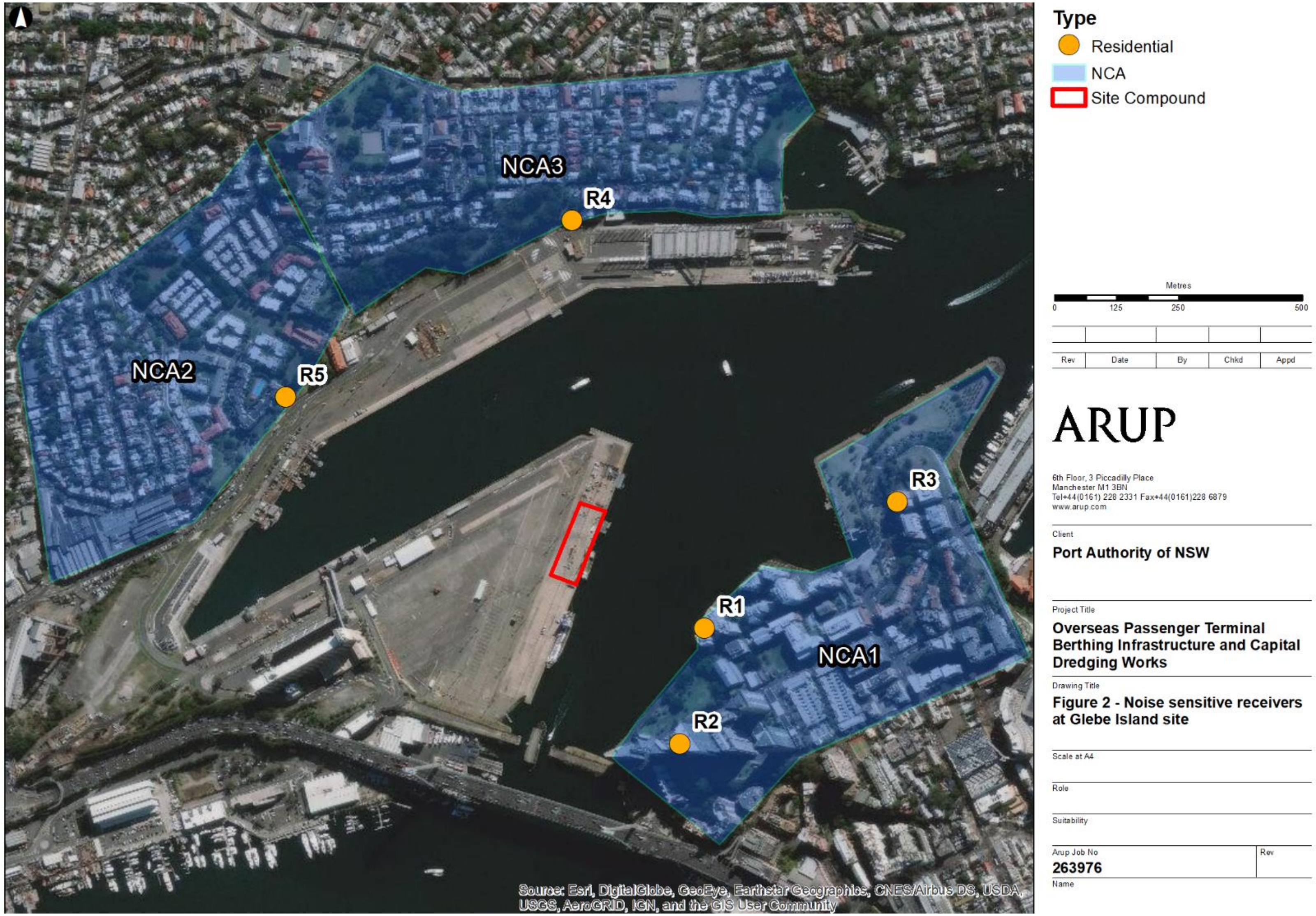


Figure 2: Noise sensitive receivers and NCAs surrounding Glebe Island Site

2.2 Noise Monitoring Locations

2.2.1 Circular Quay

Background noise data for Circular Quay was sourced from the noise monitoring results presented in the Overseas Passenger Terminal Wharf Extension: Construction Noise and Vibration Assessment by AECOM, 14 May [13]. The noise monitoring was undertaken from 23 July 2013 to 1 August 2013 at the first two locations and further logging was conducted at two additional locations from 8 November 2013 to 2 November 2013. There has been no significant development in the Circular Quay since 2013. Therefore, Arup considers it reasonable to assume that ambient noise levels have not altered significantly since 2013 and have used this data to nominate the construction management levels.

Table 6: Existing ambient acoustic noise environment for Circular Quay

Monitoring Location	RBL[1] [dB(A)]		
	Day	**Evening**	**Night**
Holiday Inn, 55 George Street, The Rocks	61	60	57
Quay Grand, 61 Macquarie Street, East Circular Quay	63	62	52
Destination NSW Office, Level 2, 88 Cumberland St.	61	61	57
Park Hyatt, 7 Hickson Rd, The Rocks	61[2]	59	56

1 - Day is defined as the period from 7 am to 6 pm Monday to Saturday; or 8 am to 6 pm on Sundays and Public Holidays. Evening is the period from 6 pm to 10 pm. Night is the remaining period.

2 – Denotes results in which all periods were affected by rain or wind noise.

It was noted that three locations, the Holiday Inn, Destination NSW office and the Park Hyatt are near each other and measured daytime, evening and night-time results are within 1 dB or each other. Therefore, measurement results from the Holiday Inn have been used to represent the background noise at all receivers on the western side of Circular Quay. Measurement results from the Quay Grand have been used to represent background noise at receivers east of Circular Quay.

2.2.2 Glebe Island

Background noise data for Glebe Island was sourced from the noise monitoring results presented in the Interim Exhibition Facility, Glebe Island, White Bay and Wharves 4 and 5, Noise Impact Assessment 610.11854-R1 prepared by SLR Consulting Australia Pty Ltd [14].

Unattended noise monitoring was conducted by SLR from 17 September 2012 and 25 September 2012. There has been no significant development in the Balmain and Pyrmont areas since 2012. Therefore, Arup considers it reasonable to assume that ambient noise levels have not changed since 2012 and have used this data to nominate the construction management levels.

A summary of the noise monitoring results is presented in Table 7.

Table 7: Existing ambient acoustic noise environment for Glebe Island

Monitoring Location	**Rating Background Level (RBL)[1] [dB(A)]**		
	Day	**Evening**	**Night**
24-36 Refinery Drive, Pyrmont[2]	50	49	47
17 Donnelly Street, Balmain	47	45	40
1 Batty Street, Balmain	51	48	45

1 - Day is defined as the period from 7 am to 6 pm Monday to Saturday; or 8 am to 6 pm on Sundays and Public Holidays. Evening is the period from 6 pm to 10 pm. Night is the remaining period.

2 – This monitoring location is labelled as 22 Refinery Drive, Pyrmont in the SLR 2012 report.

3 Assessment criteria

3.1 Construction noise criteria

The ICNG provides recommended noise levels for airborne construction noise at sensitive land uses. The guideline provides construction management noise levels above which all ‘feasible and reasonable’ work practices should be applied to minimise the construction noise impact. The ICNG works on the principle of a ‘screening’ criterion – if predicted or measured construction noise exceeds the ICNG levels then the construction activity must implement all ‘feasible and reasonable’ work practices to reduce noise levels.

The ICNG sets out management levels for noise at sensitive receivers and how they are to be applied. For residential receivers, the rating background level (RBL) is used when determining the management level. The management level for residential receivers is reproduced in Table 8. For other sensitive land uses, the management levels are reproduced in Table 9.

Table 8: Construction noise management levels at residential receivers

Time of day	Management level [1] $L_{Aeq\ (15\ min)}$	How to apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays	Noise affected RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5dB	A strong justification would typically be required for works outside the recommended standard hours.

Time of day	Management level [1] $L_{Aeq\ (15\ min)}$	How to apply
		The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2 of the ICNG.

1 - Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Table 9: Construction noise management levels at other noise sensitive land uses

Land use	Where objective applies	Management level [1] $L_{Aeq\ (15\ min)}$
Passive recreation areas	External noise level	60 dB(A)
Active recreation areas	External noise level	65 dB(A)
Educational institutions	Internal noise level	45 dB(A)
Museums	Internal noise level	45 dB(A)[2]
Commercial premises	External noise level	70 dB(A)

1 – Noise management levels apply when properties are in use.

2 – Based on AS/NZS2107:2016 max design level for Public Buildings – Museums (exhibition space)

3.1.1 Sleep disturbance

Where construction works are planned to extend over more than two consecutive nights, the ICNG recommends that an assessment of sleep disturbance impacts should be undertaken.

The ICNG refers to the NSW Environmental Criteria for Road Traffic Noise [7] for assessing the potential impacts, which notes that to limit the level of sleep disturbance the $L_{AF1,(1\ minute)}$ level (equivalent to the L_{Amax}) of a noise event which should not exceed the ambient L_{A90} noise level by more than 15 dB is not applied to traffic noise.

3.1.2 Project construction noise management levels

Overseas Passenger Terminal

Noise criteria at residential receivers for construction works proposed at the OPT site were derived from noise monitoring data from the AECOM report [13] .The RBL from a monitoring location in close proximity to the residential receivers was used to determine the NML for the Day, Evening and Night-time periods.

Table 10: Noise Management Levels for residential receivers at the OPT site

Receiver ID	NCA	Standard Hours[1]	Out of Hours[2]			Sleep disturbance (RBL + 15 dB)
		Day	Day	Evening	Night	
R1	1	73	68	67	57	67
R2	1	73	68	67	57	67
R3	1	73	68	67	57	67
R4	2	71	66	65	62	72
R5	2	71	66	65	62	72
R6	1	73	68	67	57	67

1 - Standard hours are Monday to Friday 7 am to 6 pm and Saturday from 8 am to 1 pm.

2 - Out of Hours during the different time periods:

Day are Saturday 7 am to 8 am and 1 pm to 6 pm; Sunday and public holidays 8 am to 6 pm;

Evening hours are 6 pm to 10 pm,

Night-time hours are 10 pm to 7am.

Table 11: Non-residential Noise Management Levels at OPT site during working hours

Usage	Receiver ID	Name	Time period	NML, $dBL_{Aeq\ 15minute}$
Commercial premise	C1	Northern Commercial Premises (Quay Restaurant, The Squire’s Landing)	When in use	70
	C2	Southern Commercial Premises (Cruise Bar, Yuki’s at the Quay)	When in use	70
	C3	Park Hyatt	When in use	70
	C4	Opera Bar	When in use	70
Educational institution	E1	APM College of Business and Communication, Torrens University Australia, William Blue	When in use	45 (Internal)
	E2	Julian Ashton Art School	When in use	45 (Internal)
Passive recreation area	PR1	First Fleet Park	When in use	60
	PR2	Hickson Road Reserve	When in use	60
	PR3	Foundation Park	When in use	60
Museums	H1	Australian Steam Building	When in use	45 (Internal)
	H2	Cadman’s Cottage	When in use	45 (Internal)
	H3	Museum of Contemporary Art	When in use	45 (Internal)
	H4	The Rocks Discovery Museum	When in use	45 (Internal)
	H5	Susannah Place	When in use	45 (Internal)

Glebe Island

Construction noise criteria for residential receivers at for the GI site were set based on the noise catchment areas relative to the proposed works. The catchment areas are defined for the GI site in Section 2.1.2. Measured noise data obtained from the SLR 2012 report [14] were used to derive the appropriate noise management level for the project based on the ICNG. The results are summarised in Table 12.

Table 12: Noise Management Levels for residential receivers at the GI site

Receiver ID	NCA	Standard Hours[1]	Out of Hours[2]
		Day	Day
R1	1	60	55
R2	1	60	55
R3	1	60	55
R4	3	57	52
R5	2	61	56

1 - Standard hours are Monday to Friday 7am to 6pm and Saturday from 8am to 1pm.
2 - Out of Hours during the Day are Saturday 7am to 8am and 1pm to 6pm, Sunday and public holidays 8am to 6pm

3.2 Construction traffic criteria

Increased traffic generated on the surrounding road network due to the construction activities in OPT and Glebe Island is assessed in accordance with the NSW *Road Noise Policy* (RNP) [6]. Table 3 of the RNP which sets out the assessment criteria for types of project, road category and land use, shown in Table 13 below.

Table 13: Road traffic criteria for traffic generating development - residential receivers

Road category	Type of project / land use	Assessment criteria – dBL_{Aeq}	
		Day (7:00am-10:00pm)	Night (10:00pm-7:00am)
Freeway/ arterial/sub-arterial roads	Existing residences affected by additional traffic on existing freeways / arterial / sub-arterial roads generated by land use developments	$L_{Aeq,(15\ hour)}$ 60 (external)	$L_{Aeq,(9\ hour)}$ 55 (external)

Note: These criteria are for assessment against façade corrected noise levels when measured in front of a building façade.

Regarding the application of the assessment, the RNP states:

> *In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.*

3.3 Construction vibration criteria

Vibration criteria for construction works are established in the following sections.

3.3.1 Human comfort

The NSW EPA's *Assessing Vibration – A Technical Guideline* [2] provides vibration criteria for maintaining human comfort within different space uses. The guideline recommends 'preferred' and 'maximum' weighted vibration levels for both continuous vibration sources, such as steady road traffic and continuous construction activity, and for impulsive vibration sources. The weighting curves are obtained from BS 6472-1:2008 [3].

For intermittent sources (e.g. passing heavy vehicles, impact pile driving, intermittent construction), the guideline uses the vibration dose value (VDV) metric to assess human comfort effects of vibration. VDV considers both the magnitude of vibration events and the number of instances of the vibration event. Intermittent events that occur less than 3 times in an assessment period (either day, 7 am to 10 pm, or night, 10 pm to 7 am) are counted as 'impulsive' sources for the purposes of assessment.

As noted in the Guideline, situations exist where vibration above the preferred values can be acceptable, particularly for temporary disturbances, such as a construction or excavation projects. Notwithstanding, the recommended vibration limits for maintaining human comfort in residences and other relevant receiver types are given for continuous/impulsive and intermittent vibration in Table 14 and Table 15 respectively.

Table 14: Preferred and maximum weighted root-mean-square (rms) values for continuous and impulsive vibration acceleration (m/s²) 1-80 Hz

Location	**Period**	**Preferred Values**		**Maximum Values**	
		z-axis	**x- and y-axes**	**z-axis**	**x- and y-axes**
Continuous Vibration					
Critical areas1	Day- or Night-time	0.005	0.0036	0.01	0.0072
Residences	Daytime 0700-2200h	0.010	0.0071	0.020	0.014
	Night-time 2200-0700h	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day- or Night-time	0.020	0.014	0.040	0.028
Impulsive Vibration					
Critical areas1	Day- or Night-time	0.005	0.0036	0.01	0.0072
Residences	Daytime 0700-2200h	0.30	0.21	0.60	0.42
	Night-time 2200-0700h	0.10	0.071	0.20	0.14

Location	Period	Preferred Values		Maximum Values	
		z-axis	x- and y-axes	z-axis	x- and y-axes
Offices, schools, educational institutions and places of worship	Day- or Night-time	0.64	0.46	1.28	0.92

1 - Criteria for sensitive areas are only indicative, and have been provided as guidance to acceptable vibration levels for the use of sensitive equipment, eg. camera equipment at Fox Studios.

Table 15: Acceptable vibration dose values for intermittent vibration (m/s1.75)

Location	Daytime 0700-2200 h		Night-time 2200-0700 h	
	Preferred Value	Maximum Value	Preferred Value	Maximum Value
Critical areas1	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80

1 - Criteria for sensitive areas are only indicative, and there may be a need to assess intermittent vibration against impulsive or continuous criteria.

3.3.2 Building damage

Potential structural or cosmetic damage to buildings as a result of vibration is typically assessed in accordance with British Standard 7385 Part 2-1993 and/or German Standard DIN4150-3. British Standard 7385 Part 1: 1990 defines different levels of structural damage as:

- *Cosmetic - The formation of hairline cracks on drywall surfaces, or the growth of existing cracks in plaster or drywall surfaces; in addition, the formation of hairline cracks in mortar joints of brick/concrete block construction.*
- *Minor - The formation of large cracks or loosening of plaster or drywall surfaces, or cracks through bricks/concrete blocks.*
- *Major - Damage to structural elements of the building, cracks in supporting columns, loosening of joints, splaying of masonry cracks, etc.*

Table 1 of BS7385-2 sets limits for the protection against cosmetic damage, however the following guidance on minor and major damage is provided in Section 7.4.2 of the Standard:

> *7.4.2 Guide values for transient vibration relating to cosmetic damage*
>
> *Limits for transient vibration, above which cosmetic damage could occur are given numerically in Table 1 and graphically in Figure 1* **[Not reproduced]**.
>
> *In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the guide values for the building types corresponding to line 2 are reduced. Below a frequency of 4 Hz, where a high*

displacement is associated with a relatively low peak component particle velocity value a maximum displacement of 0.6 mm (zero to peak) should be used.

Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 1, and major damage to a building structure may occur at values greater than four times the tabulated values.

Within DIN4150-3, damage is defined as “any permanent effect of vibration that reduces the serviceability of a structure or one of its components” (p.2). The Standard also outlines:

"that for structures as in lines 2 and 3 of Table 1, the serviceability is considered to have been reduced if cracks form in plastered surfaces of walls; existing cracks in the building are enlarged; partitions become detached from loadbearing walls or floors.

These effects are deemed ‘minor damage." (DIN4150.3, 1990, p.3)

While the DIN Standard defines the above damage as 'minor', the description aligns with BS7385 cosmetic damage, rather than referring to structural failures.

British Standard BS7835-2

BS 7385-2:1993 is based on peak particle velocity and specifies damage criteria for frequencies within the range 4–250 Hz, and a maximum displacement value below 4 Hz is recommended. Table 16 sets out the BS7385 criteria for cosmetic, minor and major damage. Regarding heritage buildings, British Standard 7385 Part 2 (1993, p.5) notes that “*a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive*”.

Table 16: BS 7385-2 structural damage criteria

<table>
<tr><th rowspan="2">Group</th><th rowspan="2">Type of structure</th><th rowspan="2">Damage level</th><th colspan="3">Peak component particle velocity, mm/s[1]</th></tr>
<tr><th>4 Hz to 15 Hz</th><th>15 Hz to 40 Hz</th><th>40 Hz and above</th></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Reinforced or framed structures Industrial and heavy commercial buildings</td><td>Cosmetic</td><td colspan="3">50</td></tr>
<tr><td>Minor[2]</td><td colspan="3">100</td></tr>
<tr><td>Major[2]</td><td colspan="3">200</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Un-reinforced or light framed structures Residential or light commercial type buildings</td><td>Cosmetic</td><td>15 to 20</td><td>20 to 50</td><td>50</td></tr>
<tr><td>Minor[2]</td><td>30 to 40</td><td>40 to 100</td><td>100</td></tr>
<tr><td>Major[2]</td><td>60 to 80</td><td>80 to 200</td><td>200</td></tr>
</table>

1 - Peak Component Particle Velocity is the maximum Peak particle velocity in any one direction (x, y, z) as measured by a tri-axial vibration transducer.
2 - Minor and major damage criteria established based on British Standard 7385 Part 2 (1993) Section 7.4.2

All levels relate to transient vibrations in low-rise buildings. Continuous vibration can give rise to dynamic magnifications that may require levels to be reduced by up to 50%.

German Standard DIN 4150-3

German Standard DIN 4150 - Part 3 'Structural vibration in buildings - Effects on Structure' (DIN 4150-3) are generally recognised to be conservative. DIN 4150-3 presents the recommended maximum limits over a range of frequencies (Hz), measured in any direction, and at the foundation or in the plane of the uppermost floor of a building or structure. The criteria are presented in Table 17.

Table 17: DIN 4150-3 structural damage criteria

Group	Type of structure	Vibration velocity, mm/s			
		At foundation at frequency of			Plane of floor uppermost storey
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Group 1 or 2 and have intrinsic value (eg buildings under a preservation order)	3	3 to 8	8 to 10	8

3.3.3 Buried services

DIN 4150-2:1999 sets out guideline values for vibration effects on buried pipework and reproduced in Table 18 below.

Table 18: Guideline values for short-term vibration impacts on buried pipework

Pipe material	Guideline values for vibration velocity measured on the pipe, mm/s
Steel (including welded pipes)	100
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
Masonry, plastic	50

Note:
For gas and water supply pipes within 2m of buildings, the levels given above should be applied. Consideration must also be given to pipe junctions with the building structure as potential significant changes in mechanical loads on the pipe must be considered.

In addition, specific limits for vibration affecting high-pressure gas pipelines is provided in the UK National Grid’s Specification for Safe Working in the Vicinity of National Grid High Pressure Gas Pipelines and Associated Installations – Requirements for Third Parties (report T/SP/SSW/22, UK National Grid, Rev 10/06, October 2006). This specification states that no piling is allowed within

15 m of a pipeline without an assessment of the vibration levels at the pipeline. The PPV at the pipeline is limited to a maximum level of 75 mm/s, and where PPV is predicted to exceed 50 mm/sec the ground vibration is required to be monitored.

Other services that may be encountered include electrical cables and telecommunication services such as fibre optic cables. While these may sustain vibration velocity levels from between 50 mm/s and 100 mm/s, the connected services such as transformers and switchgear may not. Where encountered, site specific vibration assessment in consultation with the utility provider should be carried out.

3.3.4 Heritage structures

Heritage structures which have been identified within 100 m from the OPT project and the distance of these heritage structures from the project site is provided in Table 19.

Table 19: Heritage items within 100 metres of the Circular Quay site

Heritage Item	Address	Distance to site [m]
Australian Steam Navigation Building	1-5 Hickson Road, The Rocks	70
Cadman's Cottage	110 George Street, The Rocks	70
Museum of Contemporary Art	136-140 George Street, The Rocks	50
Railings, Sydney Cove	Circular Quay Concourse, Circular Quay East	<10
Sailors Home	106-108 George Street, The Rocks	50
Coroner's Court	102-104 George Street, The Rocks	60
Mariners Church	98-100 George Street, The Rocks	60
Old Bushells Factory	86-88 George Street, The Rocks	90
Ken Duncan Gallery	73 George Street, The Rocks	90
Samson's Cottage (wall remains)	8 Kendall Lane, The Rocks	90
Unwin's Stores	77-85 George Street, The Rocks	90
Orient Hotel	87-89 George Street, The Rocks	90

Regarding heritage buildings, BS7385-2 notes that '*a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive*'. As all the above sites are considered to be structurally sound, these heritage structures are not considered to be more vibration sensitive than other surrounding structures. Further, based on the proposed construction equipment and the distance of the heritage items from the project site, vibration is not anticipated to be an issue for all heritage structures in the above table as well as the other Heritage items in Circular Quay which fall above the 100m radius.

4 Construction site noise assessment

4.1 OPT activities

Proposed construction equipment and activities to be used for dredging and scour protection have been provided by TLM Project Services and are summarised in Table 20.

Equipment sound power levels have been determined by reference to AS2436 [9], BS 5228-1:2009 [10], and Arup's measurement database. The equipment below has been assumed to operate concurrently and continuously over a full 15-minute period (a typical worst-case assumption).

The locations of equipment have been based the construction works areas in and around the OPT as shown in Figure 3.

Figure 3: Construction work areas in the OPT site

Table 20: Construction equipment and associated sound power levels at the OPT site

Item / Description	Quantity	Operating duration in 15min [min]	Sound Power Level, L_w	
			$dBL_{Aeq\ (15min)}$[1]	dBL_{Amax}[2]
ENABLING WORKS				
AREA 3				
Piling (vibratory)	1	5	116	137
Piling (impact sheet)	1	10	126	134
Barge Mounted Crane	1	15	100	108
Dive Boat	1	15	81	89
Generator	1	15	93	101
Lighting – Day Maker	2	15	98	106
Tug Boat	2	15	106	114
SOUTHERN EMBANKMENT STABILIZATION WORKS				
AREA 3				
Option 1: Land-based Excavator				
Long-reach Excavator	1	15	110	118
Dive Boat	1	15	81	89
Option 2: Backhoe Dredger				
Barge-mounted Backhoe Dredger	1	15	119	127
Tug Boat	2	15	106	114
Dive Boat	1	15	81	89
AREA 2				
Diesel Generator	1	15	93	101
Lighting – Day Maker	2	15	98	106
Truck	1	15	103	111
Concrete Boom Pump	1	15	109	117
Concrete Agitator Truck	2	15	107	115
DREDGING				
AREA 4A/B/C				
Option 1: Land Based Disposal Dredging				
Barge-mounted Backhoe Dredger	1	15	119	127
Tug Boat	2	15	106	114
Barge	4	15	100	108
Dive Boat	1	15	81	89
Option 2: Marine Based Disposal Dredging				
Barge-mounted Backhoe Dredger	1	15	119	127
Tug Boat	2	15	106	114

Item / Description	Quantity	Operating duration in 15min [min]	Sound Power Level, L_w	
			dB$L_{Aeq\ (15min)}$ [1]	dBL_{Amax} [2]
Split Barge	2	15	100	108
Dive Boat	1	15	81	89
AREA 5A/B/C				
Lighting – Day Maker	2	15	98	106
Generator	1	15	93	101
SCOUR MATTRESS WORKS				
Option 1: Articulated Concrete Mattress (ACM)				
AREA 4A/B/C				
Barge-mounted Crawler Crane	1	15	113	121
Dive Boat	1	15	81	89
Tug Boat	2	15	106	114
Lighting – Day Maker	2	15	98	106
Generator	1	15	93	101
Forklift	1	15	106	114
AREA 5A/B/C				
Lighting – Day Maker	2	15	98	106
Generator	1	15	93	101
Forklift	1	15	106	114
Option 2: Grouted Mattress				
AREA 4A/B/C				
Dive Boat	1	15	81	89
AREA 5A/B/C				
Concrete Agitator Delivery Truck	2	15	107	115
Lighting – Day Maker	2	15	98	106
Concrete Pump	2	15	109	117
Generator	1	15	93	101

1 – Sound power level of 1 item of equipment

2 – L_{Max} is 8 dB above the L_{Aeq} value, except for impact piling which is 21 dB (exact level is dependent on a number of factors, so a conservative estimate has been utilised based on maximum levels)

4.1.1 Hours of work

Due to the location and quantity of passing vessel traffic at the OPT, it is considered that the safest and most productive working hours will be at night-time outside of the ferry curfew periods. Typically, this would be between 9:00 pm and 5:30 am when the berth at OPT will be clear and the passing vessel traffic is low.

However, given the current environment brought about by the COVID-19 situation, the lack of maritime vessel traffic may allow significant works to occur during the day. Nevertheless, the proposed hours of construction for the OPT site is 24/7 to allow appropriate flexibility.

The Environmental Planning and Assessment (COVID-19 Development – Construction Work Days) Order 2020 [12] specifies the conditions construction work days and the construction activities allowed.

The conditions specified for the development are that the development must

(a) Be the subject of a development consent, and

(b) Comply with all conditions of the consent other than any condition that restricts the hours of work or operation on a Saturday, Sunday or public holiday, and

(c) For work or operation on a Saturday, Sunday or public holiday –

i. Comply with the conditions of the consent that restrict the hours of work or operation on any other day as if the conditions applied to work or operation on a Saturday, Sunday or public holiday, and

ii. Not involve the carrying out of rock breaking, rock hammering, sheet piling, pile driving or similar activities during the hours of work or operation that would not be permitted but for this Order, and

iii. Take all feasible and reasonable measures to minimise noise.

From the above order, no sheet piling or pile driving will be carried out during Saturdays, Sundays or public holidays.

Table 21:Proposed hours of construction for the OPT site

	Proposed construction hours	Comments
Monday to Friday	24 hours	-
Sundays or Public Holidays	24 hours	No sheet piling, pile driving

4.2 Glebe Island activities

Proposed construction equipment and activities to be used for transferring of dredged soil for land disposal have been provided by TLM Project Services and are summarised in Table 22.

Equipment sound power levels have been determined by reference to AS2436,

BS5228, and Arup's measurement database. The equipment below has been assumed to operate concurrently and continuously over a full 15-minute period (a typical worst-case assumption).

Table 22: Construction equipment usage and associated sound power levels at the Glebe Island site (L_W)

Description of works	Equipment in operation	Quantity [15-min]	Operating duration [min]	Sound Power dBL$_{Aeq}$ (15min)
Transfer of dredged soil to land for disposal	Truck (heavy)	2	15	108
	Barge	2	15	100
	Tug boat	1	15	106
	Long-reach excavator	2	15	108
Casting of Articulated Concrete Mattresses (ACM)	Crawler crane	1	15	113
	Forklift	1	15	106
	Concrete vibrator	1	15	113
	Concrete pump	1	15	109
	Concrete agitator delivery truck	2	15	107
Delivery and load out of Articulated Concrete Mattresses (ACM)	Crawler crane	1	15	113
	Truck (heavy)	1	15	108
	Barge	1	15	100
	Tug Boat	1	15	108

4.2.1 Hours of work

For the works in Glebe Island, the working hours are limited during the day due to the proximity of private residences.

The construction works in the Glebe Island compound site are proposed to occur every day between 7:00 am to 6:00 pm as outlined in Table 23.

Table 23: Proposed hours of construction for the Glebe Island compound site

Day	Proposed construction hours
Monday to Friday	7.00 am to 6:00 pm
Saturdays, Sundays and Public Holidays	7.00 am to 6:00 pm

4.3 Assessment methodology

4.3.1 OPT

Noise emissions from construction activities associated with the OPT site have been assessed to criteria outlined in Section 3.1.

Noise emissions have been modelled using SoundPlan 8 in accordance with ISO9613-2 algorithms. The model included:

- Construction noise sources listed in Table 20;

- OPT and surrounding buildings;
- Receivers listed in Table 2 and Table 3; and,
- Ground terrain and absorption.

Noise emissions have been modelled on the following conservative assumptions:

- Equipment, staging and durations are based on information provided by Table 20. A review of predicted emissions should be conducted when final construction details are available as part of the development of a Construction Noise and Vibration Management Plan.
- The equipment Table 20 have been assumed to operate concurrently and continuously over a full 15-minute period for each construction stage.

4.3.2 Glebe Island

An assessment has been completed to calculate the noise emissions from construction activities associated with the Glebe Island compound site against the criteria outlined in Section 3.1. The calculation included:

- Construction noise sources listed in Table 22;
- Glebe Island and surrounding buildings;
- Receivers listed in Table 5; and

Noise emissions have been modelled on the following conservative assumptions:

- Equipment, staging and durations are based on information provided by Table 22. A review of predicted emissions should be conducted when final construction details are available as part of the development of a Construction Noise and Vibration Management Plan.
- The equipment Table 22 have been assumed to operate concurrently and continuously over a full 15-minute period for each construction stage.

4.4 Noise prediction results

Construction noise has been assessed in accordance with the *NSW Roads and Maritime's Construction noise and vibration guideline* [17] (CNVG). Table C.1 of the guideline presents categories of perceived noise level according to the level of exceedance above the RBL for each receiver and additional mitigation measures to be triggered at each category. This is reproduced in Table 24.

The prediction results presented in this section identifies the exceedances of CNVG criteria and form the basis of recommendations for mitigation discussed in Section 8.

Table 24: Triggers for Additional Mitigation Measures – Airborne Noise

Predicted airborne $L_{Aeq(15min)}$ noise level at receiver			**Additional mitigation measures type[1]**	**Mitigation Levels[2]**
Perception[3]	**dB above RBL**	**dB above NML**		
All hours				
75dBA or greater	-	-	N, V, PC, RO	HA
Standard Hours: Mon – Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)				
Noticeable	5 to 10	0	-	NML
Clearly Audible	10 to 20	<10	-	NML
Moderately intrusive	20 to 30	10 to 20	N, V	NML+10
Highly intrusive	>30	>20	N, V	NML+20
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (1pm – 10pm), Sun/Pub Hol (8am – 6pm)				
Noticeable	5 to 10	<5	-	NML
Clearly Audible	10 to 20	5 to 15	N, R1, DR	NML+5
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR	NML+15
Highly intrusive	>30	>25	V, IB, N, R1, DR, PC, SN	NML+25
OOHW Period 2: Mon – Fri (10pm – 6am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)				
Noticeable	5 to 10	<5	N	NML
Clearly Audible	10 to 20	5 to 15	V, N, R2, DR	NM+5
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR	NML+15
Highly intrusive	>30	>25	AA, V, IB, N, PC, SN, R2, DR	NML+25

Notes (refer to detailed descriptions):

1 AA = Alternative Accommodation; V = Verification; IB = Individual briefings; N = Notification; R1 = Respite Period 1; R2 = Respite Period 2; DR = Duration Respite; PC = Phone calls; SN = Specific notifications

2 NML = Noise Management Level; HA = Highly Affected (>75 dBA) applies to residences only

3 Perception = relates to level above RBL

4.4.1 OPT

Table 25: Predicted construction noise levels for residential receivers at the Circular Quay site, $dBL_{Aeq(15min)}$

Receiver	Hours	Time Period	NML	Construction Stage						
				Enabling Works[1]	Southern Embankment Stabilisation Works		Dredging		Scour Mattress Works	
					Land-based Excavator	Backhoe Dredger	Land-based Disposal	Marine-based Disposal	Articulated Concrete Mattress	Grouted Mattress
R1: 1-3 Macquarie Street, Sydney	Standard Hours	Day	73	66	55	61	62	62	58	57
	OOHW	Day	68	-	55	61	62	62	58	57
		Evening	67	66	55	61	62	62	58	57
		Night	57	66	55	61	62	62	**58**	**57**
R2: 3-7 Macquarie Street, Sydney	Standard Hours	Day	73	66	55	61	61	61	57	55
	OOHW	Day	68	-	55	61	61	61	57	55
		Evening	67	66	55	61	61	61	57	55
		Night	57	66	55	**61**	**61**	**61**	**57**	55
R3: 61-69 Macquarie Street, Sydney	Standard Hours	Day	73	66	54	61	61	61	57	55
	OOHW	Day	68	-	54	61	61	61	57	55
		Evening	67	66	54	61	61	61	57	55
		Night	57	66	54	**61**	**61**	**61**	**57**	55
R4: 8 Hickson Road, Dawes Point	Standard Hours	Day	71	50	45	44	64	64	60	61
	OOHW	Day	66	-	45	44	64	64	60	61
		Evening	65	50	45	44	64	64	60	61
		Night	62	50	45	44	**64**	**64**	60	61

Receiver	Hours	Time Period	NML	Construction Stage						
				Enabling Works[1]	Southern Embankment Stabilisation Works		Dredging		Scour Mattress Works	
					Land-based Excavator	Backhoe Dredger	Land-based Disposal	Marine-based Disposal	Articulated Concrete Mattress	Grouted Mattress
R5: 54 Gloucester Street	Standard Hours	Day	71	59	42	52	44	44	41	41
	OOHW	Day	66	-	42	52	44	44	41	41
		Evening	65	59	42	52	44	44	41	41
		Night	62	59	42	52	44	44	41	41
R6: 2 Phillip Street, Sydney	Standard Hours	Day	73	66	54	61	60	60	57	54
	OOHW	Day	68	-	54	61	60	60	57	54
		Evening	67	66	54	61	60	60	57	54
		Night	57	66	54	**61**	**60**	**60**	**57**	54

1 – It is understood that sheet piling/pile driving works will not occur on Saturdays, Sundays and public holidays. Therefore, no OOHW daytime works was assessed. During weeknights, it is understood that piling works may occur during the evening and night-time periods.

2 – The results are highlighted according to the level of exceedance above the NML according to the CNVG criteria.

Standard hours:

Noticeable – 0 dB above NML

Clearly audible – <10 dB above NML

Moderately intrusive – 10 to 20dB above NML

Highly intrusive - >20dB above NML

Out of Hours Works (OOHW):

Noticeable – <5dB above NML

Clearly audible – 5 to 15dB dB above NML

Moderately intrusive – 15 to 25dB above NML

Highly intrusive - >25dB above NML

Table 26: Predicted construction noise levels for non-residential receivers at the Circular Quay site, $dBL_{Aeq(15min)}$

Receiver	NML	Time Period						
		Enabling Works	Southern Embankment Stabilisation Works		Dredging		Scour Mattress Works	
			Land-based Excavator	Backhoe Dredger	Land-based Disposal	Marine-based Disposal	Articulated Concrete Mattress	Grouted Mattress
C1 – Northern Commercial OPT Premises (Quay Restaurant, The Squire's Landing)	70	63	53	58	76	76	74	78
C2 - Southern Commercial OPT Premises (Cruise Bar, Yuki's at the Quay)	70	68	60	64	77	77	75	79
C3 – Park Hyatt	70	57	45	52	64	64	60	59
C4 – Opera Bar	70	60	50	55	57	57	53	52
C5 – Holiday Inn Old Sydney	70	69	61	64	63	63	61	61
E1 – APM College of Business and Communication	65	69	61	64	59	59	57	58
E2 – Julian Ashton Art School	65	54	45	47	48	48	45	45
H1 – Australian Steam Building	65	66	57	61	63	63	61	**65**
H2 – Cadman's Cottage	65	73	67	69	66	66	63	64
H3 – Museum of Contemporary Art	65	81	69	76	70	70	67	67
H4 - The Rocks Discovery Museum	65	70	60	64	62	62	58	58
H5 – Susannah Place	65	46	38	40	45	45	41	39
PR1 – First Fleet Park	60	73	58	67	65	65	61	58
PR2 – Hickson Road Reserve	60	44	33	39	64	64	**60**	59
PR3 – Foundation Park	60	51	41	45	45	45	41	41

Receiver	NML	Time Period						
		Enabling Works	Southern Embankment Stabilisation Works		Dredging		Scour Mattress Works	
			Land-based Excavator	Backhoe Dredger	Land-based Disposal	Marine-based Disposal	Articulated Concrete Mattress	Grouted Mattress

1 – The results are highlighted according to the level of exceedance above the NML according to the CNVG criteria.

Standard hours:

Noticeable – 0 dB above NML

Clearly audible – <10 dB above NML

Moderately intrusive – 10 to 20dB above NML

Highly intrusive - >20dB above NML

Out of Hours Works (OOHW):

Noticeable – <5dB above NML

Clearly audible – 5 to 15dB dB above NML

Moderately intrusive – 15 to 25dB above NML

Highly intrusive - >25dB above NML

Table 27: Predicted sleep disturbance noise levels for residential receivers at the Circular Quay site, dBL_{Amax}

Receiver	Sleep Disturbance Level (SDL)	Construction Stage						
		Enabling Works	Southern Embankment Stabilisation Works		Dredging		Scour Mattress Works	
			Land-based Excavator	Backhoe Dredger	Land-based Disposal	Marine-based Disposal	Articulated Concrete Mattress	Grouted Mattress
R1: 1-3 Macquarie Street, Sydney	67	87	63	69	70	70	66	65
R2: 3-7 Macquarie Street, Sydney	67	87	63	69	69	69	65	63
R3: 61-69 Macquarie Street, Sydney	67	87	62	69	69	69	65	63
R4: 8 Hickson Road, Dawes Point	72	71	53	52	72	72	68	69
R5: 54 Gloucester Street	72	80	50	60	52	52	57	49
R6: 2 Phillip Street, Sydney	67	87	62	69	69	69	65	62

1 - Levels shaded in grey indicate a notional exceedance of SDLs based on the worst-case assumptions noted above

4.4.2 Glebe Island

Table 28: Predicted construction noise levels for residential receivers at the Glebe Island site, $dBL_{Aeq(15min)}$

Receiver	Hours	Period	NML	Transfer of dredged spoil to land for disposal	Casting of ACMs	Delivery and load out of ACMs
R1: 24 Refinery Drive, Pyrmont	Standard Hours	Day	**60**	60	63	59
	Out of Hours	Day	**55**	60	63	59
R2: 1-25 Bowman Street, Pyrmont	Standard Hours	Day	**60**	57	60	56
	Out of Hours	Day	**55**	57	60	56
R3: 81 Point Street, Pyrmont	Standard Hours	Day	**60**	53	56	52
	Out of Hours	Day	**55**	53	56	52
R4: 40 Stephen St, Balmain	Standard Hours	Day	**57**	53	56	53
	Out of Hours	Day	**52**	53	56	53
R5: 1 Buchanan St, Balmain	Standard Hours	Day	**61**	53	56	52
	Out of Hours	Day	**56**	53	56	52

1 – The results are highlighted according to the level of exceedance above the NML according to the CNVG criteria.

Standard hours:

Noticeable – 0 dB above NML

Clearly audible – <10 dB above NML

Moderately intrusive – 10 to 20dB above NML

Highly intrusive - >20dB above NML

Out of Hours Works (OOHW):

Noticeable – <5dB above NML

Clearly audible – 5 to 15dB dB above NML

Moderately intrusive – 15 to 25dB above NML

Highly intrusive - >25dB above NML

5 Construction traffic assessment

A traffic noise assessment has been completed to determine the noise impacts of traffic generated by construction works of the OPT and compound site in Glebe Island.

5.1 OPT

Background traffic information has been based upon information within the Overseas Passenger Terminal, Sydney – Master Plan Traffic Report, Taylor Thomson Whitting (TTW) NSW Pty Ltd, June 2013 [15]. In the report, only peak hourly volumes were available for the morning (AM), lunchtime (Noon), afternoon and evening (PM) periods. A 10% heavy vehicle percentage has been assumed.

It is understood that the construction works in the OPT site will be a 24/7 operation. Assuming worst-case, the construction traffic generated from works during the night-time period of 10 pm to 7 am has been assessed.

The TTW report does not include traffic volumes along George Street during the night-time period. Further the traffic data is potentially outdated as it was prior to the light rail. Accordingly, a predictive assessment has been carried out based on the construction traffic alone.

A maximum of 25 daily truck movements is anticipated for construction works at OPT. A workforce of 22 has been assumed to arrive within one hour during the night-time.

Road traffic noise levels including both existing and construction generated traffic, have been predicted using the CoRTN algorithm at the nearest residential receiver, R4. The predicted external noise level at R4 is 47dB $L_{Aeq(9hr)}$ which is below the road traffic noise criteria of 50 dB$L_{Aeq(9hour)}$ in Table 13. It is therefore expected that any increase in noise due to the additional construction traffic may be noticeable, however, noise levels are predicted to comply with criteria.

5.2 Glebe Island

The Glebe Island compound site is accessed via James Craig Road, and then through the Glebe Island port area via a marked two lane, two-way access road. James Craig Road primarily carries traffic generated by the existing port activities on Glebe Island, the White Bay Cruise Passenger Terminal (WBCT), and adjacent maritime and commercial facilities. The nearest residential receivers are bounded by Lilyfied Road and Victoria Road (A40).

A maximum of 20 daily truck movements is proposed for construction works at Glebe Island. Given the low traffic volumes generated by the construction works, and the existing high traffic volumes on the surrounding road network, nearby residents are not expected to be impacted by construction traffic.

6 Construction vibration assessment

Given the large distances between other receivers and the piling works, vibration damage is not considered a significant risk for surrounding receivers. No adverse vibration impact, either in terms of cosmetic damage or human comfort, are expected to occur at receiver buildings due to their distance from the subject works.

The following guidance provides recommended minimum working distances for vibration intensive plant. These are based on international standards and guidance and reproduced in Table 29 below for reference.

Table 29: Recommended minimum working distances for vibration intensive plant

Plant Item	**Rating / Description**	**Minimum working distance**	
		Cosmetic damage (BS 7385)	**Human response (OH&E Vibration Guideline)**
Vibratory pile driver	Sheet piles	2 m to 20 m	20 m

The minimum working distances presented are indicative and will vary depending on the particular item of plant and local geotechnical conditions. They apply to cosmetic damage of typical buildings under typical geotechnical conditions.

Mitigation will need to be considered where sensitive receivers are located closer to the construction work zone than these minimum working distances. It is noted that focus is on mitigating cosmetic damage.

The contractor will be required to manage vibration as well as noise and make use of best practice in the management of vibration using simple and practicable techniques such equipment selection and as avoiding dropping heavy items.

Where vibration intensive works are required within the minimum working distances outlined in Table 29, vibration monitoring at the nearest potential affected building should be considered, where real-time alerts can be generated when measured vibration levels exceed criteria.

7 Assessment summary

This section summarises the predicted noise impacts based on the construction noise assessment to the noise sensitive receivers surrounding the OPT and the Glebe Island construction sites.

7.1 OPT

Table 30: Summary of predicted noise impacts to the nearby sensitive receivers surrounding the OPT site

Activity	Hours[1,2]	Period	Predicted impacts[3]	
			Residential Receivers	Non-residential Receivers [if in use]
ENABLING WORKS				
Enabling Works, Sheet Pile Installation	Standard Hours	Day	Below NML	Moderately intrusive
	Out of Hours	Evening	Below NML	
		Night	Clearly audible	
	Sleep Disturbance	Night	Above SDL	
SOUTHERN EMBANKMENT STABILIZATION WORKS				
Option 1 – Land-based Excavator	Standard Hours	Day	Below NML	Clearly audible
	Out of Hours	Day	Below NML	
		Evening	Below NML	
		Night	Below NML	
	Sleep Disturbance	Night	Below SDL	
Option 2 – Backhoe Dredger	Standard Hours	Day	Below NML	Moderately intrusive
	Out of Hours	Day	Below NML	
		Evening	Below NML	
		Night	**Noticeable**	

Activity	Hours[1,2]	Period	Predicted impacts[3]	
			Residential Receivers	Non-residential Receivers [if in use]
	Sleep Disturbance	Night	Above SDL	
DREDGING				
Option 1 – Land-based Disposal	Standard Hours	Day	Below NML	Clearly audible
	Out of Hours	Day	Below NML	
		Evening	Below NML	
		Night	Clearly audible	
	Sleep Disturbance	Night	Above SDL	
Option 2 – Marine-based Disposal	Standard Hours	Day	Below NML	Clearly audible
	Out of Hours	Day	Below NML	
		Evening	Below NML	
		Night	Clearly audible	
	Sleep Disturbance	Night	Above SDL	
SCOUR MATTRESS WORKS				
Option 1 – ACM	Standard Hours	Day	Below NML	Clearly audible
	Out of Hours	Day	Below NML	
		Evening	Below NML	
		Night	**Noticeable**	
	Sleep Disturbance	Night	Below SDL	
Option 2 – Grouted Mattress	Standard Hours	Day	Below NML	Clearly audible
	Out of Hours	Day	Below NML	
		Evening	Below NML	
		Night	**Noticeable**	

Activity	Hours[1,2]	Period	Predicted impacts[3]	
			Residential Receivers	Non-residential Receivers [if in use]
	Sleep Disturbance	Night	Below SDL	

1 - Standard hours are Monday to Friday 7am to 6pm and Saturday from 8am to 1pm.

2 - Out of Hours during the different time periods:

Day are Saturday 7am to 8am and 1pm to 6pm; Sunday and public holidays 8am to 6pm;

Evening hours are 6pm to 10pm,

Night-time hours are 10pm to 7am.

3 – The predicted impacts show the worst case impact for the nearest receiver.

4 – The NML exceedance bands according to the CNVG criteria and their corresponding subjective response to impacts

Standard hours:

Noticeable – 0 dB above NML

Clearly audible – <10 dB above NML

Moderately intrusive – 10 to 20dB above NML

Highly intrusive - >20dB above NML

Out of Hours Works (OOHW):

Noticeable – <5dB above NML

Clearly audible – 5 to 15dB dB above NML

Moderately intrusive – 15 to 25dB above NML

Highly intrusive - >25dB above NML

7.2 Glebe Island

Table 31: Summary of predicted noise impacts to the nearby sensitive receivers surrounding the Glebe compound site

Activity	Hours	Period	Predicted impacts to residential receivers
Transfer of dredged soil	Standard Hours	Day	Below NML
	Out of Hours	Day	Clearly audible
Casting of ACM	Standard Hours	Day	Below NML
	Out of Hours	Day	Clearly audible
Delivery and load out of ACM	Standard Hours	Day	Below NML
	Out of Hours	Day	Clearly audible

1 - Standard hours are Monday to Friday 7am to 6pm and Saturday from 8am to 1pm.

2 - Out of Hours during the different time periods:

Day are Saturday 7am to 8am and 1pm to 6pm; Sunday and public holidays 8am to 6pm;

Evening hours are 6pm to 10pm,

Night-time hours are 10pm to 7am.

3 – The NML exceedance bands according to the CNVG criteria and their corresponding subjective response to impacts

Standard hours:

Noticeable – 0 dB above NML

Clearly audible – <10 dB above NML

Moderately intrusive – 10 to 20dB above NML

Highly intrusive - >20dB above NML

Out of Hours Works (OOHW):

Noticeable – <5dB above NML

Clearly audible – 5 to 15dB dB above NML

Moderately intrusive – 15 to 25dB above NML

Highly intrusive - >25dB above NML

8 Mitigation measures

8.1 Standard Mitigation Measures

A summary of recommended mitigation measures is presented in Table 32.

Table 32: Recommended noise mitigation and management measures

Item No.	Item	Detail
1	Noise and vibration management plan	A Construction Noise and Vibration Management Plan shall be prepared prior to the issuing of a Construction Certificate. This will specify the actual plant to be used and will include updated estimates of the likely levels of noise and the scheduling of activities.
2	Equipment selection	Equipment shall be selected to have Sound Power Levels (Lw) to be the same or quieter as the levels used in this assessment. Where possible stationary equipment should be located behind structures such as demountable buildings or stockpiles to maximise shielding to receivers. Consider using electric / hydraulic equipment where possible. Use only the necessary size and power equipment All plant and equipment used on site must be: • maintained in a proper and efficient condition; and • operated in a proper and efficient manner. Turn off all vehicles, plant and equipment when not in use. Ensuring that the Responsible Person checks the conditions of the powered equipment used on site daily to ensure plant is properly maintained and that noise is kept as low as practicable. If rental equipment are to be used, the noise levels of plant and equipment items are to be considered in rental decisions.
3	Location of plant	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers. Only have necessary equipment on site. Plan truck movements to avoid residential streets where possible.
4	Non-tonal and ambient sensitive reversing alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work. Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.
5	Hours of work	Where noise intensive equipment is to be used near sensitive receivers, the works should be scheduled for Standard Construction Hours, where possible. If it is not possible to restrict the works to the daytime then they should be completed as early as possible in each work shift. Appropriate respite should also be provided to affected receivers in accordance with the CNVG and/or the project's conditions of approval.

8.2 Additional Construction Mitigation Measures

The CNVG defines how additional mitigation measures are applied to airborne noise impacts. The approach has been provided in Table 24 and the measures triggered from the results of the assessment in Section 4.4 are given below.

Table 33: Additional mitigation measures from CNVG

Item No.	Item	Detail
1	Notification (N)	Advanced warning of works and potential disruptions can assist in reducing the impact on the community. The notification may consist of a letterbox drop (or equivalent) detailing work activities, time periods over which these will occur, impacts and mitigation measures. Notification should be a minimum of 5 working days prior to the start of works. The approval conditions for projects may also specify requirements for notification to the community about works that may impact on them.
2	Verification (V)	As part of routine checks of noise levels or following reasonable complaints. This verification should include measurement of the background noise level and construction noise. Note this is not required for projects less than three weeks unless to assist in managing complaints.
3	Respite Offer 2 (R2)	Night-time construction noise in out of hours period 2 (OOHW 2)[1] shall be limited to two consecutive nights except for where there is a Duration Respite. For night work these periods of work should be separated by not less than one week and 6 nights per month. Where possible, high noise generating works shall be completed before 11pm.
4	Duration Respite (DR)	Respite offers and respite periods 1 and 2 may be counterproductive in reducing the impact on the community for longer duration projects. In this instance and where it can be strongly justified it may be beneficial to increase the work duration, number of evenings or nights worked through Duration Respite so that the project can be completed more quickly. The project team should engage with the community where noise levels are expected to exceed the NML to demonstrate support for Duration Respite. Where there are few receivers above the NML each of these receivers should be visited to discuss the project to gain support for Duration Respite.

1 - OOHW Period 2: Mon – Fri (10pm – 6am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)

9 Conclusions

Noise generated from the different construction phases of the OPT capital dredging works and scour-protection works and the Glebe Island compound site have been predicted at surrounding noise sensitive receivers. This has been informed by guidance from the project Construction Consultant.

The noise impacts from the OPT works to residential receivers are predicted to be marginal to minor during the Enabling works and Dredging works, where the use of equipment such as the vibratory and sheet pile drivers and the dredging machine are predicted to generate noise impacts above construction NMLs. Non-residential receivers near OPT are also predicted to have minor to moderate impacts during all the construction stages when they are in use.

For the works in Glebe Island, the impacts to the nearby residential receivers are minor during the Out of hours period.

The likelihood of adverse vibration impacts as a result of proposed construction works is low. It is recommended to have some construction monitoring during vibration works to ensure compliance of the vibration criteria.

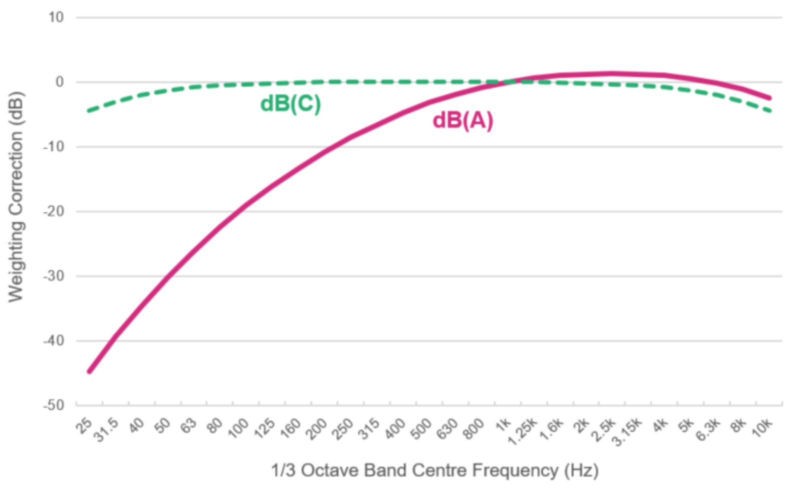
The original proposal for the OPT works was to be undertaken during the night-time period given the marine vessel traffic during the day. While the proposal seeks approval for 24/7 construction hours and has been assessed accordingly, given the current environment in light the COVID-19 situation, it may be practicable to carry out more work during standard hours. Where noise intensive equipment is to be used near sensitive receivers, the works should be scheduled for Standard Construction Hours, where possible. If it is not possible to restrict the works to the daytime, then they should be completed as early as possible in each work shift.

Preliminary recommendations are given for the control of construction noise for the periods where exceedances are predicted of relevant Noise Management Levels. The construction contractor should be required to prepare a detailed Construction Noise and Vibration Management Plan which reviews the modelled construction details and noise and vibration impacts presented in Section 7, along with development of more detailed mitigation and management strategies.

Appendix A

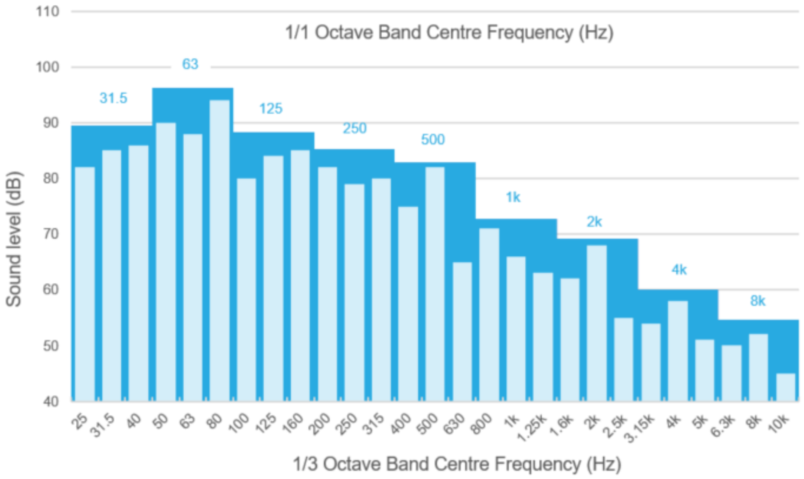
Glossary

Term	Definition
Ambient noise level	The ambient noise level is the overall noise level measured at a location from multiple noise sources. When assessing noise from a particular development, the ambient noise level is defined as the remaining noise level in the absence of the specific noise source being investigated. For example, if a fan located on a building is being investigated, the ambient noise level is the noise level from all other sources without the fan operating, such as traffic, birds, people talking and other noise from other buildings.
Background noise level	The background noise level is the noise level that is generally present at a location at all or most times. Although the background noise may change over the course of a day, over shorter time periods (e.g. 15 minutes) the background noise is almost-constant. Examples of background noise sources include steady traffic (e.g. motorways or arterial roads), constant mechanical or electrical plant and some natural noise sources such as wind, foliage, water and insects. Assessment Background Level (ABL) A single-number figure used to characterise the background noise levels from a single day of a noise survey. ABL is derived from the measured noise levels for the day, evening or night time period of a single day of background measurements. The ABL is calculated to be the tenth percentile of the background LA90 noise levels – i.e. the measured background noise is above the ABL 90% of the time. Rating Background Level (RBL / minLA90,1hour) A single-number figure used to characterise the background noise levels from a complete noise survey. The RBL for a day, evening or night time period for the overall survey is calculated from the individual Assessment Background Levels (ABL) for each day of the measurement period, and is numerically equal to the median (middle value) of the ABL values for the days in the noise survey.
Decibel (dB)	The logarithmic scale used to measure sound and vibration levels. Human hearing is not linear and involves hearing over a large range of sound pressures, which would be unwieldy if presented on a linear scale. Use of a logarithmic scale allows all sound levels to be expressed based on how loud they are relative to a reference sound (typically 20 µPa, which is the approximate human threshold of hearing). For sound in other media (e.g. underwater noise) a different reference level (1 µPa) is used instead. An increase of approximately 10 dB corresponds to a subjective doubling of the loudness of a noise. The minimum increase or decrease in noise level that can be noticed is typically 2 to 3 dB.
dB weighting curves	The frequency of a sound affects its perceived loudness and human hearing is less sensitive at low and very high frequencies. When seeking to represent the summation of sound pressure levels across the frequency range of human hearing into a single number, weighting is typically applied. Most commonly, A-weighting, denoted as dB(A), is used for environmental noise assessment. This is often supplemented by the linear or C-weighting curves, where there is the potential for excess low-frequency sound at higher sound pressure levels.

Term	Definition
	
dB(A)	dB(A) denotes a single-number sound pressure level that includes a frequency weighting ('A-weighting') to reflect the subjective loudness of the sound level. The frequency of a sound affects its perceived loudness. Human hearing is less sensitive at low and very high frequencies, and so the A-weighting is used to account for this effect. An A-weighted decibel level is written as dB(A). Some typical dB(A) levels are shown below.

Sound Pressure Level dB(A)	Example
130	Human threshold of pain
120	Jet aircraft take-off at 100 m
110	Chain saw at 1 m
100	Inside nightclub
90	Heavy trucks at 5 m
80	Kerbside of busy street
70	Loud stereo in living room
60	Office or restaurant with people present
50	Domestic fan heater at 1m
40	Living room (without TV, stereo, etc)
30	Background noise in a theatre
20	Remote rural area on still night
10	Acoustic laboratory test chamber
0	Threshold of hearing

Term	Definition
dBrms	The root mean squared (rms) value takes into account both time history variation and energy content. The rms value is typically equal to 0.707 (1/√2) times the peak value
Frequency	Frequency is the number of cycles per second of a sound or vibration wave. In musical terms, frequency is described as 'pitch'. Sounds towards the lower end of the human hearing frequency range are perceived as "bass" or 'low-pitched' and sounds with a higher frequency are perceived as 'treble' or 'high pitched'.

Term	Definition
	While single weighted sound pressure levels provide benefits in simplifying the assessment and evaluation of sound levels, further detailed evaluation of the frequency content is often undertaken. While this could be done based on individual frequencies (all ~20,000 Hz), the analysis is often grouped into bands, or 'octave bands'. 1/1 octave or 1/3 octave bands are most commonly utilised in environmental noise assessment, and while referred to by a single Hz based on the nominal centre frequency of the band (e.g. 31.5 Hz), are a summation of all frequencies between a defined lower and upper frequency. Frequency is the rate of repetition of a sound wave. The subjective equivalent in music is pitch. The unit of frequency is the hertz (Hz), which is identical to cycles per second. A 1000Hz is often denoted as 1 kHz, eg 2 kHz = 2000 Hz. Human hearing ranges approximately from 20 Hz to 20 kHz. For design purposes the octave bands between 63 Hz to 8 kHz are generally used. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. For more detailed analysis, each octave band may be split into three one-third octave bands or in some cases, narrower frequency bands. 
$L_{10(period)}$	The sound level exceeded for 10% of the measurement period, or alternatively, the sound levels would be lower for 90% of the time. The L10 is often defined as the 'average maximum' sound levels, as in AS1055-2018 with the advent of statistical sound level meters.
$L_{90(period)}$	The sound level exceeded for 90% of the measurement period. The L90 is often defined as the 'average minimum' or 'background' noise level for a period of measurement. For example, 45 dBLA90,15min indicates that the sound level is higher than 45 dB(A) for 90% of the 15-minute measurement period.
$L_{eq(period)}$	The equivalent ('eq') continuous sound level, used to describe the level of a time-varying sound or vibration measurement. The Leq is often defined as the 'average' level, and mathematically, is the energy-average level over a measurement period – i.e. the level of a constant sound that contains the same sound energy as the measured sound.
Lmax	The Lmax is the 'absolute maximum' level of a sound or vibration recorded over the measurement period. As the Lmax is often caused by an instantaneous event, it can vary significantly between measurements.

Term	Definition
Peak Particle Velocity (PPV)	The highest velocity of a particle (such as part of a building structure) as it vibrates. PPV is commonly used as a vibration criteria, and is often interpreted as a PPV based on the Lmax or Lmax,spec index.
Sound Power and Sound Pressure	The sound power level (Lw) of a source is a measure of the total acoustic power radiated by a source. The sound pressure level (Lp) varies as a function of the environment and distance from a source. The sound power level is an intrinsic characteristic of a source (analogous to its mass), which is not affected by the environment within which the source is located.
Vibration	Waves in a solid material are called ‘vibration’, as opposed to similar waves in air, which are called ‘sound’ or ‘noise’. If vibration levels are high enough, they can be felt; usually vibration levels must be much higher to cause structural damage. A vibrating structure (e.g. a wall) can cause airborne noise to be radiated, even if the vibration itself is too low to be felt. Structureborne vibration limits are sometimes set to control the noise level in a space. Vibration levels can be described using measurements of displacement, velocity and acceleration. Velocity and acceleration are commonly used for structureborne noise and human comfort. Vibration is described using either metric units (such as mm, mm/s and mm/s2) or else using a decibel scale.

Appendix F– Maritime Archaeological and Indigenous Heritage Assessment and Statement of Heritage Impacts

Capital Dredging and Scour Protection Works at the Overseas Passenger Terminal

Maritime Archaeological and Indigenous Heritage Assessment and Statement of Heritage Impact

02-Jul-2020
Prepared for – Port Authority of NSW – ABN: 50 825 884 846

Capital Dredging and Scour Protection Works at the Overseas Passenger Terminal

Maritime Archaeological and Indigenous Heritage Assessment and Statement of Heritage Impact

Client: Port Authority of NSW

ABN: 50 825 884 846

Prepared by

AECOM Australia Pty Ltd
Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia
T +61 2 8934 0000 F +61 2 8934 0001 www.aecom.com
ABN 20 093 846 925

02-Jul-2020

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 AS/NZS4801 and OHSAS18001.

Quality Information

Document	Capital Dredging and Scour Protection Works at the Overseas Passenger Terminal
Ref	\\ausyd1fp002\groups\!env\team_iap\archaeology & heritage\proposals & projects without apic numbers\2018_05_22 anmm wharf\60580544 anmm new wharves rev 2 201800711.docx
Date	02-Jul-2020
Prepared by	Chris Lewczak
Reviewed by	Darran Jordan

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
1	06-Apr-2020	Draft	Dr Darran Jordan, Principal Heritage Specialist	D. Jordan
2	12-Jun-2020	Rev1	Chris Lewczak Principal Heritage Specialist	C Lewczak
3	02-July-2020	Final	Chris Lewczak Principal Heritage Specialist	C Lewczak

Table of Contents

Executive summary		i
1.0	Introduction	1
	1.1 Background	1
	1.2 Site location	1
	1.3 Project justification	1
	1.4 Scope of work	1
	1.5 Report methodology	4
	1.6 Report limitations	4
2.0	Statutory legislation	5
	2.1 Commonwealth legislation	5
	2.2 State legislation	5
	2.3 Local legislation	9
	2.4 Heritage register searches	10
	2.5 Summary	14
3.0	Aboriginal Archaeological Context	16
	3.1 Landscape Context	16
5.0	Historical context	20
	5.1 Early European occupation	20
	5.2 Later Developments	22
	5.3 Overseas Passenger Terminal and Wharf	23
	5.4 Campbells Cove	29
6.0	Aboriginal Archaeological Context	35
	6.1 AHIMS Search	35
	6.2 Native Title	37
	6.3 Aboriginal Archaeological Context	37
	6.4 Submerged Site Preservation	38
7.0	Site Inspection	41
	7.1 Weather and Tide Conditions	41
	7.2 Conduct of Survey	41
	7.3 Survey results	42
	7.4 Interpretation of Results	53
	7.5 Summary of Previous Maritime Archaeological Assessment	53
	7.6 Bathymetric multi-beam survey and side scan sonar data	54
	7.7 Maritime archaeological potential	56
8.0	Assessment criteria	57
	8.2 Assessment of significance for archaeological remains associated with the former Campbells Wharf No. 7 (1901-1980)	58
9.0	Impact assessment	61
	9.1 Proposed works	61
	9.2 Aboriginal Heritage Assessment Key Findings	63
	9.3 Heritage impact assessment	64
10.0	Statement of heritage impact	68
	10.1 Sydney Opera House World Heritage Listing	68
	10.2 Maritime archaeological remains assocated with Wharf No.7	69
	10.3 Summary	70
11.0	Conclusion and recommendations	72
12.0	References	74

List of Tables

Table 1 Summary of listed heritage items within and/or adjacent to the Project site	14
Table 2 Review of landscape context of the Project Area	16
Table 3 AHIMS Search Results	35

Table 4 Preservation Potential by Site Type (following Nutley 2006) 39
Table 5 Tides for the survey day 41
Table 6 Rain and wind conditions for the three days prior and for the day of the inspection 41
Table 7 Significance assessment criteria 57
Table 8 Significance assessment of the former Campbells Cove Wharf No. 7 (1901- 1980) 58
Table 9 Due Diligence Process Questions 63
Table 10 Assessment of heritage impact of the Project against the significance assessment 65
Table 11: World Heritage properties impact assessment 68
Table 12 Statement of heritage impact for the remains of Wharf No. 7 at Campbells Cove 69

List of Figures

Figure 1: Location of the proposed capital dredging works and rock armour protection work 3
Figure 2: Location of nearby Heritage items listed on the NHL. SHR and LEP 11
Figure 3: Tank Stream and Foreshore, c. 1788 19
Figure 4: 1807 map excerpt of the OPT area and proposed extension. (Source: James Meehan, 1807, Plan of the town of Sydney in New South Wales, National Library of Australia, MAP F 106B. Project area in red 21
Figure 5: Sydney from 1810 to 1820: shewing buildings erected by Governor Macquarie, National Library of Australia, MAP F 309. Project area in red 21
Figure 6: Plan of the Rocks showing the resumption of land by the City of Sydney. (Source: Source: City of Sydney, 1901, Plan Showing The “Rocks” Resumption, State Records NSW, Darling Harbour Resumption Maps, 1900-1902) 22
Figure 7: 1933 Aerial Photograph showing the configuration of the OPT and Wharf No.7. Project Area shown in red. 24
Figure 8: 1960s aerial photograph showing the configuration of the OPT after the expansion works and Wharf No.7. 24
Figure 9: 1980 aerial photograph showing what appears to be the demolition of Wharf No.7. Project Area shown in red. 25
Figure 10: E&A Berth No. 5, Circular Quay, 1919. (Source: Government Printing Office, 1919, Mitchell Library, NSW, 1-25041) 26
Figure 11: View of northern end of the wharf and OPT in 1961 with P&O Liner Oriana. The last of the previous warehouses can be seen in the foreground. (Source: Wolfgang Sievers, 1961, National Library of Australia, 791186) 26
Figure 12: View of northern end of the wharf and OPT in about 1965. Note the warehouse has been removed and the shed present on Wharf No. 7 in the foreground. (Source: Anon., c. 1965, City of Sydney Archives, SRC4534) 27
Figure 13: Earlier wharves uncovered during construction of the Overseas Passenger Terminal. (Source: Anon., 1960, City of Sydney Archives, NSCA CRS 48/1201) 27
Figure 14: Detail of caissons during construction. (Graeme Andrews, 1985, ‘Working Harbour’ Collection, City of Sydney Archives, 80327) 28
Figure 15: Campbells Cove and Circular Quay, Sydney from Dawes Point ca.1870. (Source: State Library of NSW SPF / 786) 29
Figure 16: Plan of wharfage improvements in Circular Quay showing the works completed (red), in progress (green) and proposed (yellow). (Source: Government Printing Office, 1893-1894, Plan of Circular Quay Wharfage Improvements) 30
Figure 17: 1909 Royal Commission on Sydney Improvements Plan Showing the Extension of George Street to Dawes Point (Plan No.35). Note: this plan shows the newly constructed Campbells Cove Wharf (7a and 7b). (New South Wales Parliamentary Papers, 1909, Interim Report of the Royal Commission for the Improvement of the City of Sydney and its Suburbs, Vol. 5:383, Plan No. 35, available http://www.photosau.com.au/cosmaps/scripts/displayIndex.asp?Index=RC19) 31
Figure 18: 1980 plan of Campbells Cove showing Wharf No. 7, approximately 110 m long and 28 m wide. (Source: The Maritime Services Board of New South Wales 1980

Hydrographic Survey at Overseas Terminal Sydney Cove, Cosmos Archaeology, NSW) 32
Figure 19: Photograph taken of Patriarch at Campbells Wharf, Sydney Cove, ca.1930s. (Source: Cyril Hume, c. 1930, PATRIARCH at Campbells Wharf Sydney Cove, Cyril Hume Sailing Ship Collection, Sydney Heritage Fleet) 32
Figure 20: Sydney Cove, Wharf No. 7 area showing the 1901-1980 wharf in 1979. (Source: Graeme Andrews 'Working Harbour' Collection: 80403 GKA in the City of Sydney Image Library) 33
Figure 21: 1935 photograph of Campbells Cove showing Wharf No. 7. (Source: E.W. Searle collection of photographs at National Library of Australia nla.pic-vn4655456) 33
Figure 22: Photograph of Campbells Cove in 1979. (Source: Graeme Andrews 'Working Harbour' Collection: 80419 GKA in the City of Sydney Image Library) 34
Figure 23: AHIMS Search Results 36
Figure 24: Sedimentary cross-section showing location and depth of dugong (from Etheridge, 1905) 39
Figure 25: Transects run as part of the maritime archaeology survey at OPT. (Base image Google Earth) 42
Figure 26: Glass tube standing 800 mm proud of the seabed at 1 m mark west of transect line. (PDS OPT Transect 1 South) 44
Figure 27: Horse shoe and sheet of copper sheathing at the 3 m mark on the east side of transect line. (PDS OPT Transect 1 South) 44
Figure 28: Northern (degraded) end of 7 m pile. (PDS OPT Transect 1 South) 44
Figure 29: Plank crossing transect at 25 m mark. Top half of image indicated by red arrow. (PDS OPT Transect 1 South) 44
Figure 30: Ceramic coffee cup with no handle at the 26 m mark to the east of the transect. (PDS OPT Transect 1 South) 44
Figure 31: Mobile timber recorded on the western side of transect near 30 m. (PDS OPT Transect 1 South) 44
Figure 32: Example of bottles and brick rubble spread between 33 - 30 m. (PDS OPT Transect 1 S) 45
Figure 33: Chain link adjacent to concrete block to the east of the transect at 39 m. (PDS OPT Transect 1 South) 45
Figure 34: Example of seabed along Transect 2. (PDS OPT Transect 2 N 0 to 40 m) 46
Figure 35: Concrete block. (PDS OPT Transect N 0 to 40 m) 46
Figure 36: Ferrous pipe; 1.2 m long and 0.5 m diameter. (PDS OPT Transect 2 N 0 to 40 m) 46
Figure 37: Two long neck beer bottles with brick. (PDS OPT Transect N 0 to 40 m) 46
Figure 38: Concrete block at 45 degree angle. (PDS OPT Transect 2 N 0 to 40 m) 46
Figure 39: Square concrete block (0.4 m). (PDS OPT Transect 2 N 0 to 40 m) 46
Figure 40: Concrete rubble. (PDS OPT Transect N 0 to 40 m) 47
Figure 41: Plastic shopping bag. (PDS OPT Transect N 0 to 40 m) 47
Figure 42: Flat hose, potentially a dredge or fire hose recorded between 5 and 10 m along transect. (PDS OPT Transect 3 South 40 to 0 m) 48
Figure 43: Section of 8 m length of ferrous pipe with right angled bracket crossing the transect at 6.5 m mark. Concrete block can be seen in the background. (PDS OPT Transect 3 South 40 – 0 m) 48
Figure 44: Coil of soft metal material possibly lead or tin recorded 11 m along the transect. (PDS OPT Transect 3 South 40 to 0 m) 48
Figure 45: Tyre located 15 m along the transect. (PDS OPT Transect 3 South) 48
Figure 46: Short length of copper strip with fastening holes recorded at 17 m along the transect. (PDS OPT Transect 3 South 40 to 0 m) 49
Figure 47: Piece of chain link lying loose on the seabed at 19 m along the transect. (PDS OPT Transect 3 South 40 to 0 m) 49
Figure 48: Piece of metal sheathing with fastening holes. The metal was slightly concave. (PDS OTP Transect 3 South 0 to 40 m) 49
Figure 49: Buried timber, potentially a plank, measuring 0.02 m thick with only 0.05 m exposed. Indicated by red arrow. (PDS OTP Transect 3 South 0 to 40 m) 49
Figure 50: Green glass bottle with curved body at 26 m along transect. (PDS OPT Transect 3 South 0 to 40 m) 49

Figure 51: Timber, likely a waler, running almost parallel with the transect line between 30 and 35 m. (PDS OPT Transect 3 South 40 to 0 m) 49
Figure 52: Timber pile running perpendicular to wale timber (just visible underneath the pile) (PDS OPT Transect 3 South 0 to 40 m) 50
Figure 53: Example of seabed on Transect 4. (Professional Diving Services, OPT Transect 4 NE 0 to 40 m) 51
Figure 54: Pile stump: 0.45 diameter and standing 0.5 m proud of the seabed. Very heavily eroded. (PDS OPT Transect 4 NE 0 to 40 m) 51
Figure 55: Tree branch resting loose on seabed. Outline marked in blue. (PDS Transect OPT 4 NE 0 to 40 m) 51
Figure 56: Ferrous pipe resting loose on seabed. (PDS OPT Transect 4 NE 0 to 40 m) 51
Figure 57: Concrete rubble (PDS OPT Transect 4 NE 0 to 40 m) 51
Figure 58: Grill from a shopping trolley, indicated with red arrow. (PDS OPT Transect 4 NE 0 to 40 m) 51
Figure 59: Example of the sandy seabed, lightly silted with a covering of shell grit and scattered strands of kelp. (Professional Diving Services: OTP Transect 5 West 0 to 20 m) 52
Figure 60: Potential concrete block at a 45 degree angle at the 11 m south of the transect line. (Professional Diving Services: OTP Transect 5 West 0 to 20 m) 52
Figure 61: Potential pile stump, heavily degraded, south of the transect line at the 13 m mark. (Professional Diving Services: OTP Transect 5 West 0 to 20 m (Professional Diving Services: OTP Transect 5 West 0 to 20 m) 53
Figure 62: Pile recorded crossing the transect line at the 15 m mark running in a SE to NW direction. (Professional Diving Services: OTP Transect 5 West 0 to 20 m) 53
Figure 63: Multibeam survey of the Project area undertaken by Port Authority of NSW in March 2018. Image on the left is the original image, image on the right has been marked up by the maritime archaeologist (Source: Port Authority of NSW). This information is provided courtesy of Port Authority of NSW. Copyright is owned by Port Authority of New South Wales 55
Figure 64: Proposed extent of dredging showing proposed depths to be dredged. Note: Dredging would only occur within the outlined “Provisional Berth” area 62

Executive summary

Port Authority of New South Wales (NSW) proposes to undertake capital dredging and scour-protection works at the Overseas Passenger Terminal (OPT) on the western side of Circular Quay in Sydney Harbour. A compound location to facilitate the works is proposed at Berth 2 on Glebe Island. The proposal dredging location and compound site at Glebe Island.

The project driver is to deepen the OPT berth pocket to increase the underkeel clearance to allow cruise ships to safely berth. Scour protection would be installed along the whole length of the quay wall to prevent undermining from hydraulic instability. Currently, there is a risk of incoming cruise ships having less than 0.5 metres (m) underkeel clearance, which is a clear safety concern.

The proposal's key features are:

- Installing a sheet pile retaining wall of about 65 m long at the southern end of the OPT berth pocket.
- Dredging approximately 20,000 m^3 of sediment to deepen the berth pocket.
- Installing scour protection of about 12,000 m^2 in the form of pumped concrete mattress or articulated concrete mattresses.

AECOM has been commissioned by Port Authority of NSW to undertake a maritime archaeological assessment that includes a Statement of Heritage Impact (SoHI), and a Indigenous heritage Due Diligence Assessment for any known or potential impacts to cultural heritage remains that may be present within the Project area. This includes known and potential impacts to Indigenous and non-Indigenous heritage and archaeological sites.

Cosmos Archaeology Pty Ltd (Cosmos Archaeology) were engaged separately by Port Authority of NSW to undertake an underwater survey of the Project area, the results of which were to be used in this AECOM report. The results of the underwater survey are used in the Section 7.0 of this report, and the whole report added as an appendix to this report.

This assessment has identified the proposed capital dredging works and scour protection works at the OPT are likely to have an impact on historical archaeological remains present at the northern end of the berth pocket, and potential impacts to Aboriginal objects within a former estuarine environment that has since become submerged.

The Aboriginal due Diligence report has assessed the impact from dredging works to be rated as Moderate, however, it has also been assessed as a low to moderate potential to impact any intact Aboriginal sites.

Impacts have also been indented to occur to remains associated with the former Wharf No. 7 built in Campbells Cove in 1901 and removed from the site in 1980. The wharf was constructed after the resumption of wharves in Sydney Harbour in 1900 and is believed to have been built under the new standard for wharf construction.

Opportunities to relocate the proposed works are not possible as the OPT is required to function as the overseas passenger terminal for curse ships entering Sydney Harbour. Impact to the former Wharf No. 7 cannot be avoided, and the impacts need to be mitigated.

Proposed mitigation measures include undertaking a controlled maritime archaeological program that would include recording, testing and the sieving of any dredge deposit remains that are present within the location of the former wharf. As the project has been assessed as impacting on potential archaeological (relic) remains associated with the former Wharf No. 7, the following recommendations can be made.

Aboriginal Heritage Recommendations

In light of the above key findings and Due Diligence Process Questions presented in Table 4, this Aboriginal Heritage Due Diligence Assessment provides the following management recommendations

1. This assessment has determined that Aboriginal objects may be encountered during the proposed works. Investigations of Aboriginal cultural heritage undertaken in accordance with

the requirements of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b) however, are impractical within submerged contexts. Therefore, a robust unexpected finds procedure for Aboriginal heritage should be developed prior to commencement of works. The procedure should be developed to run concurrently with historic investigations (refer below) and include protocols for identifying and managing Aboriginal cultural heritage.

2. Should any Aboriginal objects be identified at any stage of the project, Port Authority of New South Wales may be required to apply for an Aboriginal Heritage Impact Permit (AHIP) under Section 90 of the National Parks and Wildlife Act 1974 (NPW Act 1974). Generally, applications for AHIPs must be supported by an Aboriginal Cultural Heritage Assessment Report (ACHAR) compiled in accordance with Section 3 of the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011). A process of Aboriginal community consultation should be carried out accordance with OEH’s Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010a) must also be demonstrated.

3. In the event that human skeletal material (remains), are identified at any point during the Project, the procedure outlined in Appendix B should followed.

4. In the event that Aboriginal objects, including possible human skeletal material (remains), are identified at any point during the Project, the procedure outlined in Appendix B should followed.

Maritime Archaeological Recommendations

5. A Section 140 permit application should be submitted to Heritage NSW, Department of Premier and Cabinet, prior to the commencement of works. The application must include a maritime archaeological research design and methodology must be prepared that details the methodology for how the maritime archaeologist works would be conducted in conjunction with the proposed works. The document should include
   - Principal heritage specialists working on the project;
   - Details regarding the stages of works to be conducted on site, include methodology for each site;
   - How the works would be undertaken;
   - Recording methods for each stage of works, ;
   - Method for collecting and location for the storage of relics collected from the site which the artefact analysis is under taken; and,
   - Reporting at the conclusion of the project.

1.0 Introduction

1.1 Background

Port Authority of New South Wales (NSW) proposes to undertake capital dredging and scour-protection works at the Overseas Passenger Terminal (OPT) on the western side of Circular Quay in Sydney Harbour. A compound location to facilitate the works is proposed at Berth 2 on Glebe Island. The proposal dredging location and compound site at Glebe Island is presented on Figure 1, and proposed dredging area is presented on Figure 2.

The project driver is to deepen the OPT berth pocket to increase the underkeel clearance to allow cruise ships to safely berth. Scour protection would be installed along the whole length of the quay wall to prevent undermining from hydraulic instability. Currently, there is a risk of incoming cruise ships having less than 0.5 metres (m) underkeel clearance, which is a clear safety concern.

The proposal's key features are:

- Installing a sheet pile retaining wall of about 65 m long at the southern end of the OPT berth pocket.
- Dredging approximately 20,000 m^3 of sediment to deepen the berth pocket.
- Installing scour protection of about 12,000 m^2 in the form of pumped concrete mattress or articulated concrete mattresses.

AECOM has been commissioned by Port Authority of NSW to undertake a maritime archaeological assessment that includes a Statement of Heritage Impact (SoHI) for any known or potential impacts to cultural heritage remains that may be present within the Project area. This includes known and potential impacts to Indigenous and non-Indigenous heritage and archaeological sites.

Cosmos Archaeology Pty Ltd (Cosmos Archaeology) were engaged separately by Port Authority of NSW to undertake an underwater survey of the Project area, the results of which were to be used in this AECOM report. The results of the underwater survey are used in the Section 7.0 of this report, and the whole report added as an appendix to this report.

AECOM has also been commissioned to prepare a separate Indigenous heritage Due Diligence Assessment. This assessment has been prepared by Luke Wolfe, Senior Heritage Specialist at AECOM, and the results of this assessment have been included and added as an appendix to this report.

1.2 Site location

The OPT is situated on the western side of Sydney Cove (Circular Quay). The investigation for this project is confined to the seabed in front of the wharf at the OPT (Figure 1).

This report includes a general history of the reclamation and seawall development in Darling Harbour and Cockle Bay (to the south of the Project area) to further understand the development phases of wharves within the Project area.

1.3 Project justification

The capital dredging works are required to maintain a safe depth of water below the current keel of vessels berthed at the OPT. Scour protection would be installed along the whole length of the quay wall to prevent undermining from hydraulic instability. Currently, there is a risk of incoming cruise ships having less than 0.5 m underkeel clearance, which is a clear safety concern.

1.4 Scope of work

The objectives of this investigation are to:

- Review geotechnical data, including borehole investigations and geophysical survey data of the Project area;

- Prepare an Aboriginal heritage due diligence report to assess the potential for submerged cultural landscapes within the Project area;
- Undertake a maritime archaeological assessment, incorporating site inspection data collected by Cosmos Archaeology, to assess the potential for maritime archaeological remains to be present within the Project area; and
- Prepare a SoHI, which includes statements of significance for any known or potential maritime archaeological remains, assessing the impact of the proposed works on the archaeological potential in the Project area.

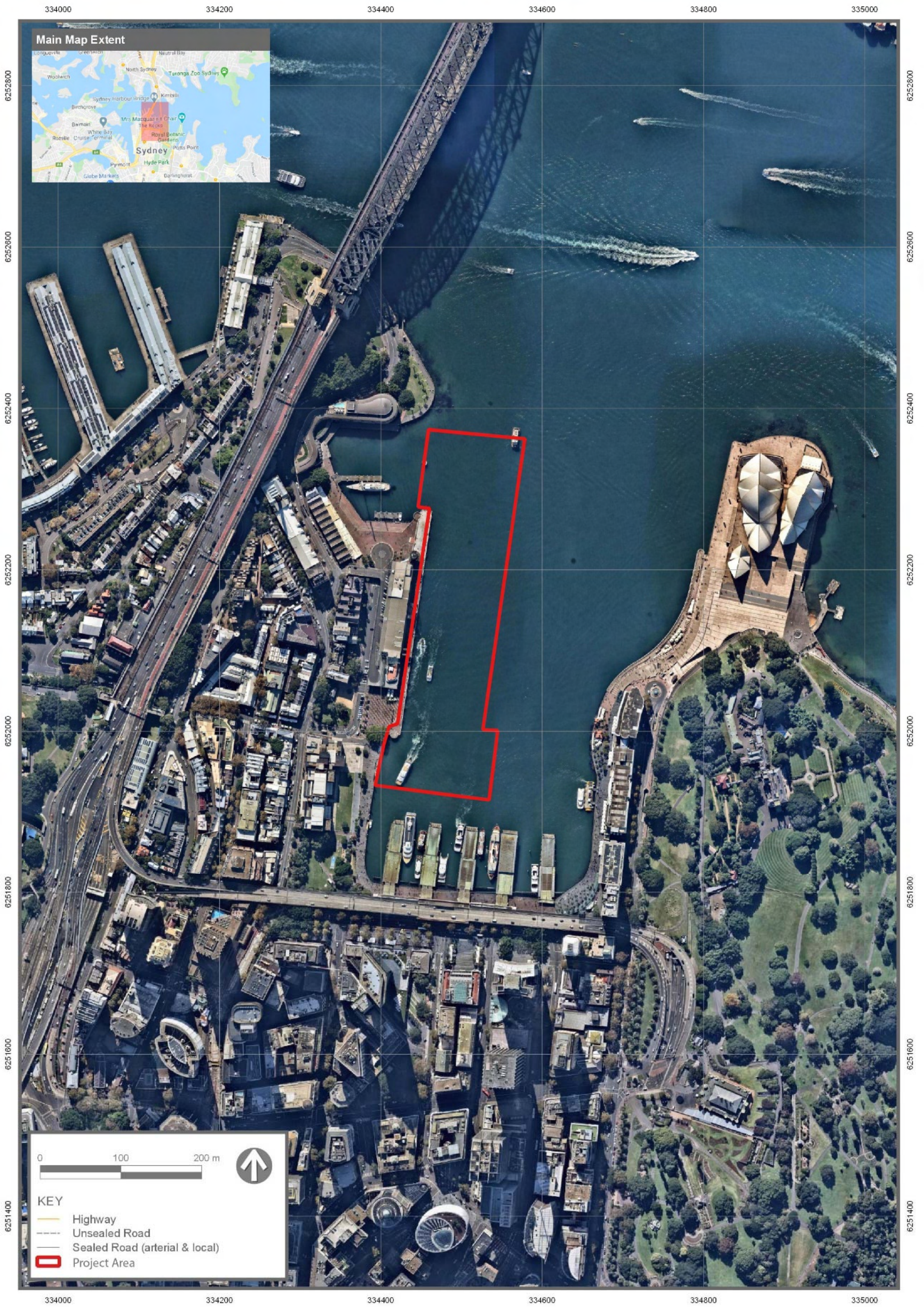


Figure 1: Location of the proposed capital dredging works and rock armour protection work

1.5 Report methodology

This heritage assessment has been undertaken in accordance with the NSW Heritage Division guidelines *Assessing Heritage Significance* (NSW Heritage Office, 2001) and *Statements of Heritage Impact* (NSW Heritage Office & Department of Urban Affairs & Planning, 2002) and includes:

- desktop searches of relevant heritage registers;
- review of Project drawings and concept design reports;
- review of the following key documents:
  - Cosmos Archaeology 2014 maritime archaeological assessment,
  - heritage register listings for the Project area,
  - relevant historic shipwreck databases,
  - review of borehole data and Port Authority of NSW Hydrographic Survey data,
- assessment of the Project against the heritage significance of all known and potential maritime archaeological remains within the Project area. The assessment has been undertaken in light of the conservation processes and principles found in *The Burra Charter: The Australian ICOMOS Charter for Places of Cultural Significance* (2013). *The Burra Charter* is considered to be the pre-eminent guidance document for the management of change for places of heritage significance within Australia.

1.5.1 Report authorship and acknowledgements

The maritime archaeological component of this report has been prepared by Chris Lewczak (Principal Heritage Specialist and Maritime Archaeologist). Luke Wolfe (Senior Heritage Specialist) has prepared the Aboriginal heritage due diligence assessment. Dr Darran Jordan (Principal Heritage Specialist) provided a technical review of the content.

Section 7.0 has been prepared using the assessment data provided by Cosmos Archaeology. The entirety of the Cosmos Archaeology site inspection report has been included in Appendix A.

1.6 Report limitations

The purpose of this report is to identify and assess historic/maritime heritage and archaeological potential which might be impacted by the Project. Predictions have been made within this report about the probability of archaeological materials occurring within the site, based on landform indications and environmental contexts. However, it is possible that materials may occur in areas without landform indications and in any context. This report is based on the design for the Project made available at the time of assessment; it is noted that details of the Project may change or be refined.

A summary of the statutory requirements regarding historical heritage is provided in Section 2.0. The summary is provided based on the experience of the authors with the heritage system in Australia and does not purport to be legal advice. It should be noted that legislation, regulations and guidelines change over time and users of the report should satisfy themselves that the statutory requirements have not changed since the report was written.

2.0 Statutory legislation

2.1 Commonwealth legislation

2.1.1 Environmental Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) defines the 'environment' as both natural and cultural environments and therefore includes Aboriginal and non-Aboriginal historic cultural heritage items. Under the EPBC Act, protected heritage items are listed on World Heritage List (WHL); the National Heritage List (NHL) (items of significance to the nation) or the Commonwealth Heritage List (CHL) (items belonging to the Commonwealth or its agencies). These two lists replaced the Register of the National Estate (RNE). The RNE has been suspended and is no longer a statutory list; however, it remains as an archive.

If proposed works are situated within the designated area or buffer zone of an item or place listed on the WHL, a referral must be made under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) if proposed action has, will have, or is likely to have a significant impact on the world heritage values of a declared World Heritage property.

The NHL is a register of natural and cultural places with outstanding heritage significance to the Australian nation. Each entry to the NHL is assessed by the Australian Heritage Council as having exceptional heritage value and is protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. The Act requires that approval is obtained from the Australian Government Minister for the Environment Protection, Heritage and the Arts before any action takes place that has, will have, or is likely to have, a significant impact on the national heritage values of a listed place.

Under Part 9 of the EPBC Act, any action that is likely to have a significant impact on a matter of National Environmental Significance (known as a controlled action under the EPBC Act), may only progress with approval of the Commonwealth Minister for the Department of the Environment and Energy (DoEE). An action is defined as a project, development, undertaking, activity (or series of activities), or alteration. An action would also require approval if:

- it is undertaken on Commonwealth land and would have or is likely to have a significant impact on the environment on Commonwealth land; and
- it is undertaken by the Commonwealth and would have or is likely to have a significant impact.

2.2 State legislation

2.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act), administered by the NSW Department of Planning and Environment (DP&E), requires that consideration be given to environmental impacts as part of the land use planning process in NSW. In NSW, environmental impacts include impacts to Aboriginal and non-Aboriginal (i.e., European) cultural heritage.

2.2.2 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act), administered by OEH, is the primary legislation for the protection of Aboriginal cultural heritage in NSW. The NPW Act gives the Director General responsibility for the proper care, preservation and protection of 'Aboriginal objects' and 'Aboriginal places', defined under the Act as follows:

- an *Aboriginal object* is any deposit, object or material evidence (that is not a handicraft made for sale) relating to Aboriginal habitation of NSW, before or during the occupation of that area by persons of non-Aboriginal extraction (and includes Aboriginal remains); and
- an *Aboriginal place* is a place declared so by the Minister administering the NPW Act because the place is or was of special significance to Aboriginal culture. It may or may not contain Aboriginal objects.

Part 6 of the NPW Act provides specific protection for Aboriginal objects and places by making it an offence to harm them and includes a 'strict liability offence' for such harm. A 'strict liability offence' does not require someone to know that it is an Aboriginal object or place they are causing harm to in order to be prosecuted. Defences against the 'strict liability offence' in the NPW Act include the carrying out of certain 'Low Impact Activities', prescribed in Clause 80B of the *National Parks and Wildlife Amendment Regulation 2010* (NPW Regulation), and the demonstration of due diligence.

An Aboriginal Heritage Impact Permit (AHIP) issued under Section 90 of the NPW Act is required if impacts to Aboriginal objects and/or places cannot be avoided. An AHIP is a defence to a prosecution for harming Aboriginal objects and places if the harm was authorised by the AHIP and the conditions of that AHIP were not contravened. Applications for an AHIP must be accompanied by assessment reports compiled in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011) and the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b). Applications must also provide evidence of consultation with the Aboriginal communities. Consultation is required under Part 8A of the NPW Regulation and is to be conducted in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a). AHIPs may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects. Section 89A of the NPW Act requires notification of the location of Aboriginal sites within a reasonable time, with penalties for non-notification. Section 89A is binding in all instances.

2.2.3 Sydney Regional Environmental Plan (SREP) – Sydney Harbour Catchment (2005)

NSW Regional Environmental Plans (REPs) are plans drafted by the Department of Planning and apply to a nominated "region," covering broad issues such as urban growth, commercial centres, extractive industries, recreational needs, rural lands, heritage and conservation. They provide the framework for detailed local planning by councils. The local council of the area in which development is proposed to be carried out is usually the consent authority for that development for the purposes of the Sydney Regional Environmental Plan (SREP), unless the Department of Planning selects to substitute the Minister or Director General of Planning as the consent authority in respect to particular forms of development.

The stated objectives of the *SREP – Sydney Harbour Catchment (2005)* with regards to foreshores and waterways areas are as follows (Section 53);

a. *to conserve the environmental heritage of the land to which this Part applies, and*

b. *to conserve the heritage significance of existing significant fabric, relics, settings and views associated with the heritage significance of heritage items, and*

c. *to ensure that archaeological sites and places of Aboriginal heritage significance are conserved, and*

d. *to allow for the protection of places which have the potential to have heritage significance but are not identified as heritage items.*

Note: *Attention is drawn to the provisions of the Heritage Act 1977 and the National Parks and Wildlife Act 1974 under which an approval or permit under either or both of those Acts may be required for certain activities, whether or not development consent is required by this clause.*

Part 5 of the *SREP – Sydney Harbour Catchment (2005)* contains provisions for the protection and conservation of cultural heritage sites, items and values – both Aboriginal and non-Aboriginal.

Under the SREP, a "heritage item" is defined as:

a. *a building, work, archaeological site or place:*

   i. *that is specified in an inventory of heritage items prepared for the purposes of this plan, being an inventory that is available at the head office of the Department, and*

   ii. *that is situated on a site described in Schedule 4 and identified on the Heritage Map, or*

b. *a place:*

   i. *that is specified in an inventory of heritage items prepared for the purposes of this plan, being an inventory that is available at the head office of the Department, and*

   ii. *that is described in the inventory as a place of Aboriginal heritage significance.*

Clause 55 of the SREP provides protection for heritage items. Under this clause, the following development may be carried out only with development consent:

a. *demolishing or moving a heritage item,*

b. *altering a heritage item by making structural or non-structural changes to its exterior, including changes to its detail, fabric, finish or appearance,*

c. *altering a heritage item by making structural changes to its interior,*

d. *disturbing or damaging a place of Aboriginal heritage significance or an Aboriginal object,*

e. *erecting a building on, or subdividing, land on which a heritage item is located.*

(2) Development consent is not required by this clause if:

a. *in the opinion of the consent authority:*

   i. *the proposed development is of a minor nature or consists of maintenance of the heritage item, and*

   ii. *the proposed development would not adversely affect the significance of the heritage item, and*

   iii. *the proponent has notified the consent authority in writing of the proposed development and the consent authority has advised the applicant in writing before any work is carried out that it is satisfied that the proposed development will comply with this subclause and that development consent is not otherwise required by this plan.*

(4) Before granting development consent as required by this clause, the consent authority must assess the extent to which the carrying out of the proposed development would affect the heritage significance of the heritage item concerned.

(5) The assessment must include consideration of a heritage impact statement that addresses at least the following issues (but is not to be limited to assessment of those issues, if the heritage significance concerned involves other issues):

a. *the heritage significance of the item as part of the environmental heritage of the land to which this Part applies, and*

b. *the impact that the proposed development will have on the heritage significance of the item and its setting, including any landscape or horticultural features, and*

c. *the measures proposed to conserve the heritage significance of the item and its setting, and*

d. *whether any archaeological site or potential archaeological site would be adversely affected by the proposed development, and*

e. *the extent to which the carrying out of the proposed development would affect the form of any historic subdivision.*

(6) The consent authority may also decline to grant development consent until it has considered a conservation management plan, if it considers the development proposed should be assessed with regard to such a plan.

Clause 59 – Development in Vicinity of Heritage Items:

1. Before granting development consent to development in the vicinity of a heritage item, the consent authority must assess the impact of the proposed development on the heritage significance of the heritage item.

2. This clause extends to development:

    a. *that may have an impact on the setting of a heritage item, for example, by affecting a significant view to or from the item or by overshadowing, or*

    b. *that may undermine or otherwise cause physical damage to a heritage item, or*

    c. *that will otherwise have any adverse impact on the heritage significance of a heritage item.*

3. The consent authority may refuse to grant development consent unless it has considered a heritage impact statement that will help it assess the impact of the proposed development on the heritage significance, visual curtilage and setting of the heritage item.

4. The heritage impact statement should include details of the size, shape and scale of, setbacks for, and the materials to be used in, any proposed buildings or works and details of any modification that would reduce the impact of the proposed development on the heritage significance of the heritage item.

2.2.4 Heritage Act 1977

The NSW *Heritage Act 1977* (as amended) was enacted to conserve the environmental heritage of NSW. Under Section 32, places, buildings, works, relics, movable objects or precincts of heritage significance are protected by means of either Interim Heritage Orders (IHO) or by listing on the NSW State Heritage Register (SHR). Items that are assessed as having State heritage significance can be listed on the SHR by the Minister on the recommendation of the NSW Heritage Council.

Proposals to alter, damage, move or destroy places, buildings, works, relics, movable objects or precincts protected by an IHO or listed on the SHR require an approval under Section 60. The 'relics provision' requires that no archaeological relics be disturbed or destroyed without prior consent from the Heritage Council of NSW. Therefore, no ground disturbance works may proceed in areas identified as having archaeological potential without first obtaining an excavation permit pursuant to Section 60 of the *Heritage Act 1977* or an archaeological exemption.

For the purposes of this Act, the State of NSW includes the seabed and the water column up to 3 nautical miles (nm) from the coast. The NSW *Heritage Act 1977* therefore, within 3 nm of the NSW coast, can protect shipwrecks. Shipwrecks currently under the jurisdiction of the NSW *Heritage Act* are identified in the Historic Shipwrecks Register, maintained by the NSW Heritage Council.

Part 3C of the Act contains provisions for the protection of shipwrecks over 75 years old. This section is included in the Act to provide a link to and consistency with the (Commonwealth) *Historic Shipwrecks Act 1976*. In NSW the 'relics' provision takes precedence over Part 3C when it comes to determining the legal and protected status of a wreck and associated artefacts.

Under Section 170 of the *Heritage Act 1977*, NSW Government agencies are required to maintain a register of heritage assets. The register places obligations on the agencies, but not on non-government proponents, beyond their responsibility to assess the impact on surrounding heritage items.

Archaeological features and deposits are afforded statutory protection by the 'relics provision'. Section 4(1) of the *Heritage Act 1977* (as amended 2009) defines 'relic' as follows:

any deposit, artefact, object or material evidence that:

a. relates to the settlement of the area that comprises NSW, not being Aboriginal settlement, and
b. is of State or local heritage significance.

2.3 Local legislation

2.3.1 Sydney Local Environmental Plan 2012

The Project area is located within the City of Sydney Local Government Area (LGA).

Part 5, Section 5.10 of the Sydney Local Environmental Plan (LEP) 2012 deals with heritage conservation within the area covered by this LEP. All heritage items listed on the LEP are included in Schedule 5. The Sydney LEP states:

(1) The objectives of this clause are as follows:

- a. to conserve the environmental heritage of the City of Sydney,
- b. to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views,
- c. to conserve archaeological sites,
- d. to conserve Aboriginal objects and Aboriginal places of heritage significance.

(2) Development consent is required for any of the following:

- a. demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):
  - i. a heritage item,
  - ii. an Aboriginal object,
  - iii. a building, work, relic or tree within a heritage conservation area,
- b. altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,
- c. disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,
- d. disturbing or excavating an Aboriginal place of heritage significance,
- e. erecting a building on land:
  - i. on which a heritage item is located or that is within a heritage conservation area, or
  - ii. on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,
- f. subdividing land:
  - i. on which a heritage item is located or that is within a heritage conservation area, or
  - ii. on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.

2.4 Heritage register searches

In NSW the types of statutory listings for non-indigenous cultural heritage sites, objects and places are:

- WHL
- NHL;
- NSW SHR;
- REP;
- LEP; and
- Section 170 Heritage and Conservation Register.

Heritage register searches were undertaken 24 March 2020 for the Project area with the following results.

2.4.1 World Heritage List

The proposed works are situated within the buffer zone associated with Sydney Opera House. The impact of the works against the *Significant Impact Guidelines 1.1* (Department of the Environment, 2013:17) have been assessed in the Section 9 of this report.

2.4.2 National Heritage List

There are no items listed on the NHL or CHL within the Project area.

The Sydney Harbour Bridge is listed on the NHL and the closest point from the Harbour Bridge listing to the Project area is 130m to the northwest. As the works would be contained to below the water level, there is not expected to be any direct or indirect impact to this heritage listing.

The Sydney Opera House is listed on the NHL and is located 370 m to the east of the Project area. As the works would be contained to below the water level, there is not expected to be any direct or indirect impact to this heritage listing.

2.4.3 NSW State Heritage Register

There are several items listed on the SHR located adjacent to the Project area. These include:

- Railings, Sydney Cove (item number 01572), located 10 m west of the Project area.
- Sydney Cove West Archaeological Precinct (item Number 01860), located 50 m west of the Project area.
- Cadman's Cottage, grounds, trees, space (item number 00981), located approximately 70 m to the west of the Project area.
- Sailor's Home (former) (item number 01576), located approximately 70 m to the west of the Project area.
- Coroner's Court (former) - Shops & offices (item number 01541), located approximately 70 m to the west of the Project area.
- Mariners' Church (item number 01559), located approximately 70 m to the west of the Project area.
- ASN Co Building (item number 01526), located approximately 70 m to the west of the Project area.
- Campbell's Stores (item number 01536), located approximately 100 m to the west of the Project area.

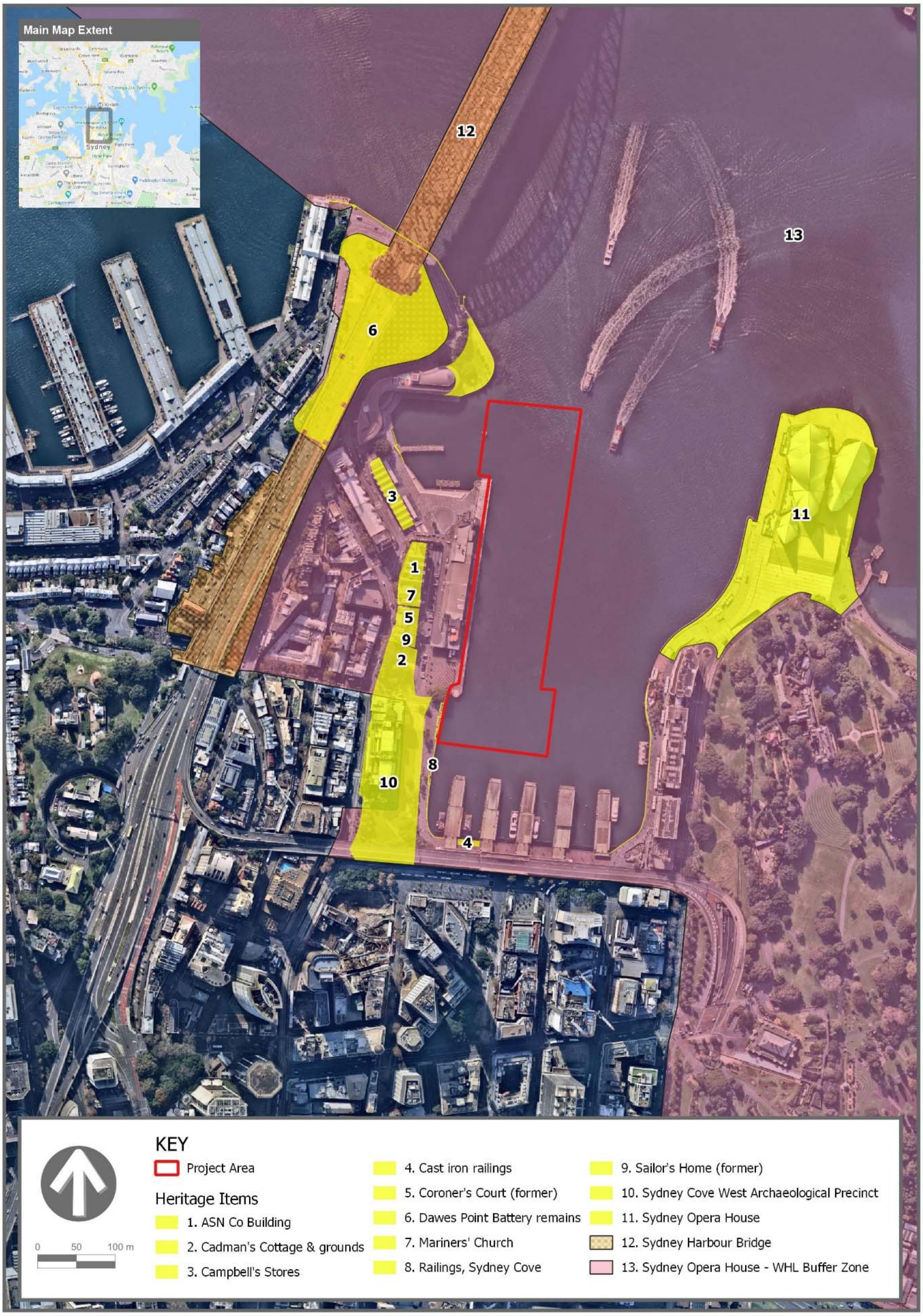


Figure 2: Location of nearby Heritage items listed on the NHL. SHR and LEP

2.4.4 NSW Historic Shipwreck Register

The NSW Historic Shipwreck Register is a database maintained by the NSW Heritage Division and contains upwards of 1,800 wrecks.[1] This database has been built up around historical accounts of the loss of vessels, mainly through the systematic examination of newspapers from the 1790s to the present day. The database has been augmented by other sources such as archival information from the Australian Hydrographic Office.

The database has been searched to locate any known or potential shipwrecks that have occurred in Sydney Cove. There are 112 registered vessels that are listed as wrecked in “Sydney Harbour” that have not been located. This description includes vessels that were reported lost within “Sydney Harbour Heads”, or general locations such as “just outside Circular Quay” whereby the location may be further afield than the location described.

Refining the search to closer to the Project area, there was one shipwreck, *Sovereign of the Seas*, identified to have been lost at Campbell’s wharf in 1861. The vessel was again refloated and it is considered unlikely that any evidence of the vessel will remain. Other vessels that had incidents in the vicinity of the Project area include *Three Bees*, *Ann Jameson* and *Princess*. These were either re-floated, as was the case with the latter two, or have not been located but are unlikely to be within the Project area.

2.4.5 Sydney Local Environmental Plan 2012

Identified items of cultural heritage significance within the Project area are listed on Schedule 5 of the *Sydney Local Environmental Plan 2012.* Each item listed on Schedule 5 is subject to protection under the planning and development controls of the LEP.

There are no listings on the Sydney LEP that are located within 100 m of the Project area.

2.4.6 Sydney Regional Environmental Plan (Sydney Harbour Catchment 2005)

The Project site is located within the Foreshores and Waterways Area of Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005. Clause 15 of the SREP includes planning principles for heritage conservation relating to development within the Foreshores and Waterways Area. Part 5 of the SREP outlines the Heritage provisions that are afforded to heritage sites listed on Schedule 4 of the SREP.

Clause 53 outlines and the objectives of the SREP in relation to heritage are to:

a) to conserve the environmental heritage of the land to which this Part applies, and

b) to conserve the heritage significance of existing significant fabric, relics, settings and views associated with the heritage significance of heritage items, and

c) to ensure that archaeological sites and places of Aboriginal heritage significance are conserved, and

d) to allow for the protection of places which have the potential to have heritage significance but are not identified as heritage items.

Clause 52(2) sets out the specific objectives in the SREP that are specific to the WHL of the Sydney Opera House These are to

- to establish a buffer zone around the Sydney Opera House so as to give added protection to its World Heritage Value; and
- to recognise that views and vistas between the Sydney Opera House and other public places within that zone contribute to its World Heritage Value.

---

[1] **NSW Heritage Office, 2007** ‘Maritime Heritage Online’, NSW, available http://www.environment.nsw.gov.au/maritimeheritage/index.htm

Division 3A, Clause 58B provides for the protection of the world heritage value of the Sydney Opera House. The following

- matters are to be taken into consideration in relation to development within the Sydney Opera House buffer zone:
- - the objectives set out in clause 53 (2);
- - the need for development to preserve views and vistas between the Sydney Opera House and other public places within that zone;
- - the need for development to preserve the world heritage value of the Sydney Opera House;
- - the need for development to avoid any diminution of the visual prominence of the Sydney Opera House when viewed from other public places within that zone.

Minor works that are undertaken within the Sydney Opera House buffer zone are exempt requiring approval are set out in Clause 58C. Specifically exemptions from Division 3A that are relevant this project are:

1) This Division does not apply to or in respect of building work that merely involves—
   a) the renovation, repair, rebuilding or demolition of a building, or
   b) internal alterations to a building, or
   c) external alterations to a building that are carried out below ground level.

As the proposed works are al located underwater, these would be considered works that were carried out below ground level. As such, the Project would be considered to be ‘Minor Works’ as defined under Division 3, Clause 58C of the SREP. Therefore, no assessment would be required under the provisions of this SREP.

2.4.7 NSW Section 170 Heritage and Conservation Register

All NSW State Government Agencies are required to keep an up to date record to assist in total asset management by providing information on their assets which have identified heritage significance. The Register has been prepared in accordance with the NSW Heritage Office guidelines and corresponds with information in the State Heritage Inventory (SHI), as managed by the NSW Heritage Office. Relevant listed Section 170 items include:

- *Sydney Cove Passenger Terminal* - listed on Port Authority of NSW’s Section 170 Heritage and Conservation Register.
- *Sydney Cover Passenger Terminal - Extendible Gangways* - listed on Port Authority of NSW’s Section 170 Heritage and Conservation Register.

2.5 Summary

The table below outlines the known and potential heritage and archaeological items that are located within or immediately adjacent to the Project area.

Table 1 Summary of listed heritage items within and/or adjacent to the Project site

Heritage list	Items within the Project Area	Level of significance	Items adjacent to the Project Area	Level of significance	Distance to Project Area (metres)
World Heritage List	Sydney Opera House Buffer Zone	World Heritage List	Sydney Opera House	World Heritage List	370
National Heritage List	Nil	n/a	Sydney Opera House	National	370
			Sydney Harbour Bridge	National	130
Commonwealth Heritage List	Nil	n/a	Nil	n/a	n/a
State Heritage Register	Nil	n/a	*Railings, Sydney Cove (#01572)*	State	10
			Sydney Cove West Archaeological Precinct (#01860)	State	50
			Cadman's Cottage, grounds, trees, space (#00981)	State	70
			Sailor's Home (former) (item number 01576)	State	70
			Coroner's Court (former) - Shops & offices (#01541)	State	70
			Mariners' Church (#01559)	State	70
			ASN Co Building (#01526)	State	70
			Campbell's Stores (#01536)	State	100
Port Authority of NSW S170	Nil	n/a	*Sydney Cove Passenger Terminalis*	State	40
			Sydney Cover Passenger Terminal - Extendible Gangways	State	40

Heritage list	Items within the Project Area	Level of significance	Items adjacent to the Project Area	Level of significance	Distance to Project Area (metres)
Sydney LEP 2012	Nil	n/a	Nil	n/a	n/a
NSW Historic Shipwrecks Register	*Sovereign of the Seas*	Protected – re-floated	*Three Bees*	Protected	Unknown
			Ann Jameson	Protected	Unknown
			Princess	Protected	Unknown

3.0 Aboriginal Archaeological Context

3.1 Landscape Context

Consideration of the landscape context of the Project area is predicated on the now well-established proposition that the nature and distribution of Aboriginal archaeological materials are closely connected to the environments in which they occur. Environmental variables such as topography, geology, hydrology and the composition of local floral and faunal communities will have played an important role in influencing how Aboriginal people moved within and utilised their respective Country. Amongst other things, these variables will have affected the availability of suitable campsites, drinking water, economic[2] plant and animal resources, and raw materials for the production of stone and organic implements. At the same time, an assessment of historical and contemporary land use activities, as well as geomorphic processes such as soil erosion and aggradation, is critical to understanding the formation and integrity of archaeological deposits.

For the current Project, consideration of the paleo-landscape and environs of the Sydney foreshore area is pertinent to determining the potential for submerged, formally-terrestrial Aboriginal sites. The terms 'submerged' and 'formally-terrestrial' site in this context refer to those Aboriginal sites that may have been inundated around 15,000 to 18,000 B.P.[3] during the last major phase of maximum glaciation and marine transgression (Nutley, 2006). It is now widely accepted that fluctuations of sea-level associated with glacial - interglacial phases would have resulted in a maximum sea-level variation of approximately 120 m. Additionally, relatively short phases would have occurred in which sea levels were at or above the present level (Lewis et al., 2013). While the body of submerged archaeological research in Australia remains at present, relatively scarce, several studies suggest the potential for survival of such sites associated with these phases of environmental change (C. Dortch, 2002; C. E. Dortch & Morse, 1984; Westley et al., 2011; Yanko-Hombach, Valentina Mudie & Gilbert, 2011). The potential for these sites however, remains largely hypothetical, complicated by the need of both specialised equipment and personnel to investigate underwater environments. Physical evidence (i.e., artefacts, intact middens etc) has yet to been identified in Australia, so archaeological investigations must, for the time being, rely on secondary evidence including bathymetrical, geotechnical and environmental data to identify the presence of Potential Archaeological Deposits (PADs) in submerged environs. It follows however, that a degree of interpretation is required to determine the prehistorical environs of the Project area prior to inundation. A summary of key observations and predictions regarding the landscape context of the Project area are presented in Table 2.

Table 2 Review of landscape context of the Project Area

Environmental Variable	Key Observations
Topography	The terrestrial morphology of Sydney Harbour (also 'Port Jackson'), prior to inundation, is described as a series of deep and steep-sided river valleys controlled by the underlying geological structures of the Sydney Basin. Initially formed during the Permian-Triassic geologic period as an uplifted coastal plain, watercourses later eroded pathways into the Hawkesbury Sandstone bedrock. Throughout the Last Glacial Maximum (approximately 24,000 to 18,000 years B.P.), sea levels in the Australasian region were around 100 to 130 m below the current level. Between 19,000 to 18,000 years B.P., a climate reversal resulted in deglaciation and a subsequent rapid rise in global sea levels. By about 10,000 years B.P., sea levels in south-eastern Australia had risen and it was around this time that Port Jackson embayment was flooded, drowning the ancient valley systems underlying the current Middle Harbour, Parramatta River and Lane Cove River environs. Marine sediments and delta sands were subsequently pushed

[2] i.e., edible and/or otherwise useful (e.g., medicine, clothing)
[3] B.P. stands for Before Present. As the present is in a constant state of flux, it was defined in relation to B.P. as being 1950 A.D. (the choice of year generally being attributed to that being when practical radiocarbon dating was developed). A.D. stands for Anno Domini which is Latin for "in the year of the Lord", referring to the Gregorian calendar which has a zero point estimated to be the year that Jesus Christ was born. The alternative term for A.D. is C.E. or Common Era.

Environmental Variable	Key Observations
	landwards, infilling Port Jackson whilst additional sedimentation occurred in the middle and upper portions of these valleys with the deposition of estuarine muds and tidal sands. Between about 7,900 to 7,700 years B.P., the sea level along south-eastern Australia reached its present level. During this phase, former overhangs and cliff lines that had previously formed within the Hawkesbury Sandstone bedrock were inundated and infilled with sediments as described above.
Hydrology	Prior to colonisation, the Tank Stream would have been the primary freshwater source for Aboriginal peoples occupying the Port Jackson area. Although now heavily modified, the Tank Stream was one of the principle influencing factors which guided Governor Arthur Phillip's decision to use Sydney Cove instead of other bays in Port Jackson for the colony in 1788 (Figure 2). A minor tributary of the Tank Stream, named in 1788 as Hospital Creek, followed a course across George Street before discharging to the Tank Stream near the area now occupied by Circular Quay. At this time, the Tank Stream itself was described as a narrow 'ferny gully' which flowed north through a small valley from the elevated ground located in the area now bounded by Market, Park, Elizabeth and Pitt Streets and discharged into Sydney Cove (Owen & Macphail, 2018). To accommodate the needs of the establishing colony, settlers cleared vegetation around the Tank Stream to facilitate greater access for stock grazing and to satisfy other urban requirements. Within two years the watercourse had become polluted with urban runoff, sewerage and stock-related impacts. Construction of new residential dwellings were consequently banned and tanks were built near Bridge Street to capture what little useable water remained, giving rise to the name. While a 15 m wide 'green belt' was declared in 1804, by 1826 the Tank Stream had ceased to be used as a water supply.
Geology and Soils	Reference to the Sydney 1:100,000 Geological Sheet (1983) indicates that the Project area is underlain by Quaternary-aged stream alluvium / estuarine sediments, which in turn lie on Triassic-aged Hawkesbury Sandstone bedrock, described as: ◦ Stream alluvium and estuarine sediments: silty to peaty quartz sand silt and clay with common shell layers; ◦ Sandstone: medium to coarse grained with very minor shale and laminite lenses. As described above, around the Last Glacial Maximum, the Tank Stream channel extended northwards before draining into Sydney Cove. Reference to recent geotechnical investigations undertaken by (Coffey Pty Ltd, 2019) indicate that soils comprising clayey sands, sandy clays and clays form the deeper subsurface profile within the Project area. Where such sediments were interpreted as being intact (i.e., not impacted by previous dredging operations), these sandier soils are suggestive of marine and tidal delta sediments, while deeper clays exhibiting medium to high plasticity indicate estuarine conditions.
Flora and Fauna	Vegetation records of the vicinity of the Project area may be interpreted from a variety of sources, including both historical ethnographic literature and pictorial representations, as well as palynological[4] data. For instance, on 22 January 1788, sailor James Nagle observed vegetation *"comprising all bushes but a small distance at the head of the cove was level and large trees but scattering and no underwood worth mentioning"*. Palynological analysis undertaken by McPhail and Owen (2018) for a site located approximately 150 m from the Project area, indicate the pre-1788 vegetation community in the area was dominated by

[4] Being the study of plant pollen, spores and certain microscopic plankton organisms.

Environmental Variable	Key Observations
	Rainbow Fern and Casuarina, associated with a relatively diverse sclerophyll shrub flora. Rarer evidence of tree ferns and fern species common to wet gully environs were also identified, though species suggestive of mangrove conditions at 1788 were absent. While these observations provide a relative indication for pre-1788 conditions, a greater deal of interpretation is required to estimate conditions during post-Last Glacial Maximum (LGM) conditions when sea levels were lower. To date, no palynological studies have been undertaken on sediments in the Project area. However, it is feasible to surmise that mangrove or similarly-deltaic conditions may have existed based on observed estuarine soils encountered at depth within the Project area. As with vegetation, determining with any certainty the pre-European faunal landscape of the Project area and environs is difficult to determine from post-LGM conditions. However, consideration of pre-European vegetation regimes and local archaeo-faunal assemblages suggests that a range of marine and terrestrial faunal resources would have been present in the area. Locally occurring marine resources, for example, are likely to have consisted of a wide range of fish and shellfish, Crustacea such as crabs and crayfish, and other marine mammals including turtles and dugongs (Etheridge, 1905). Attenbrow (V. Attenbrow, 2010) notes that the results of the excavation of Aboriginal midden sites throughout Sydney have found that shellfish harvesting generally occurred in all parts of the estuary but with most fishing conducted in the lower parts of the estuary. A diverse array of terrestrial mammals (for example, kangaroos, wallabies, possums, birds, reptiles and amphibians), would have also been available in woodland areas surrounding and including the Project area.
Historical Disturbance	A Descriptions of historical disturbances is outlined in Section 5.0 below.

Figure 3: Tank Stream and Foreshore, c. 1788

5.0 Historical context

This historical background has been put together based on the previous AECOM and Cosmos Archaeology assessments that were both undertaken in 2014. Additional research has been undertaken to supplement this history.

5.1 Early European occupation

The First Fleet disembarked at the eastern end of what is today Argyle Street on 26 January 1788. The original shore line ran roughly along the current alignment of Circular Quay West Road and the western edge of the foreshore promenade. The relatively flat land along the shoreline was taken up by Government infrastructure and George Street (originally High Street) was formed to service the hospital, gaol, Government Dockyards and Commissariat Stores (Sydney Harbour Foreshore Authority, 2010). Robert Campbell was the first merchant to establish a private wharf, in Campbells Cove, but he was soon to be followed by many more. Housing for the convicts, emancipists, free-settlers and sailors was pushed up onto the sandstone outcrops that rose to the west. Houses, hotels and shops were constructed on land granted and leased from the Government, however, unofficial occupation was the most common form of tenure.

The administration of the Colony quickly moved towards providing the necessary maritime and social infrastructure. The first wharf was in operation by 1792, in the vicinity of present day First Fleet Park. On the western side of George Street was a Hospital and store (Figure 4). To the north Government dockyards were in operation from 1797 and facilities included workshops, storehouse, boat sheds, sawyers sheds, saw pits, a watch house and a room for the clerk (NSW Heritage Division, 2014). In 1816 the coxswain’s barracks, now known as Cadman’s Cottage was completed at the northern end of the yards (Figure 5 no.26). Between 1818 and 1822 improvements to the dockyard led to the construction of four repairing docks (Figure 5, no.29). The northern-most of these is thought to be located under the eastern end of Argyle Street and Barney and Bligh Reserve, located in the space between Argyle Street and Cadman’s Cottage (NSW Heritage Division, 2014). From the 1830s the dockyards began to contract to the south. A map of the area, purported to show Sydney between 1810 and 1820, although not completed until the 1860s, indicates that the vicinity of the present day OPT was occupied by Captain Piper, whose property contained a building near the George Street frontage with a rocky foreshore and possible wharf. Moving north were Campbell’s house, stables and wharf (Figure 5).

Construction of Circular Quay between 1854 and 1855 saw the Macquarie era docks in-filled and the land reclaimed. Between 1859 and 1863 Argyle Street was extended out over the reclaimed land. The extension of Argyle Street cut the Colonial Storekeepers building off from the dockyards and these were demolished, with new stores being built to the south of Argyle Street (NSW Heritage Division, 2014). The original foreshore remained evident in front of Cadman’s Cottage until 1870-75, when the area was filled and raised. A plan by Henry Percy Dove, completed sometime between 1870 and 1890, indicates the extent of the land in front of Cadman’s Cottage and the Sailor’s Home.

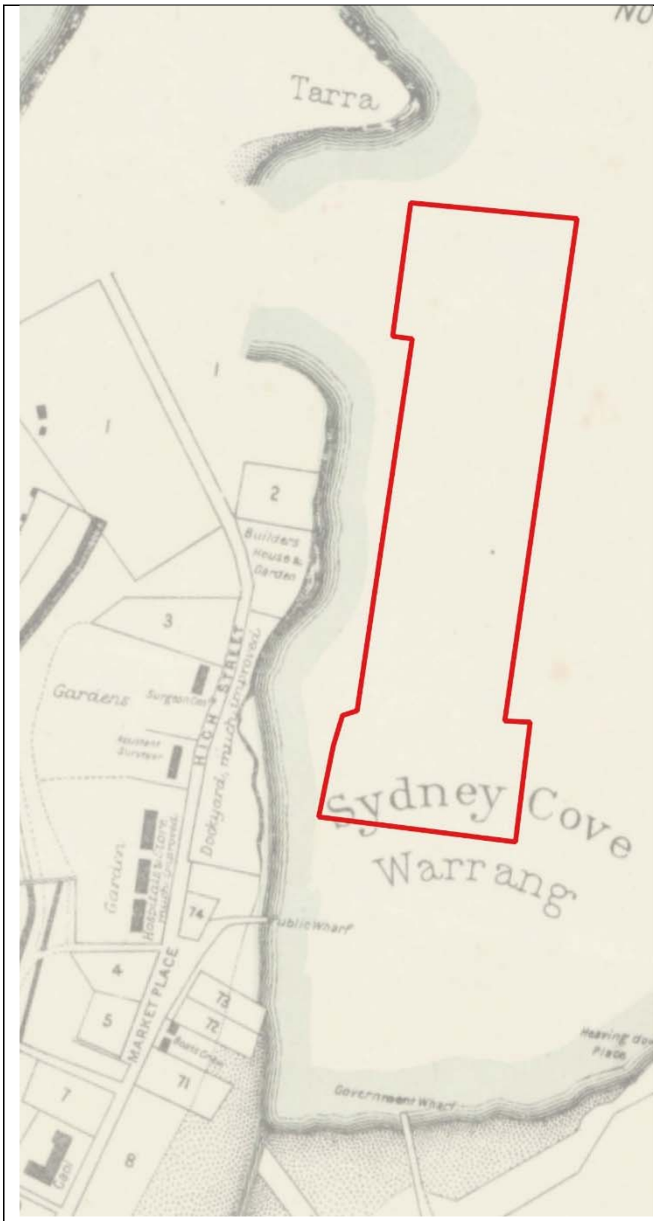


Figure 4: 1807 map excerpt of the OPT area and proposed extension. (Source: James Meehan, 1807, Plan of the town of Sydney in New South Wales, National Library of Australia, MAP F 106B. Project area in red

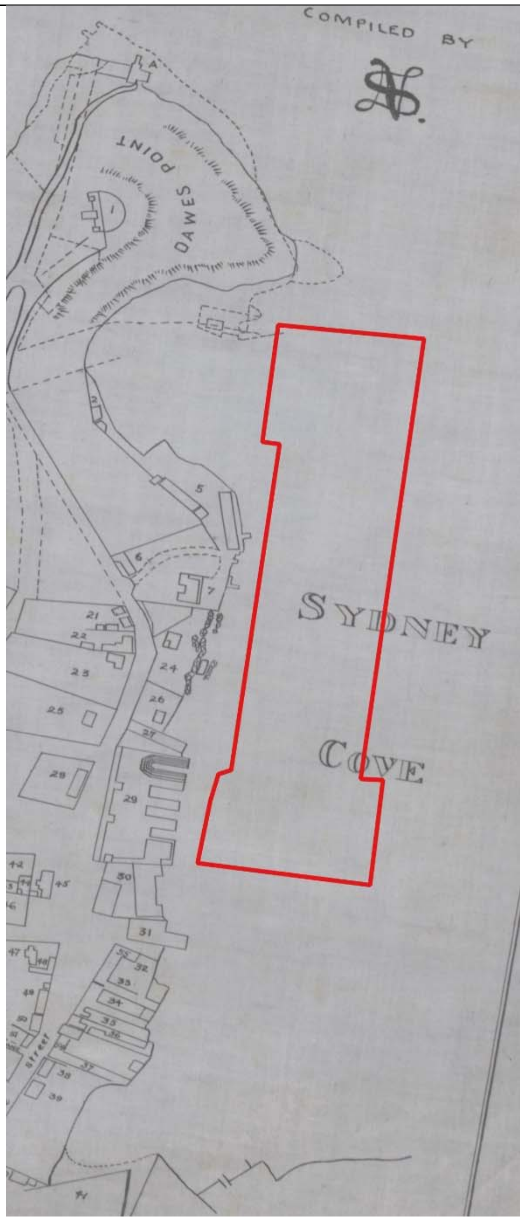


Figure 5: Sydney from 1810 to 1820: shewing buildings erected by Governor Macquarie, National Library of Australia, MAP F 309. Project area in red

5.2 Later Developments

Following a purported outbreak of bubonic plague in 1900, large areas of The Rocks were resumed by the Government (Figure 6). Large areas were demolished and a process of redesign was undertaken that saw the realignment of some streets and the construction of terrace housing and flats in some areas. Redevelopment was slow and it was not until just before the First World War and into the 1920s that progress was made. The construction of the Sydney Harbour Bridge caused further demolitions and divided The Rocks from Millers Point. Similarly, the construction of the Cahill Expressway in the 1950s cut The Rocks off from the centre of Sydney and gave rise to further demolition.

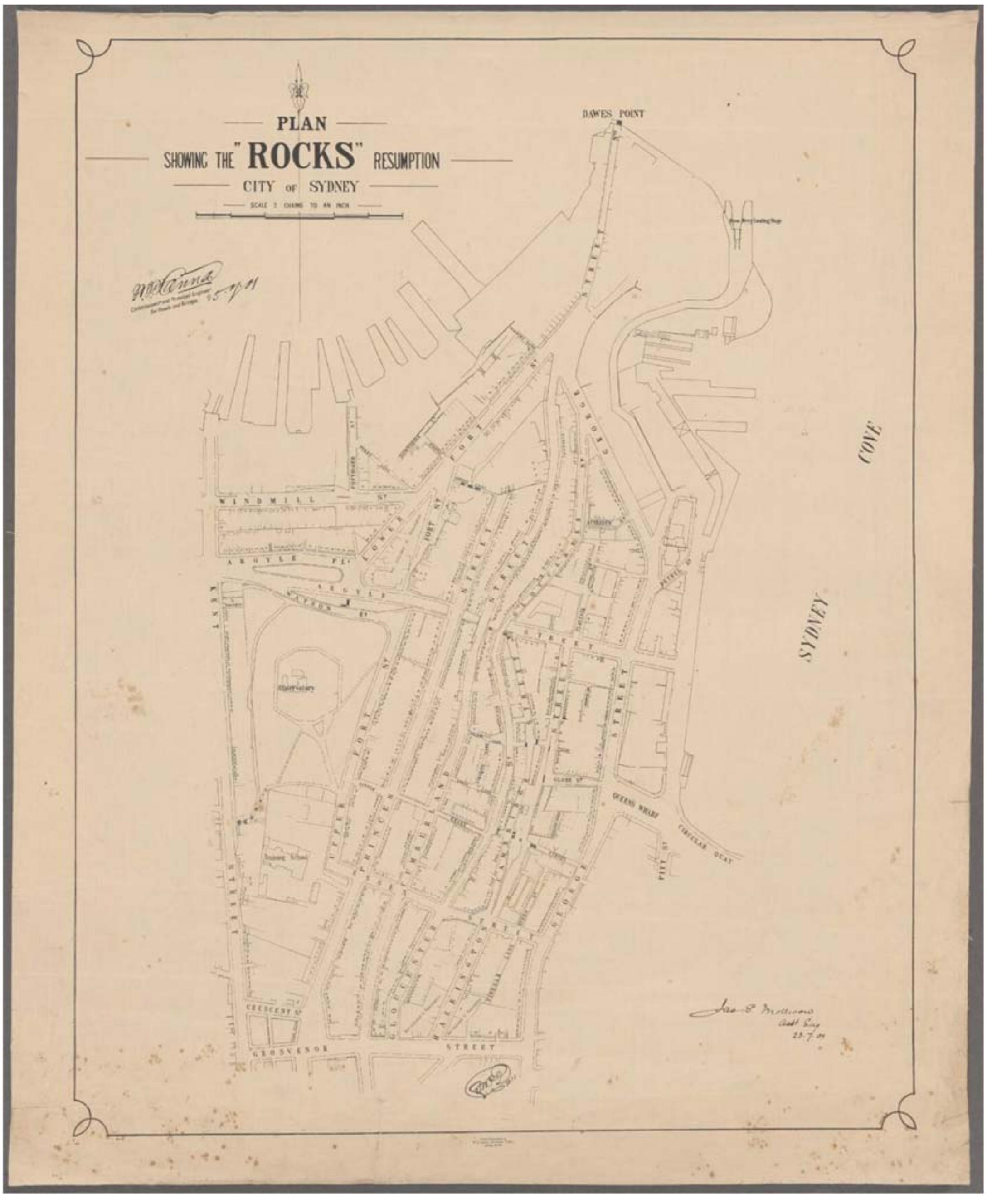


Figure 6: Plan of the Rocks showing the resumption of land by the City of Sydney. (Source: Source: City of Sydney, 1901, Plan Showing The "Rocks" Resumption, State Records NSW, Darling Harbour Resumption Maps, 1900-1902)

In tandem with the development of the Opera House site, the Sydney Cove Redevelopment Authority was established in 1968. The purpose of the Authority was to redevelop and manage The Rocks. What little land remained in private ownership was bought and today the only property not owned by the Authority is St Patricks Church (Sydney Harbour Foreshore Authority, 2010).

In 1971 the Authority released its plan for the area, which involved high-rise development across The Rocks. The only historic buildings to be spared were Cadman's Cottage, St Patricks Church, Science House, Argyle Bond Store, the Australian Steam Navigation Company and Campbell's Storehouse. The facades of some other buildings were slated to be retained. The public were horrified at the proposed redevelopment, but their concerns were not addressed by the Government. Instead, local residents asked the building unions to impose a ban on construction, known as a 'green ban'. The green bans effectively halted the redevelopment. In the intermediary, the Authority began to refurbish some of the buildings and began to form a shopping precinct along George Street, which started to attract locals and tourists alike (Sydney Harbour Foreshore Authority, 2010).

The introduction of the *NSW Heritage Act in 1977* provided a statutory means of protecting the heritage significance of The Rocks. From the late 1980s the Authority was known as the Sydney Cove Authority, changing its name again in 1999, when it became the Sydney Harbour Foreshore Authority (SHFA). In the same year planning power for The Rocks was vested in the NSW Minister for Planning.

5.3 Overseas Passenger Terminal and Wharf

Following the Second World War, passenger movements increased from 20,000-30,000 per year to 160,000 in 1962. The increase in arrivals and departures was a result of increased immigration, tourism and short cruises. Ships were increasing in size and there were increasing needs for customs clearance and visitor facilities. The Maritime Services Board had created stop-gap measures at Pyrmont in the early 1950s, followed by Woolloomooloo from 1956. During this time the Board was investigating more permanent measures.

Sydney Cove was selected for a passenger terminal "due to its proximity to public transport; its situation in a bustling commercial centre surrounded by stately buildings and with a rich local history" (Sydney Ports Corporation, 2014). The Board was spurred into action by P&O Orient's announcement that they were to construct two super liners for the Australian route – Oriana and Canberra.

Construction of the OPT began in 1958 with the demolition of wharves and sheds (Figure 7, Figure 8 & Figure 9) on the site that had been constructed between 1900 and 1903 for use by the shipping firm Norddeutscher Lloyd (Weber Lehmann & Co.) (Conybeare Morrison International, 2005). Figure 11 shows the sheds as they existed prior to demolition, the caption for which indicates the sheds may also have been used by the E&A (England and Australia Company) and was known as Berth No. 5. The sheds were constructed on the wharf and it would appear from later images (Figure 12), that the northern-most of these sheds was retained during the construction of the OPT, but was demolished by approximately 1965 (Figure 12). The area was converted from wharf to reclaimed land in 1969 (Sydney Harbour Foreshore Authority, 2012). During the preparation works for the OPT, evidence of this earlier wharfage was uncovered and photographed (Figure 13).

The wharf for the OPT was built from 14 reinforced concrete caissons (Figure 14), which created a 720 foot long seawall (220 m). Following the construction of the seawall, the space behind was backfilled to reclaim the area. Each of the caissons was 50 feet long and surmounted by reinforced concrete seven feet high. At the northern end, steel sheet piling was used to join the new seawall to the old adjacent wharf.

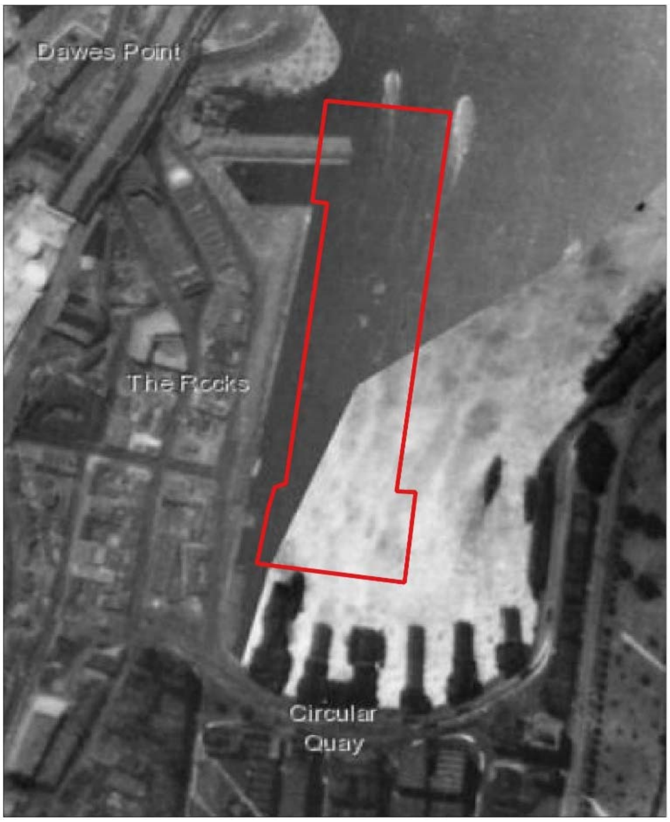


Figure 7: 1933 Aerial Photograph showing the configuration of the OPT and Wharf No.7. Project Area shown in red.

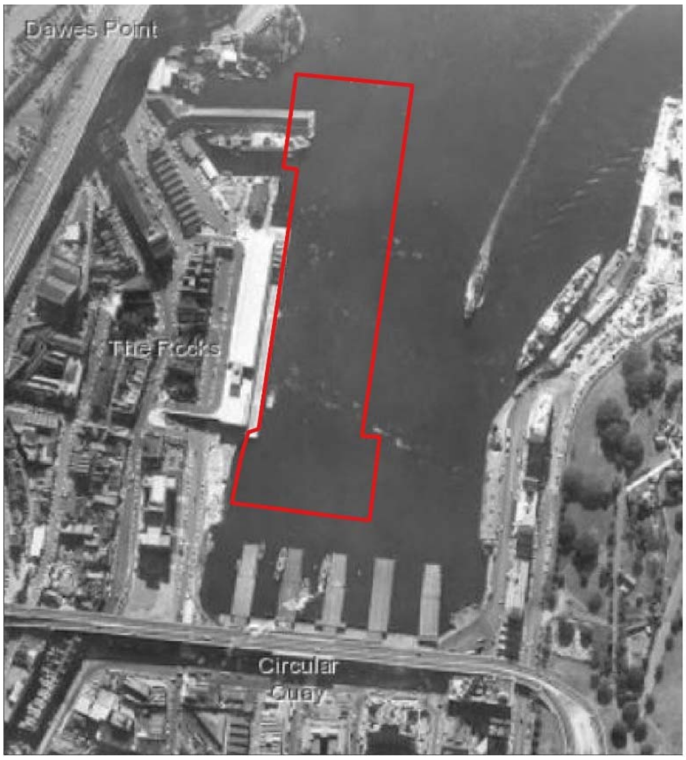


Figure 8: 1960s aerial photograph showing the configuration of the OPT after the expansion works and Wharf No.7.

Figure 9: 1980 aerial photograph showing what appears to be the demolition of Wharf No.7. Project Area shown in red.

Figure 10: E&A Berth No. 5, Circular Quay, 1919. (Source: Government Printing Office, 1919, Mitchell Library, NSW, 1-25041)

Figure 11: View of northern end of the wharf and OPT in 1961 with P&O Liner Oriana. The last of the previous warehouses can be seen in the foreground. (Source: Wolfgang Sievers, 1961, National Library of Australia, 791186)

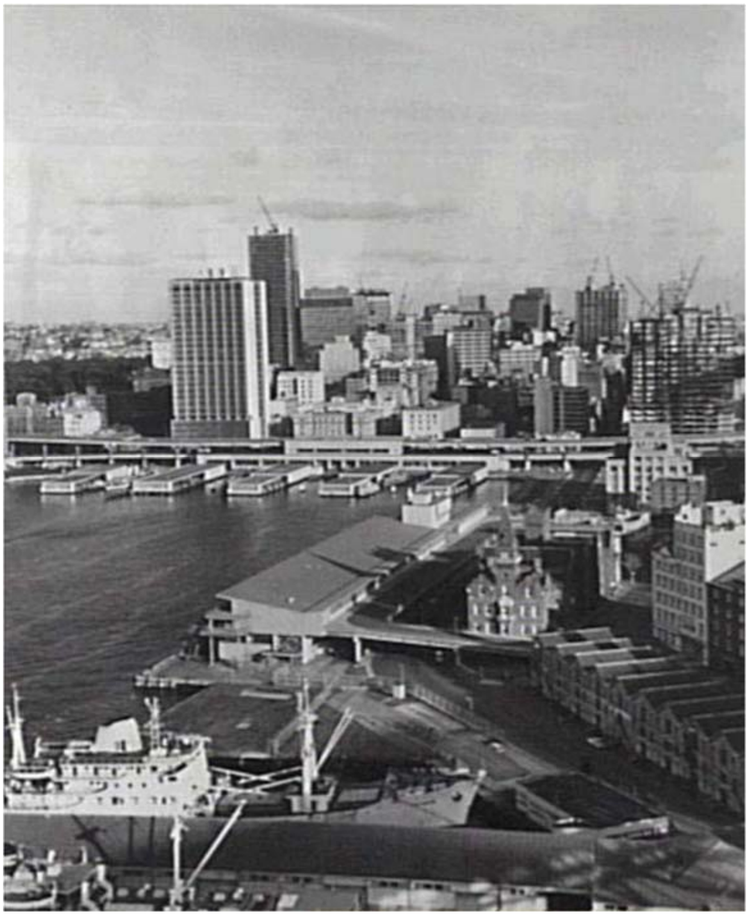


Figure 12: View of northern end of the wharf and OPT in about 1965. Note the warehouse has been removed and the shed present on Wharf No. 7 in the foreground. (Source: Anon., c. 1965, City of Sydney Archives, SRC4534)

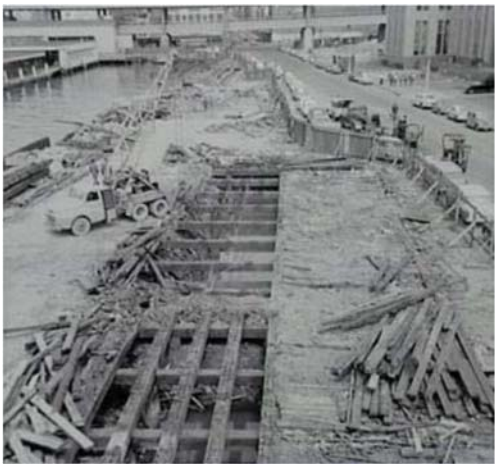


Figure 13: Earlier wharves uncovered during construction of the Overseas Passenger Terminal. (Source: Anon., 1960, City of Sydney Archives, NSCA CRS 48/1201)

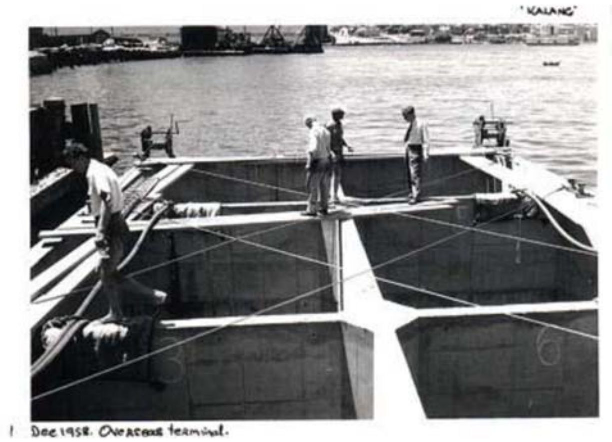


Figure 14: Detail of caissons during construction. (Graeme Andrews, 1985, 'Working Harbour' Collection, City of Sydney Archives, 80327)

The original Terminal building allowed a 40 foot (12 m) apron to the Cove and was 625 by 111 feet (190.5 by 34 m). The ground floor was dedicated to cargo, while the first floor contained customs and passenger facilities (Sydney Ports Corporation, 2014).

The Terminal was officially opened on 20 December 1960 by the Honourable J.B. Renshaw, MLA Deputy Premier, Treasurer and Minister for Lands. Ten days later the Oriana arrived on her maiden voyage. The Section 170 Register listing states:

> *"Over the next two decades the terminal was the arrival point of many newcomers to Australia and as such played an important role in the history of Australia of which the contribution of migrants to Australian life is a large part."*

(Sydney Ports Corporation, 2014)

The advent of cheaper air travel in the 1980s, however, saw a decline in passenger numbers. By 1983 it was suggested that nearly a third of the terminal was no longer required. Between 1985 and 1987 Lawrence Nield and Partners worked on a redevelopment for the Terminal, which included the insertion of restaurants and cafes and the construction of the tower structure in the north eastern corner of the OPT. The Nield and Partners redevelopment was recognised by the Royal Australian Institute of Architects with a merit award in the Public and Commercial Buildings category for 1988 (Conybeare Morrison International, 2005). Lawrence Nield described his approach to the building thus:

> *"When precast panels were stripped away, that the great portals and the floating butterfly roof could become essential elements in the architectural language of the terminal. From these were developed 'figures' such as the glass butterfly roof, porte cocheres which became easily part of family of forms with the main butterfly roof. The use, reuse and adaptation of the portals made a major supporting figure. Similarly a tower was appropriate at the northern end of the building, both as an urban pivot and a reference to nearby towers at the Australian Steam Navigation building and the Mining Museum. This urban figure developed dialogue with the new lift tower at the southern end of the building.*

(Conybeare Morrison International, 2005)

On completion in 1960, the northern termination of the wharf was L-shaped and contained the remnant earlier warehouse until around 1965 (see Figure 11). Following the removal of the warehouse, the space was used as a car park. The configuration of the wharf remained unchanged until the mid-1980s. In association with the construction of Nield and Partners northern tower, the wharf was reconfigured to reflect the shape of the tower and to provide a mooring point. During the revitalisation of Campbells Cove, the wharf frontage was reshaped into its current configuration. As part of this, the finger wharf that had been in existence in Campbells Cove since the 1890s, was diminished to its current stature.

Further redevelopment of the OPT was undertaken in the lead up to the 2000 Olympics in order to provide enhanced public access. This included the insertion of three new restaurants, new lifts, improved foreshore access, public viewing decks on the top two levels and the restoration of Arthur Murch's mural (Conybeare Morrison International, 2005). There were no modifications to the wharf as part of this upgrade.

5.4 Campbells Cove

Campbells Cove was initially granted to millwright John Baughan in 1794. Baughan died in 1797 and the property was sold to Robert Campbell. Campbell came to Sydney in 1798 as a representative of Campbell, Clark and Company, to finalise affairs surrounding the loss of the speculative cargo ship Sydney Cove, which had been lost in Bass Strait in 1796.

Campbell purchased the property during this trip. Campbell returned to India, where he had been based, before settling in Sydney in 1800 (Conybeare Morrison International, 2005). Following his return to Sydney, he began constructing warehousing and a wharf in what is now known as Campbells Cove. He had a minor setback due to his support of Governor Bligh, but was restored to his property and position following the arrival of Governor Macquarie (Conybeare Morrison International, 2005).

Over the next several decades Campbell and his sons continued to develop the warehousing and wharfage facilities. The family operated business struck financial difficulties in the mid-1830s, narrowly holding on to the property. In 1841 Campbell applied to the Colonial Secretary to enlarge the wharf so ships could unload at low tide. The application was granted. A large rock which was too large to be removed was incorporated into the wharf as a foundation. In 1843 the property was mortgaged to The Australian Trust Company for £10,000. It is unknown if this was a sign of further financial difficulties or the mobilisation of capital to further improve the facilities. Campbell died in 1845, leaving his property divided between six heirs.

By 1845 Campbell's Wharf contained a house, stores, warehouse and wharf, and at the northern end there were three stores plus an office and store. There was also a cottage for the overseer and an empty timber woolshed. In 1858 there were another five warehouses of stone and slate roofs and soon afterwards the construction of additional warehouse bays commenced with a total of 11 bays by 1861. The warehousing was leased to a range of tenants (Figure 15) (Conybeare Morrison International, 2005).

Figure 15: Campbells Cove and Circular Quay, Sydney from Dawes Point ca.1870. (Source: State Library of NSW SPF / 786)

There appears to have been a disagreement between Campbell's heirs and the later holders of the mortgage, as the matter was taken to the Supreme Court in 1877, where they were successful. At that time negotiations were already underway with the Australasian Steam Navigation Company (ASN Company), who were looking for new wharfage, having outgrown their Sussex Street premises. The sale had been completed by 1876 and the ASN Company then applied to the Minister of Lands for permission to erect piled jetties in the harbour.

Approval was granted on 1 May 1876. The works included a 320 foot wharf built along the foreshore and two jetties, one of 250 feet and the other of 350 feet in length (see Figure 18). Turpentine was used for the timbers subject to the water, with ironbark and other hardwoods for braces, beams and planking (Conybeare Morrison International, 2005).

In 1878 the sandstone warehousing, formerly known as Campbell's Bonded Stores, became The Metcalfe Bond and Free Stores. Between 1882 and 1887 the third storey was added. In 1879 the southern part of the wharf was leased to the Peninsular and Oriental Steam Navigation Company. From 1880 sections of the land were sold off around the periphery, particularly that facing George Street. Despite this, the ASN Company found themselves in financial difficulty. The Company amalgamated with the Queensland Steam Navigation Company in 1886 to become the Australasian United Steam Ship Company. The Company offered the Colonial Government the wharf for £300,000. The Government made a counteroffer of £275,000 in 1887, which was accepted. Formal conveyance occurred on 28 October 1887 (Conybeare Morrison International, 2005). In the mid-1890s the Government undertook wharfage improvements, as shown in Figure 16.

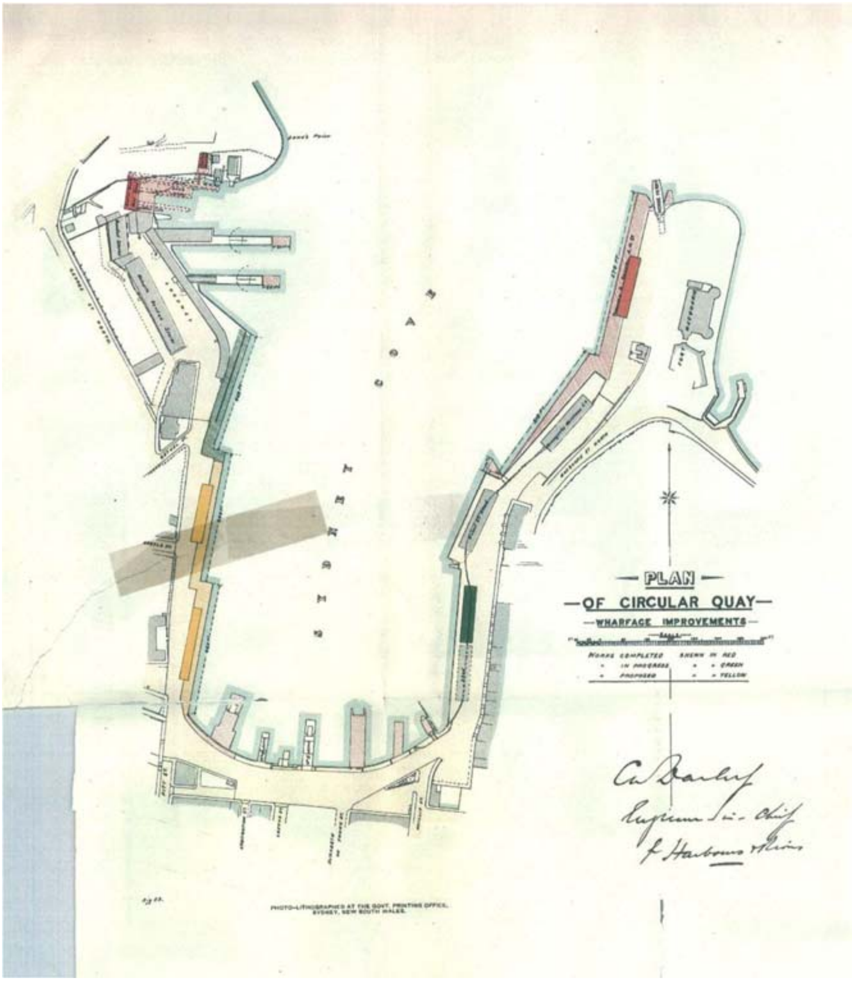


Figure 16: Plan of wharfage improvements in Circular Quay showing the works completed (red), in progress (green) and proposed (yellow). (Source: Government Printing Office, 1893-1894, Plan of Circular Quay Wharfage Improvements)

The Government renounced the Peninsular and Oriental Steam Navigation Company's lease, giving it instead to Blackwall and Company. In 1901 the Sydney Harbour Trust took over management of the site and contracted Norddeutscher Lloyd to build a 1,000 by 40 foot wharf along the western side of Sydney Cove (where the current OPT wharf is located), which was located on the site of the future OPT (Conybeare Morrison International, 2005). The works also included the removal of the two 1876 jetties and the erection of a single, central wharf (Figure 17). The new wharf was known as Wharf No. 7 and was predominately used for commercial shipping. There was a decline in international commerce from the 1930s onwards, with commercial use of the area ceasing with the construction of the OPT in 1960 (Conybeare Morrison International, 2005). Around this time the wharf was taken over by the Maritime Services Board and used to station various work vessels that operated in Sydney Harbour (Figure 18 to Figure 22).

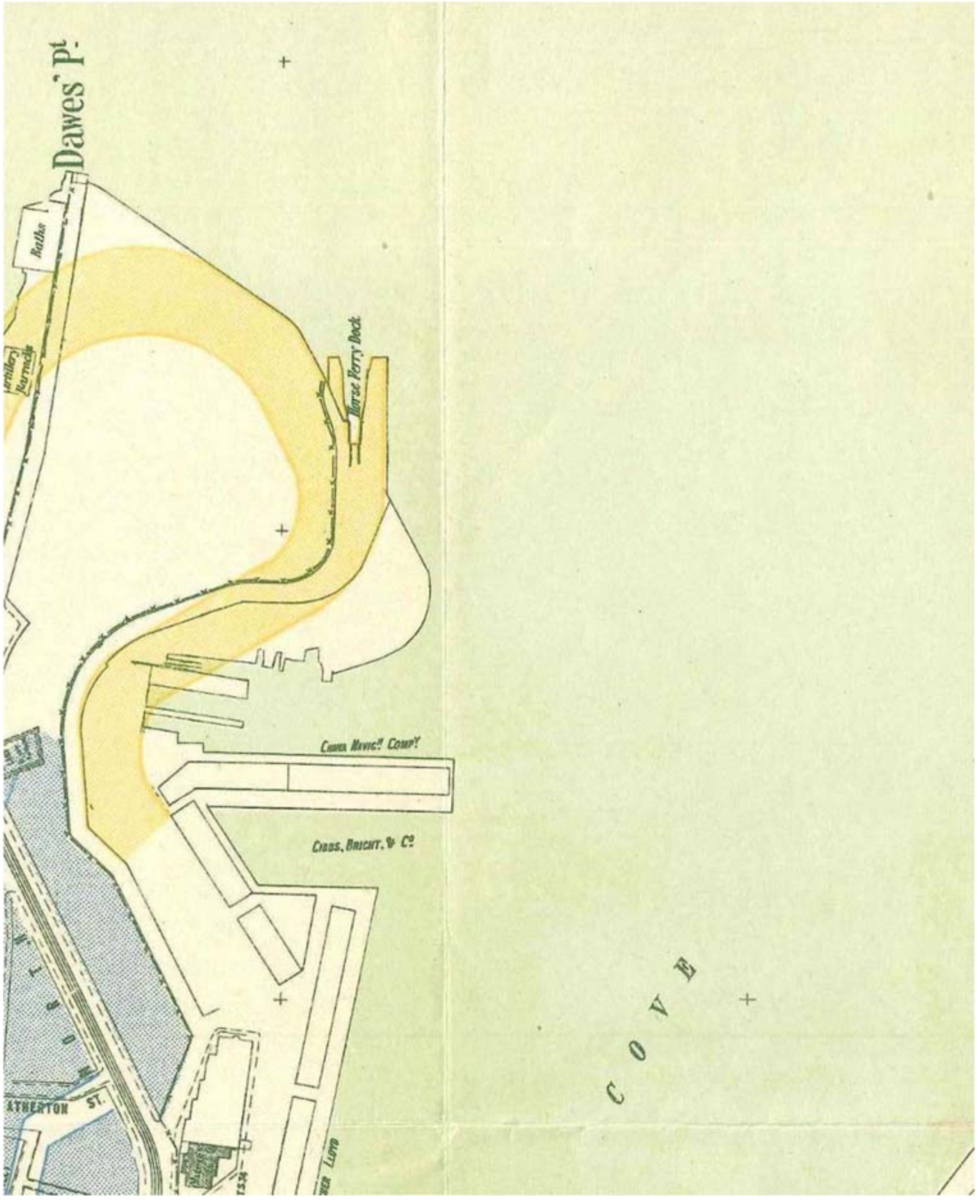


Figure 17: 1909 Royal Commission on Sydney Improvements Plan Showing the Extension of George Street to Dawes Point (Plan No.35). Note: this plan shows the newly constructed Campbells Cove Wharf (7a and 7b). (New South Wales Parliamentary Papers, 1909, Interim Report of the Royal Commission for the Improvement of the City of Sydney and its Suburbs, Vol. 5:383, Plan No. 35, available http://www.photosau.com.au/cosmaps/scripts/displayIndex.asp?Index=RC19)

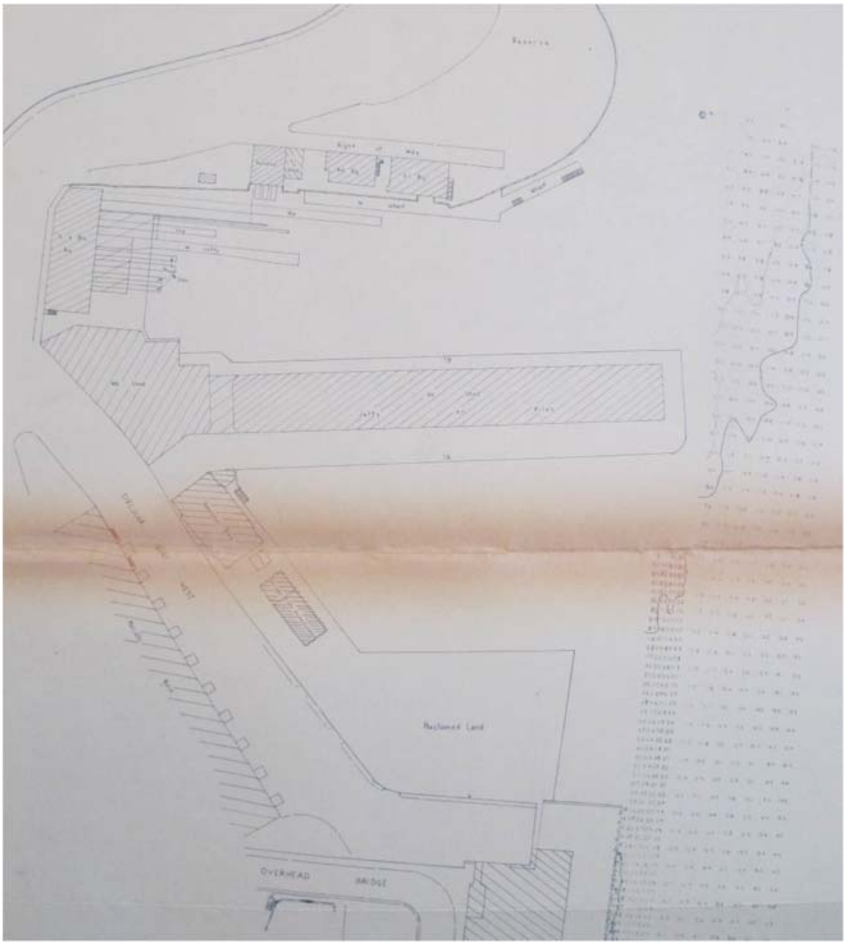


Figure 18: 1980 plan of Campbells Cove showing Wharf No. 7, approximately 110 m long and 28 m wide. (Source: The Maritime Services Board of New South Wales 1980 Hydrographic Survey at Overseas Terminal Sydney Cove, Cosmos Archaeology, NSW)

Figure 19: Photograph taken of Patriarch at Campbells Wharf, Sydney Cove, ca.1930s. (Source: Cyril Hume, c. 1930, PATRIARCH at Campbells Wharf Sydney Cove, Cyril Hume Sailing Ship Collection, Sydney Heritage Fleet)

Figure 20: Sydney Cove, Wharf No. 7 area showing the 1901-1980 wharf in 1979. (Source: Graeme Andrews 'Working Harbour' Collection: 80403 GKA in the City of Sydney Image Library)

Figure 21: 1935 photograph of Campbells Cove showing Wharf No. 7. (Source: E.W. Searle collection of photographs at National Library of Australia nla.pic-vn4655456)

Figure 22: Photograph of Campbells Cove in 1979. (Source: Graeme Andrews 'Working Harbour' Collection: 80419 GKA in the City of Sydney Image Library)

6.0 Aboriginal Archaeological Context

6.1 AHIMS Search

The AHIMS database, administered by the NSW Department of Premier and Cabinet, contains records of all Aboriginal objects in accordance with Section 89A of the NPW Act. It also contains information about Aboriginal places, which have been declared by the Minister to have special significance with respect to Aboriginal culture. Previously recorded Aboriginal objects and declared Aboriginal places are known as 'Aboriginal sites'.

A search of the AHIMS database on 4 March 2020 for an approximate 2 x 2 kilometre (km) area centred on the Project area (AHIMS search area) returned 27 site entries (Figure 23). Of these, four sites were listed as 'destroyed' and a further two listed as 'Not a Site' (being registrations which on further investigation have proven not to be of Aboriginal origin). Of the remaining 21 sites, open artefact sites and areas of Potential Archaeological Deposit (PAD) were equally the most common, both representing 42.5% (n=9) respectively, for the total AHIMS search area. Other, comparatively poorly represented types include one Ancestral Burial/Aboriginal Ceremony and Dreaming site, one rock art site and one midden containing shell material. No registered Aboriginal sites are located within the Project area, though it is noted that AHIMS sites are typically only located on terrestrial environs. The closest registered site however, is 'Harrington IFS01' (AHIMS #45-6-3762), located approximately 280 m south west of the Project area. The prevalence of open artefact sites attests to the practical nature of Aboriginal occupation within the AHIMS search area. It is noted that a number of these sites (n=4) are located on the northern foreshore area of Sydney, near Balls Head. Areas of PAD, meanwhile, suggest the limited intrusive investigations of Aboriginal heritage within the Central Business District (CBD) area of Sydney, likely owing to access limitations. Summary details of the sites, the location of which is shown on Figure 23 (in addition to other sites in the search area), are provided in Table 3.

Table 3 AHIMS Search Results

Site type	AHIMS feature(s)	n	%
Midden	Artefact/s, Shell material	1	5%
Art	Art (Pigment or Engraved)	1	5%
Burial	Ancestral Burial; Aboriginal Ceremony and Dreaming; Artefact/s	1	5%
Open Artefact Site	Artefact/s	9	42.5%
PAD	Potential Archaeological Deposit	9	42.5%
Total	-	**21**	**100%**

Figure 23: AHIMS Search Results

6.2 Native Title

A search of the National Native Title Register (NNTR) and Register of Native Title Claims (RNTC) administered by the National Native Title Tribunal (NNTT) was undertaken for the City of Sydney Council LGA, inclusive of land within and surrounding the Assignment Area. No current Native Title listings or claims were identified within the City of Sydney LGA.

6.3 Aboriginal Archaeological Context

Available archaeological data indicate that Aboriginal people have occupied the Sydney region[5] for at least 36,000 years (Jo McDonald CHM 2005b). Late Pleistocene/early Holocene occupation of the Greater Sydney region is evidenced by radiometric dates from both coastal and hinterland sites (Val Attenbrow, 2010) (Table 3.1). The Project area is located within the traditional lands of the Cadigal Aboriginal people, a member of the Eora language group (Horton, 1994), who referred to Sydney Cove as 'Warrane' (Sydney Harbour Foreshore Authority, 2014). There has been debate regarding the use of the name Eora as a separate language group, with its use only introduced in later sources and not contained in the earliest ethnographic recordings. This suggests that the Eora area was either part of the Kuring-Gai area or the Darug area (Val Attenbrow, 2010) based on the available linguistic evidence (Ross, 1988). Some studies have argued that the Darug territory extended to the coastline between Port Jackson and Botany Bay, based on the ethnographic observations of explorers and settlers (J. Kohen, 1985, 1988; J. Kohen & Lampert, 1987). Darug is believed to have been spoken from the Hawkesbury River in the north, to Appin in the south, and from the coast west across the Cumberland Plain into the Blue Mountains. Early sources (Collins, 1798; Dawes, 1790; Hunter, 1793; Tench, 1793) and more recent linguistic research (Troy, 1994) indicate that two distinct dialects of Darug were spoken at the time of European contact, a coastal dialect, spoken on the Sydney peninsula and the country to the north of Port Jackson, and a hinterland dialect, spoken on the Cumberland Plain from Appin in the south to the Hawkesbury River in the north (Val Attenbrow, 2010). This linguistic division is thought to correspond to a broader economic division between 'coastal' and 'hinterland' Darug-speaking peoples, with the accounts of several early observers (V. Attenbrow, 2010; Bradley, 1792; Collins, 1798, 1802; Tench, 1793) suggestive of a 'coastal', marine-oriented subsistence economy and contrasting 'inland' economy focused on the exploitation of land mammals, plant foods and freshwater faunal resources. Some idea of population size for the coastal Darug at contact is provided by (Val Attenbrow, 2010), who suggests that the area around Port Jackson likely supported a minimum population density of 0.75 persons per square kilometre (i.e.1 person/1.3 square kilometre). Attenbrow's estimate is based on Governor Phillip's own estimate of the Aboriginal population of this area, made in 1788. Phillip, reporting to Lord Sydney on 15 May 1788, estimated a total population of not "less than one thousand five hundred" ((Val Attenbrow, 2010)). Attenbrow (2010:17), citing Hunter (1793 [1968]: 62), notes that "population densities for the hinterland (west of Parramatta) were initially assessed by the colonists as being less than those along the coast" but urges interpretive caution given the deleterious effects of the 1789 smallpox epidemic, which "had killed many people living to the west of Rose Hill before Phillip's 1791 expedition crossed the Cumberland Plain to the Hawkesbury-Nepean River". More recently, (James Kohen, 1995) has estimated a minimum overall density of around 0.5 persons per square kilometre for the hinterland zone. Individual band sizes notwithstanding, much larger groups of Aboriginal people, numbering in the hundreds, are known to have come together for events such as corroborees, ritual combats and feasts (V. Attenbrow, 2010; J. Kohen et al., 1999).

Available historical records indicate that a wide range of marine and freshwater fauna were exploited by Darug-speaking peoples for food and other resources (See (Val Attenbrow, 2010). Along the coast, an emphasis on the exploitation of marine resources, principally fish and shellfish, is attested in the writings of several early observers (e.g., (V. Attenbrow, 2010; Bradley, 1792; Collins, 1798, 1802; Tench, 1793)). Compared with their faunal counterparts, the plant food resources of coastal Darug-speaking peoples are poorly represented in the writings of early colonial observers. Nonetheless, available descriptions do suggest that plants formed a regular part of the diets of groups in the area (V. Attenbrow, 2010). Along the coast, a "vegetable catalogue" consisting of "a few berries, the yam

[5] Following Attenbrow (2012a), the land bounded by the coast on the east, by the Hawkesbury-Nepean River on the north and west, and by a line running east-west through Picton and Stanwell Park in the south.

and fern root, the flowers of the different Banksia, and at times some honey" is reported by Collins (Collins, 1798)(1798 [1975:462-63]). A wide range of hunting and gathering 'gear' was employed by Darug speaking peoples, with distinctive repertoires for men and women (McDonald, 2008: 24). Men's gear included several different forms of spears (variously barbed), spear throwers, clubs, 'swords', boomerangs, shields and hafted stone hatchets. Women's toolkits, in contrast, included fishing hooks, lines and sinkers, digging sticks and various containers (shell and wood). Net bags made from plaited wood fibre appear to have been used by both men and women (Val Attenbrow, 2010). Bark canoes were also widely used (Val Attenbrow, 2010)).

6.4 Submerged Site Preservation

As stated by Nutley (2006:1), the survival of Aboriginal sites within submerged contexts is a factor of the interplay between the environment and the composition of the physical evidence itself. Likewise, the characteristics of the submerged landform itself (width, depth and slope and the interplay of coastal and riverine hydrology and sediment transportation) are critical to site survival. For the current Project area, consideration of estuarine and coastal systems with backwater environs, mud flats, swamp, mangrove and marshland environments are capable of retaining cultural materials in ever-increasing layers of sedimentation. Nutley (2006) suggests that stone artefacts, quarry sites, and, in some areas, stone fish traps may be preserved in such inundated environments since they are relatively durable cultural material items.

Open artefact sites (comprising flaked or ground lithic objects) for example, that either settle into, or are inundated by anaerobic environments, are likely to avoid the abrasive, chemical and biological attack otherwise endured during gradual inundation, though not all site types provide such clear evidence. Rockshelters, for example, are landscape features that are quite likely to remain in situ, though the mere presence of the latter in underwater environs, as Nutley suggests, cannot provide a reliable indication of actual habitation by Aboriginal peoples, and further investigation is required to determine the presence or absence of archaeological deposit.

In the Greater Sydney context, this is best demonstrated by the Aboriginal resource and gathering site registered as AHIMS #45-6-0751, identified during the construction of the Alexandra Canal in the 1890s. Located in Alexandria approximately 7 km south of the current Project area, both Aboriginal edge ground stone hatchets and dugong (*Dugong dugon*) skeletal remains were identified, the latter showing indications of butchering. The investigation documented a 5 m deep sedimentary sequence comprising alternating layers of estuarine sands, shelly sands and peat containing terrestrial plant remains including in situ roots and stumps, suggesting that the site alternated between sub-aerial exposure and submergence throughout the Holocene (Figure 24). Conventional radiocarbon (C14) dating from a sample of the dugong bones produced an age of 5,520 ± 70 years B.P. The investigation concluded that the discovery of the terrestrial plant remains at the depth of 4.5 m below the high-water level represented a clear demonstration of climactic and environmental change during this time and evidence of past Aboriginal peoples' activity in the area.

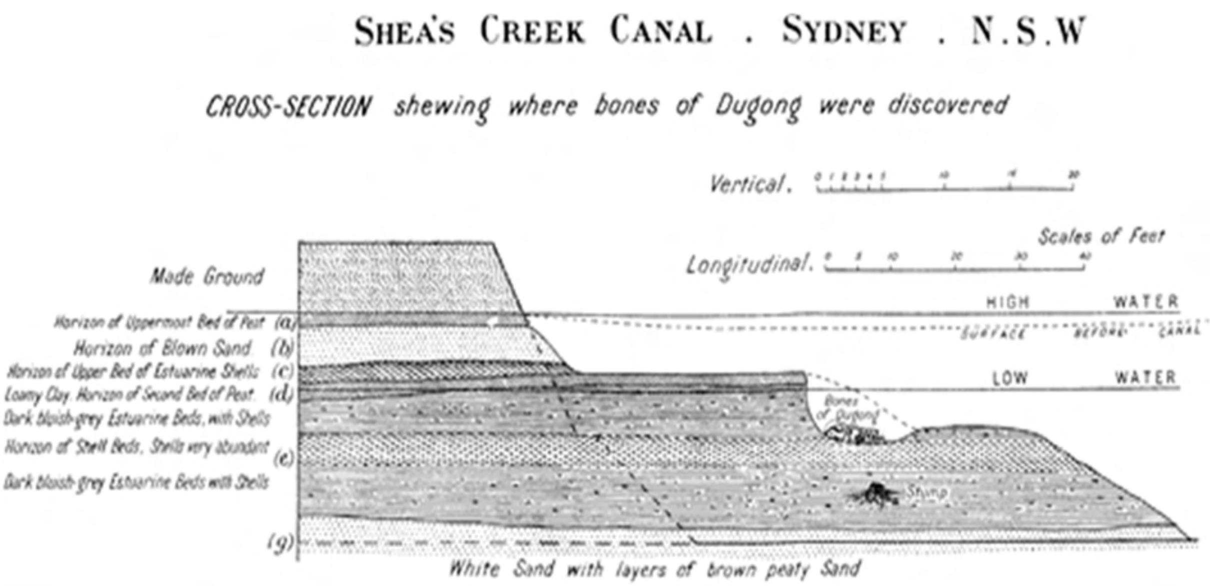


Figure 24: Sedimentary cross-section showing location and depth of dugong (from Etheridge, 1905)

The Alexandria site provides an indicative example of terrestrial submergence in low-energy environments, sufficient to preserve site evidence in situ. In a high dynamically-active coastal or riverine environment however, there is a strong likelihood that even robust items will eventually succumb to those forces. As Nutley (2006) suggests, in such an environment, even stone tools may become waterworn to the point where they are no longer recognisable as such.

As demonstrated above, environmental factors and artefactual composition interact to determine archaeological site survival and highlights the need for a multidisciplinary approach to investigations. In the context of the current Project however, a review of the environmental factors outlined in Section 5 is pertinent to developing a predictive model of site survival in former estuarine and tidal delta environs. Using the AHIMS search results data provided in Section 6.1 as a basis, Table 3 below provides a summary of common site types that would be anticipated in the Project environs, with the preservation potential rated against the interpreted pre-inundation environs.

Table 4 Preservation Potential by Site Type (following Nutley 2006)

Site type	Description	Preservation Potential	Likelihood
Open Artefact Sites	Objects susceptible to abrasion and translocation during slow and highly dynamic inundation but likely to survive rapid, low-energy inundation. Artefact scatter sites likely to be dispersed rather than being identified in situ.	Moderate	Moderate to High
Culturally-modified trees	Unlikely to survive in marine conditions.	Low	Low
Shell middens:	Only likely to survive rapid, low-energy inundation unless deeply buried in consolidated sediments or peat prior to inundation. Likely to be found in a dispersed condition and may be difficult to differentiate from natural shell beds.	Low to Moderate	Moderate
Fish traps	Only fish traps constructed from stone would survive inundation, more likely to survive relatively intact in low-energy environs, e.g. estuarine.	Low to Moderate	Low

Site type	Description	Preservation Potential	Likelihood
Rockshelters	Moderately resistant to inundation, particularly in low-energy environs. Cultural deposit within the shelter would survive only in instances of deep stratigraphy or protection by fallen boulders in front of shelter.	Moderate	Moderate
Rock art sites	Engravings are unlikely to survive on soft sandstone where dynamic environs may result in rapid erosion. Sandstone that absorbs red ochre may retain that stain but may equally be susceptible to absorbing additional masking colouration from waterborne minerals	Low	Low

7.0 Site Inspection

Cosmos Archaeology undertook a site inspection for this current project on 29 January, 2020. The inspection was undertaken by a commercial dive team from Professional Diving Services under the direction of a Maritime Archaeologist from Cosmos Archaeology.

7.1 Weather and Tide Conditions

Diving in Sydney Harbour near Circular Quay is not heavily affected by changes in tide however, previous rainfall carrying silt from land can severely dampen visibility. Fortunately, minimal rainfall had occurred three days prior to the inspection and none had fallen on the diving day. The weather conditions that were taken into consideration in the approach to undertaking the inspection are outlined in Table 5 and Table 6.

Table 5 Tides for the survey day[6]

29-Jan-2020	Time	0538	1159	1827
	Height (m LAT)	0.6	1.7	0.45

Table 6 Rain and wind conditions for the three days prior and for the day of the inspection[7]

Date	Rain (mm)	Wind 09:00 (km/h)	Wind 15:00 (km/h)
26-Jan-2020	0.2	7 E	6 ENE
27-Jan-2020	0.0	54 S	17 ESE
28-Jan-2020	0.0	44 S	6 W
29-Jan-2020	0.0	17 S	17 SSE

7.2 Conduct of Survey

The survey was conducted by a commercial diver/maritime archaeologist under the direction of the maritime archaeologist. The inspection originally consisted of four transects in the area to the north of the OPT and two circular searches to the east of the terminal wharf. However, VTS restrictions, imposed on the day due to operational reasons, did not allow the completion of either of the originally proposed and approved circular searches or the 40 m eastern transect.

The surveys were conducted using Surface Supplied Breathing Apparatus (SSBA), with helmet mounted video and video lights. The diver also carried a hand-held Sony RX100-IV camera with video lights for taking still images. The diver was in communication with the boat and this allowed the maritime archaeologist to instruct the diver and receive observations of the seabed and any finds in real time. The diver carried a 100 m transect line marked at 5 m increments and a 1.3 m fibreglass probe marked in 0.1 m increments.

For Transect 1 South, the boat was moored to the southern side of the mooring dolphin. A shot line was dropped next to the dolphin as an attachment point for the transect line. The diver ran the transect line out 40 m to the south. Following the line back towards the north, the diver took video footage of one side of the transect and then on the way back filmed the other side, thereby getting good coverage either side of the transect line. Once back at the starting point, the diver wound in the transect line, stopping to probe either side of the line at every 5 m marker.

[6] Bureau of Meteorology, Australian Government, 2020, Sydney tide table predictions, http://www.bom.gov.au/ntc/IDO59001/IDO59001_2020_NSW_TP007.pdf, accessed 29 January 2020.

[7] Bureau of Meteorology, Australian Government, 2020, 'Latest weather observations for Sydney Harbour', available http://www.bom.gov.au/climate/dwo/202001/pdf/IDCJDW2124.202001.pdf, accessed 29 January 2020.

For Transect 2 North, Transect 3 South and Transect 5 West, a shot line was dropped at 33.856389° 151.210556° and the diver ran the transect line out on the cardinal points to 40 m, 40 m and 20 m respectively. As VTS had restricted diving to the east of the central position it was decided to run a 20 m transect to the North-east (Figure 25).

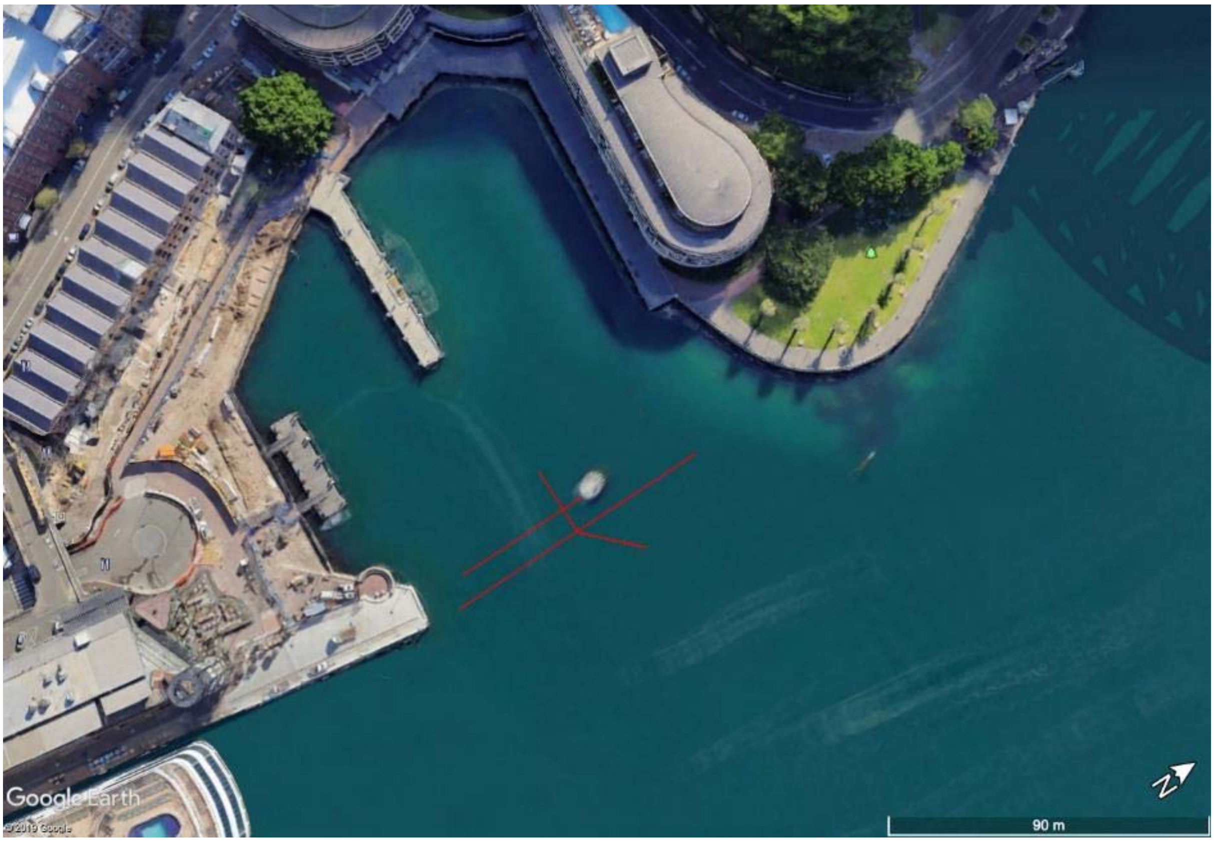


Figure 25: Transects run as part of the maritime archaeology survey at OPT. (Base image Google Earth)

7.2.1 Survey bias and accuracy

The following factors had an influence on the bias and accuracy of the survey.

Water visibility

The water visibility ranged from 0.2 m to 2 m which decreased as sediment was disturbed. On certain occasions during the inspection dive, the visibility dropped to 0 m due to current and direction of the dive. The water clarity had an effect on the width of the inspection corridor, which was on average, 2 m wide on either side of the baseline.

Sea bed visibility

For the majority of the survey area, the sea bed consisted of sand and silt with a covering of a shell grit and stands of kelp which reduced ground visibility dramatically. It is possible that smaller artefacts may have been overlooked.

Concretion and growth

The heavy covering of growth on many of the objects located during the survey, impeded the interpretation of the object. In particular, it was difficult to determine if there was copper sheathing on some of the recorded timber piles.

7.3 Survey results

The seabed throughout the Project area was generally sandy with a light covering of silt and shell grit. Varying densities of kelp were spread throughout the Project area. Visibility ranged mostly between 0.2 m through to 2 m throughout the diving surveys, although this was reduced depending upon the current and the direction of the dive. The depths of all the dives were under 15 m, with the surveys ranging between 7 m and 13 m.

Transect 1 S		
Date: 29 January, 2020	*Method: SSBA*	*Tide: Flooding*
Distance and direction: 40 m south	*Diver: Callum Harvey*	
Time start (min): 0927	*Time end (min): 0941*	*Total time (min): 14*
Depth: 7.2 - 11.1 m	*Water visibility: 0.5 – 2 m*	*Seabed visibility: Good*

The diver set the transect line, running 40 m to the south from the southern side of the dolphin. The depth on the southern side of the dolphin was 7.2 m while the depth at the southern end was 11.1 m. The seabed was sandy with scattered stands of kelp, lightly covered in silt with a heavy shell grit towards the southern end which became lighter as the diver moved north.

To the west of the transect at the 1 m mark a glass tube was recorded. The tube stood proud of the seabed 0.8 m with a diameter of 0.1 m. The tube was easily removed from the seabed and was hollow (Figure 26). It's function is currently unknown.

At the 3 m mark on the eastern side of the transect, a horse shoe and a small section of copper sheathing were recorded lying adjacent to each other (Figure 27). There was one visible fastening hole in the sheathing. From the 5 m mark, a 7 m length of pile lay in a south-east to north-west direction. The pile was 0.4 m diameter. The northern end appeared broken and heavily degraded (Figure 28). The pile was heavily encrusted with growth so any presence of metal sheathing was unable to be recorded.

A glass milk bottle was recorded just after the 15 m mark and a concrete block was lying crossing the centre of the transect at the 20 m mark. This block was embedded in the seabed at a 45° angle and measured 0.7 m x 0.3 m and was 0.15 m thick. A 2 m long by 0.25 m wide plank lay across the transect in an east-west direction at the 25 m mark (Figure 29). Approximately one metre away a ceramic coffee cup was located, missing the handle (Figure 30).

On the western side of the transect a mobile piece of timber was recorded running parallel with the transect near the 30 m mark. The timber measured 0.4 m long, 0.05 m wide and 0.03 m high (Figure 31). On the eastern side of the transect between 30 m and 35 m there was brick rubble and bottles (Figure 32). On the western side there were two bricks and another bottle.

At the 40 m mark on the eastern side of the transect there was a concrete block measuring 0.3 x 0.4 m and 0.1 m thick. Immediately adjacent to the block were two links of a large chain heavily encrusted with growth (Figure 33).

No refusal was met when probing along the majority of the transect line. At the 25 m mark on the western side of the transect there was refusal at 0.9 m, while on the eastern side there was refusal between 0.4 to 0.8 m. There were no consistent depths of refusal around these points, so it is likely the obstructions were small rocks or concrete rubble. At 40 m, the probe hit refusal at 0.8 m but probing in the immediate area around this mark did not meet any further resistance.

Figure 26: Glass tube standing 800 mm proud of the seabed at 1 m mark west of transect line. (PDS OPT Transect 1 South)

Figure 27: Horse shoe and sheet of copper sheathing at the 3 m mark on the east side of transect line. (PDS OPT Transect 1 South)

Figure 28: Northern (degraded) end of 7 m pile. (PDS OPT Transect 1 South)

Figure 29: Plank crossing transect at 25 m mark. Top half of image indicated by red arrow. (PDS OPT Transect 1 South)

Figure 30: Ceramic coffee cup with no handle at the 26 m mark to the east of the transect. (PDS OPT Transect 1 South)

Figure 31: Mobile timber recorded on the western side of transect near 30 m. (PDS OPT Transect 1 South)

Figure 32: Example of bottles and brick rubble spread between 33 - 30 m. (PDS OPT Transect 1 S)

Figure 33: Chain link adjacent to concrete block to the east of the transect at 39 m. (PDS OPT Transect 1 South)

Transect 2 N		
Date: 29 January, 2020	*Method:* SSBA	*Tide:* Flooding
Distance and direction: 40 m north	*Diver:* Callum Harvey	
Time start (min): 1110	*Time end (min):* 1125	*Total time (min):* 15
Depth: 8.3 – 9.9 m	*Water visibility:* 0.2 – 1 m	*Seabed visibility:* Good

The diver set the transect line, running 40 m to the north. The seabed had a gentle slope from 8.3 m down to a depth of 9.9 m at the northern end. The seabed was sandy, lightly covered in silt and shell grit, with scattered stands of kelp, apart from the area between 15 m and 30 m, which became very silty, reducing visibility in this area (Figure 34).

A concrete block was recorded on the eastern side of the transect at the 3 m mark (Figure 35). This block was rectangular, measured 0.3 x 0.4 mm and 0.1 mm thick and was resting at an approximate 45° angle into the seabed. Immediately adjacent to this block was a 1.2 m long ferrous pipe with a 0.5 m diameter running in a north-east to south-west direction (Figure 36).

Immediately past the 5 m mark on the eastern side of the transect were two bottles, one broken at the neck. These appeared to be long neck beer bottles. A brick was partially buried at the base of a bottle (Figure 37). Another object, possibly a piece of concrete, was recorded at 13 m and measured 0.6 m long x 0.1 m wide and 0.1 high.

An apparent concrete object was located at the 13 m mark. This was a thin piece of concrete measuring 0.6 long x 0.1 m wide and 0.1 m deep (Figure 38). A piece of what appeared to be concrete rubble was recorded on the western side of the transect at 18 m (Figure 40). At 23 m, a square concrete block was resting on the seabed. Measuring 0.4 m square, it was 0.25 m thick (Figure 39).

The only other material recorded was a bottle and a modern plastic bag (Figure 41).

No refusal was met when probing along the transect line, except for an area to the east of the line at the 5 m mark. The probe hit refusal at 1 m but probing in the immediate area around this mark did not meet any further resistance. In another area at the 20 m mark, there was refusal between 0.3 and 0.5 m beneath the seabed. There did not appear to be any pattern to the depth of refusal.

Figure 34: Example of seabed along Transect 2. (PDS OPT Transect 2 N 0 to 40 m)

Figure 35: Concrete block. (PDS OPT Transect N 0 to 40 m)

Figure 36: Ferrous pipe; 1.2 m long and 0.5 m diameter. (PDS OPT Transect 2 N 0 to 40 m)

Figure 37: Two long neck beer bottles with brick. (PDS OPT Transect N 0 to 40 m)

Figure 38: Concrete block at 45 degree angle. (PDS OPT Transect 2 N 0 to 40 m)

Figure 39: Square concrete block (0.4 m). (PDS OPT Transect 2 N 0 to 40 m)

Figure 40: Concrete rubble. (PDS OPT Transect N 0 to 40 m)

Figure 41: Plastic shopping bag. (PDS OPT Transect N 0 to 40 m)

Transect 3 S		
Date: 29 January, 2020	*Method:* SSBA	*Tide:* slack to ebbing
Distance and direction: 40 m south	*Diver:* Callum Harvey	
Time start (min): 1147	*Time end (min):* 1214	*Total time (min):* 27
Depth: 8.2 – 13.5 m	*Water visibility:* 0.5 – 1.5 m	*Seabed visibility:* Good

The diver set the transect line, running 40 m to the south. The depth at the southern end was 13.5 m. The seabed was sandy, lightly covered in silt and shell grit, with scattered stands of kelp. The seabed had a clay like texture between the 20 m and 30 m marks.

There was a length of flat hose, similar to a dredge or fire hose lying just underneath a light silt layer, on the eastern side of the transect between 5 m and 10 m (Figure 42). A concrete block was recorded running across the transect line at 6 m in an almost east to west alignment. The block was 2 m long and 0.3 m high. Immediately adjacent to the block, was a long ferrous pipe. The pipe was on the same alignment as the block, was 8 m long and had a diameter of 0.1 m. On the western side of the transect, the pipe had a right angled ferrous bracket made of flat bar attached to the southern side (Figure 43). On the eastern side of the transect, there were two ferrous spikes attached to the northern side of the pipe. Approximately, 2 m from the eastern end the pipe was bent as if something had tried to lift it or caught and dragged it. The pipe was bent in a V-shape for an approximately 2 m section before disappearing into the seabed.

At 12 m along the transect line, to the west, a coil of lead or tin was buried in the sea bed. The material was coiled like a rope but the material acted more like a soft metal such as lead, as when bent it stayed in the bent position. The coil was heavily covered in sediment (Figure 44). Just past the coil, there was a small collection of bottles, many broken and on the western side of the transect at 15 m a modern tyre was recorded. The tyre was embedded in the seabed at a 45° angle (Figure 45).

At 16 m there was a thin strip of copper. The strip measured 0.2 m long and 0.015 m wide. There were holes at regular intervals along the strip, potentially for fastenings (Figure 46). Continuing along the transect, there was more brick rubble and broken bottles. At 19 m along the transect there was a small piece of chain link (Figure 47). At 21 m along the transect a small piece of copper sheathing was recorded. Measuring 0.1 x 0.3 m, the metal was slightly concave and fastening holes were present. No fastenings were found with the sheathing piece (Figure 48 and Figure 47). Close to the piece of sheathing, a section of what appeared to be planking was buried in the sediment. The plank was 0.02 m thick and only a 0.05 m section was exposed (Figure 49).

A green glass bottle was recorded at 26 m along the transect. The bottle had a curved body and was 0.02 m tall. The body was lightly embedded in the silt (Figure 50).

On the eastern side of the transect, between the 30 m and 35 m mark, a 4 m long piece of timber ran almost parallel with the transect line, measuring 0.25 m wide and 0.15 m thick. This is potentially a timber wale (Figure 51). A fastening hole of 3 mm diameter was recorded at the northern end. No other fastening holes or fastenings were observed along the length of timber. The southern end was squared off. Sitting on top of this timber was another rounded timber running in a perpendicular direction (west to east). The western end was heavily degraded with a blackened appearance and the eastern end was degraded and heavily encrusted with growth. The timber was 0.3 m diameter and 2.5 m long (Figure 52).

At the 40 m mark there was brick rubble, bottles and a concrete block, resting on its edge measuring 0.6 x 0.7 and 0.05 m thick. There was also one bone fragment, large enough to be an animal bone such as cow or sheep.

The original probe was lost in the visibility and was replaced with a 2 m fibreglass pole marked at 0.1 m increments. No refusal was met when probing along the transect line, except for a 10 m area either side of the transect line at the 10 m mark. The probe hit refusal at 1 m but probing in the immediate area around this mark did not meet any further resistance.

Figure 42: Flat hose, potentially a dredge or fire hose recorded between 5 and 10 m along transect. (PDS OPT Transect 3 South 40 to 0 m)

Figure 43: Section of 8 m length of ferrous pipe with right angled bracket crossing the transect at 6.5 m mark. Concrete block can be seen in the background. (PDS OPT Transect 3 South 40 – 0 m)

Figure 44: Coil of soft metal material possibly lead or tin recorded 11 m along the transect. (PDS OPT Transect 3 South 40 to 0 m)

Figure 45: Tyre located 15 m along the transect. (PDS OPT Transect 3 South)

Figure 46: Short length of copper strip with fastening holes recorded at 17 m along the transect. (PDS OPT Transect 3 South 40 to 0 m)

Figure 47: Piece of chain link lying loose on the seabed at 19 m along the transect. (PDS OPT Transect 3 South 40 to 0 m)

Figure 48: Piece of metal sheathing with fastening holes. The metal was slightly concave. (PDS OTP Transect 3 South 0 to 40 m)

Figure 49: Buried timber, potentially a plank, measuring 0.02 m thick with only 0.05 m exposed. Indicated by red arrow. (PDS OTP Transect 3 South 0 to 40 m)

Figure 50: Green glass bottle with curved body at 26 m along transect. (PDS OPT Transect 3 South 0 to 40 m)

Figure 51: Timber, likely a waler, running almost parallel with the transect line between 30 and 35 m. (PDS OPT Transect 3 South 40 to 0 m)

Figure 52: Timber pile running perpendicular to wale timber (just visible underneath the pile) (PDS OPT Transect 3 South 0 to 40 m)

Transect 4 NE		
Date: 29 January, 2020	*Method:* SSBA	*Tide:* Ebbing
Distance and direction: 20 m north east	*Diver:* Callum Harvey	
Time start (min): 1240	*Time end (min):* 1253	*Total time (min):* 13
Depth: 8.2 – 11.3 m	*Water visibility:* 0.5 to 1.5 m	*Seabed visibility:* Good

The diver set the transect line, running 20 m to the north west. The seabed was sandy, lightly covered in silt and shell grit, with scattered stands of kelp (Figure 53).

A pile stump was recorded along the transect line at the 2 m mark. The centre was heavily degraded making the top of the stump semi-circular. The pile stood 0.5 m proud of the seabed and measured 0.4 m in diameter. The pile was too degraded and heavily encrusted with growth obscuring any evidence of copper sheathing (Figure 54).

A timber branch was recorded loose on top of the seabed adjacent to this pile 1.5 m long x 50 mm diameter (Figure 55). Just past the 5 m mark on the transect a ferrous pipe, 1 m long x 80 mm in diameter. The pipe was hollow and appeared broken at both ends (Figure 56).

There was scattered concrete rubble along the rest of the transect (Figure 57) and the remnants of a shopping trolley were located on the western side of the transect just before the 15 m mark (Figure 58).

No refusal was met when probing along the transect line, except for one area to the west of the line at the 20 m mark. The probe hit refusal at 0.6 m but probing in the immediate area around this mark did not meet any further resistance.

Figure 53: Example of seabed on Transect 4. (Professional Diving Services, OPT Transect 4 NE 0 to 40 m)

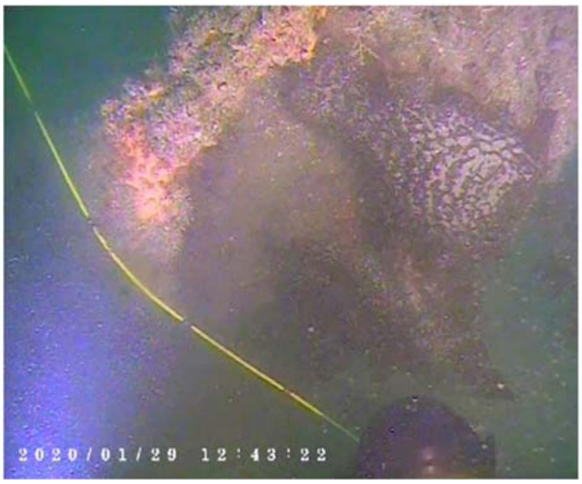


Figure 54: Pile stump: 0.45 diameter and standing 0.5 m proud of the seabed. Very heavily eroded. (PDS OPT Transect 4 NE 0 to 40 m)

Figure 55: Tree branch resting loose on seabed. Outline marked in blue. (PDS Transect OPT 4 NE 0 to 40 m)

Figure 56: Ferrous pipe resting loose on seabed. (PDS OPT Transect 4 NE 0 to 40 m)

Figure 57: Concrete rubble (PDS OPT Transect 4 NE 0 to 40 m)

Figure 58: Grill from a shopping trolley, indicated with red arrow. (PDS OPT Transect 4 NE 0 to 40 m)

Transect 5 W		
Date: 29 January, 2020	*Method: SSBA*	*Tide:* Ebbing
Distance and direction: 20 m west	*Diver:* Callum Harvey	
Time start (min): 1258	*Time end (min):* 1310	*Total time (min): 12*
Depth: 8.2 – 11.9 m	*Water visibility:* 0.5 – 2 m	*Seabed visibility:* Good

The diver set the transect line, running 20 m to the west, heading into Campbells Cove. The depth at the western end was 11.9 m. The seabed was sandy, lightly covered in silt and shell grit, with scattered stands of kelp (Figure 59).

A small scattering of concrete rubble was present near the beginning of the transect line. At the 5 m mark, a 2 m length of concrete was recorded. This concrete was a rounded triangular shape and rose 0.1 m above the seabed. It appeared relatively new with only a small amount of growth, possibly a piece of kerbing. A square potentially concrete block was located at the 11 m mark. Resting at a 45° angle, the block rose out of the seabed 0.1 m and measured 1 m x 0.3 m (Figure 60).

At the 13 m mark, a rounded object protruded 0.4 m from the seabed. Measuring 0.5 m x 0.3 m, the object appears narrow for a pile but was solidly embedded in the seabed and may have been heavily degraded (Figure 61). There was no obvious evidence of sheathing. Another potential concrete block (0.4 x 0.4 x 0.3 m) was recorded at the 15 m mark and immediately adjacent to this block, a pile was recorded running in an approximate south-east to north-west direction (Figure 62). The pile measured 6 m long and was 0.4 m diameter. The south-east end was heavily degraded, while the north-west end appeared cut. It was heavily covered in growth obscuring any presence of copper sheathing.

No refusal was met when probing along the transect line, except for one area to the north of the line at 10 m. The probe hit refusal at 1 m but probing in the immediate area around this mark did not meet any further resistance.

Figure 59: Example of the sandy seabed, lightly silted with a covering of shell grit and scattered strands of kelp. (Professional Diving Services: OTP Transect 5 West 0 to 20 m)

Figure 60: Potential concrete block at a 45 degree angle at the 11 m south of the transect line. (Professional Diving Services: OTP Transect 5 West 0 to 20 m)

Figure 61: Potential pile stump, heavily degraded, south of the transect line at the 13 m mark. (Professional Diving Services: OTP Transect 5 West 0 to 20 m (Professional Diving Services: OTP Transect 5 West 0 to 20 m)

Figure 62: Pile recorded crossing the transect line at the 15 m mark running in a SE to NW direction. (Professional Diving Services: OTP Transect 5 West 0 to 20 m)

7.4 Interpretation of Results

This maritime archaeological survey conducted to the east of the OPT mooring dolphin located near Campbells Cove recorded items very similar in nature and variety to the maritime survey conducted in 2014 . The archaeological remains present on the seabed included in situ pile stumps, cut sections of piles lying on the seafloor and other structural timbers, including possible timber walers. The amount of growth on these timbers prohibited the identification of any remnant copper sheathing, however, two loose pieces of sheathing were recorded lying loose on the seabed. The long ferrous pipe in Transect 3 South likely carried water or other services along a structure and was attached lengthways with the angled bracket. These items are likely remains of the former Wharf No. 7 (1901-1980) in Campbells Cove. Wharf No. 7 was a longer and wider structure than the previous structure (built in 1876) in the Cove, and the location of the mooring dolphin is located at the western end of the 1901 wharf, beyond the eastern end of the previously constructed 1876 wharf.

No relics were recorded on the seabed in the survey area. Other material such as bricks, a modern tyre, concrete rubble and bottle scatters were recorded. Some of this modern material is likely to have been from the building of the OPT wharf extension.

Diver probing during the survey did not record any evidence of timbers lying underneath the seabed. Where refusal was felt underneath the seabed, it was unpredictable and random indicating rock or concrete scatter rather than lengths of timber or wharf remains.

7.5 Summary of Previous Maritime Archaeological Assessment

Cosmos Archaeology previously had undertaken a maritime archaeological survey and assessment for the proposed extension of the OPT wharf and installation of a new mooring dolphin to the north of the OPT in 2014. The diving survey was conducted over one day and identified a number of copper sheathed piles, hawser ropes, whalers and various other remains in the location of the then proposed dolphin. These remains were interpreted as the remains associated with the western end of Wharf 7 (1901 – 1980). The archaeological potential assessed in 2014 concluded that remains of the former wharf have progressively been covered over with sediment. Structural material likely to be present on the seabed would consist of remains associated with the construction, repair and maintenance of the wharf. This would include pile remains and other sub-structure wharf remains such as timber whalers, corbels and deck beams.

The assessment also identified a moderate potential for relics to be present within the footprint of the former Wharf No. 7. The location for the mooring was to impact on remains associated with the former wharf within the footprint of the former wharf. As such, no assessment of archaeological potential that may exist within the berth pockets associated with the former wharf was made.

7.6 Bathymetric multi-beam survey and side scan sonar data

The results of a multi-beam and side scan sonar survey of the Project area was provided by Port Authority of NSW. The survey area was along the entirety of the OPT wharf, including the area up to and surrounding the mooring dolphin to the north, and the area immediately to the south of the Wharf (Figure 63).

The multi-beam and side scan sonar survey results have been reviewed by the maritime archaeologist for this report. Along the whole of the western edge of the OPT wharf area, including the area immediately beyond the southern end, the existing rock armour can be seen along the existing seawall, but also scattered out further into the existing berth pocket. A higher density of the existing rock armour can be seen at the northern end of the OPT, along the newer section of wharf constructed in 2014 (Figure 63).

At the northern end of the surveyed area, immediately around the location of the existing mooring dolphin, the remains of the 1901-1980 Wharf No. 7 can be seen. The yellow and orange extent of the wharf in the multi-beam survey depicts the height of the remains above the seabed. These results line up with the remains of the former wharf recorded by Cosmos Archaeology during the 2014 and 2020 survey of this area. The remains on the seabed appear to be very well defined within the footprint of the former wharf. The side scan sonar survey does not clearly show these remains, however, the results do show potential piles and/or other remains of the former wharf scattered further out in the berth pocket and into Sydney Cove (Figure 63).

The review of the multi-beam and side scan sonar data for the remainder of the Project area, including those areas along the OPT berth pocket where the maritime archaeological team was not able to undertake a survey, did not reveal the presence of any anomalies on the seabed that could be associated with any potential cultural heritage item.

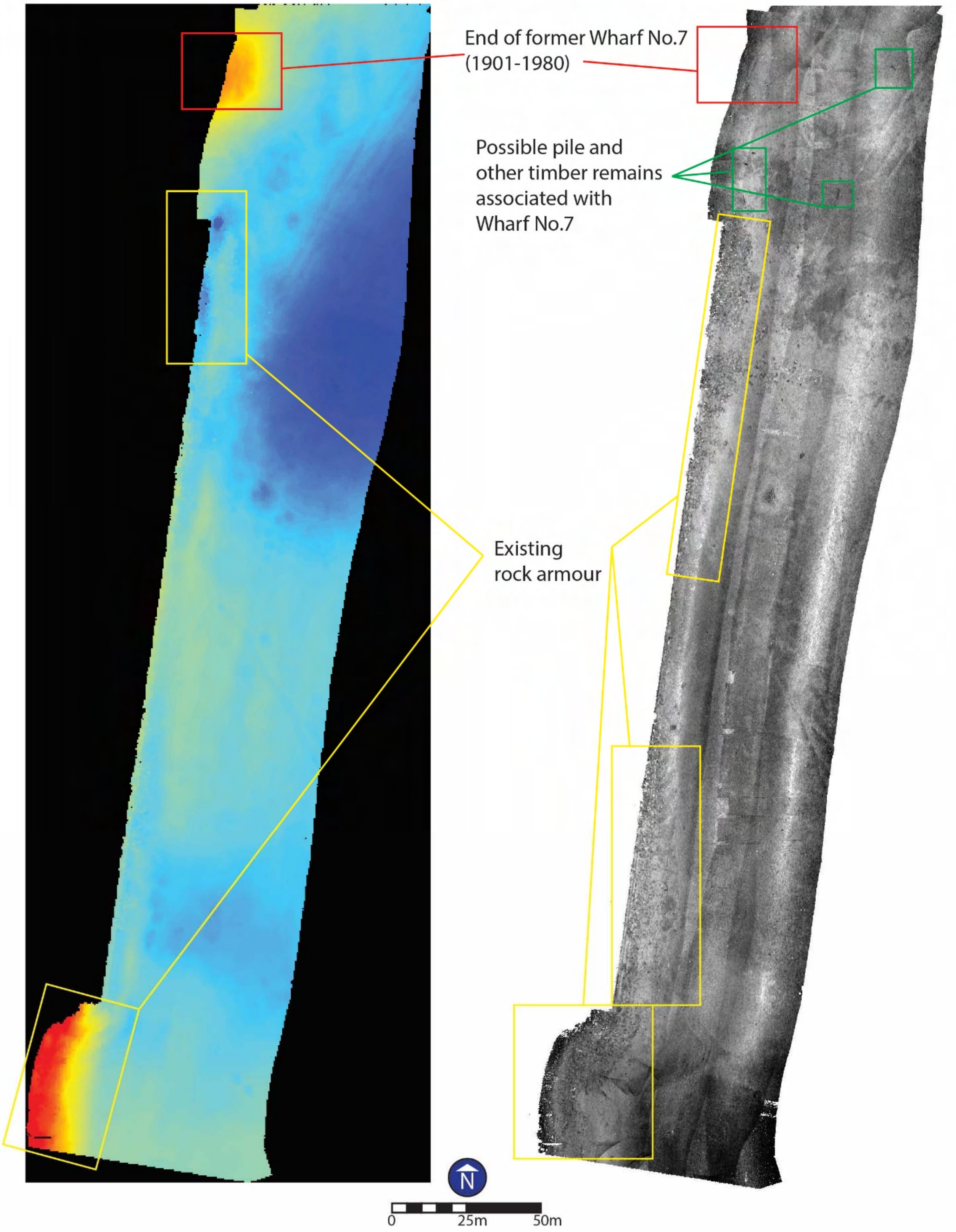


Figure 63: Multibeam survey of the Project area undertaken by Port Authority of NSW in March 2018. Image on the left is the original image, image on the right has been marked up by the maritime archaeologist (Source: Port Authority of NSW). This information is provided courtesy of Port Authority of NSW. Copyright is owned by Port Authority of New South Wales

7.7 Maritime archaeological potential

Based on the historical research and the review of the multi-beam and side scan sonar data, as well as the results of the maritime archaeological surveys in 2014 and 2020, predictions about the maritime archaeological potential of the Project area can be made.

The maritime archaeological surveys in 2014 and 2020, and the geophysical survey results show the remains of the former Wharf No. 7 (1901-1980) present in Campbells Cove. The archaeological remains on the seabed include both *in situ* and cut sections of piles on the seabed, other structural remains including deck beams, and other metal fastening. The 2014 survey identified the presence of piles with copper sheathing attached, and the 2020 survey identified copper sheathing present on the seabed. Copper sheathing was a protective measure installed to wharf piles in the 20th century from marine borer attack. This was an expensive process, however, the sheathing of the piles meant the piles were protected and would require less maintenance.

The location of the proposed works are at the end of the former Wharf No. 7, a longer and wider wharf than the earlier 1876 wharf. As this is the case, the remains that have been identified on the seabed are likely to only be associated with the former Wharf No. 7 and are not likely to be associated with the earlier wharf in Campbells Cove.

Divers in both the 2014 and 2020 survey undertook probing to identify the presence and depth of materials that may be present below the seabed. During both surveys, divers identified that material was present below the seabed. During the 2014 survey it was noted that these were likely timbers present within the footprint of the former wharf. The 2020 maritime survey also noted material present below the seabed, but noted that this may also relate to building material associated with the construction of the OPT wharf extension and/or from the construction of the mooring dolphin. The potential for maritime archaeological remains associated with the former Wharf No. 7 (1901-1980) is considered to be ***high***.

No relics were recorded on the seabed during both maritime archaeological surveys. Other material, such as a brick and tyre (modern), concrete rubble and bottle scatters were recorded. The potential for archaeological deposits associated with the shipping and transportation in front of the current wharf is affected by site formation processes that have occurred during and after the lifespan of the wharf. Typically, archaeological deposits associated with vessels berthed at a wharf are located immediately between the wharf and the vessel or on the opposite side of the vessel toward the middle of the cove. The limit of these deposits is based on the width of the vessels berthed at the wharf. Relics associated with the working life of the wharf also have the potential to be deposited immediately below the footprint of the former wharf, particularly from material that has fallen between deck planking. This material would relate directly to the working life of the wharf. The archaeological potential within this area is considered to be ***moderate***.

The OPT berth pocket area has previously been dredged. The extant remains of the existing rock armour were along the western side of the surveyed area, including the area immediately to the south of the OPT wharf. The review of the multi-beam and side scan sonar survey did not reveal any anomalies on the seabed that may relate to possible cultural heritage remains within the OPT berth pocket area. The historical archaeological potential within this area is considered to be ***low***.

8.0 Assessment criteria

8.1.1 Significance assessment criteria

In order to understand how a development would impact on heritage or archaeological items, it is essential to understand why an item is significant. An assessment of significance is undertaken to explain why a particular item is important and to enable the appropriate site management and curtilage to be determined. The process of assessing heritage significance is outlined in the guideline *Assessing Heritage Significance* (NSW Heritage Office, 2001) which is part of the *NSW Heritage Manual* (Heritage Branch, Department of Planning). The *Assessing Heritage Significance* guidelines establish seven evaluation criteria which reflect four categories of significance and whether a place is rare or representative.

A heritage item can be identified as being significant at a local level (i.e. to the people living in the vicinity of the site), at a State level (i.e. to all people living within NSW) or be significant to the country as a whole and be of National or Commonwealth significance. In accordance with the guideline *Assessing Heritage Significance*, an item would be considered to be of State significance if it meets two or more criteria at a State level, or of local heritage significance if it meets one or more of the criteria outlined in Table 7. The Heritage Council require the summation of the significance assessment into a succinct paragraph, known as a Statement of Significance. The Statement of Significance is the foundation for future management and impact assessment.

Table 7 Significance assessment criteria

Criterion	Inclusions/exclusions
Criterion (a) *– an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).*	The site must show evidence of significant human activity or maintains or shows the continuity of historical process or activity. An item is excluded if it has been so altered that it can no longer provide evidence of association.
Criterion (b) – an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local to area).	The site must show evidence of significant human occupation. An item is excluded if it has been so altered that it can no longer provide evidence of association.
Criterion (c) *– an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area).*	An item can be excluded on the grounds that it has lost its design or technical integrity or its landmark qualities have been more than temporarily degraded.
Criterion (d) *– an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons.*	This criterion does not cover importance for reasons of amenity or retention in preference to proposed alternative.
Criterion (e) *– an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area). Significance under this criterion must have the potential to yield new or further substantial information.*	Under the guideline, an item can be excluded if the information would be irrelevant or only contains information available in other sources.
Criterion (f) – an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).	An item is excluded if it is not rare or if it is numerous, but under threat. The item must demonstrate a process, custom or other human activity that is in danger of being lost, is the only example of its type or demonstrates designs or techniques of interest.

Criterion	Inclusions/exclusions
Criterion (g) *– an item is important in demonstrating the principal characteristics of a class of NSW's (or local area's):* • *cultural or natural places cultural; or natural environments.*	An item is excluded under this criterion if it is a poor example or has lost the range of characteristics of a type.

8.2 Assessment of significance for archaeological remains associated with the former Campbells Wharf No. 7 (1901-1980)

Below is the significance assessment for the archaeological remains, including the structure and potential maritime archaeological deposits, associated with the former Campbells Wharf No. 7 (Table 8). This significance assessment is based on the assessment previously prepared by Cosmos Archaeology (Cosmos Archaeology Pty Ltd, 2014).

Table 8 Significance assessment of the former Campbells Cove Wharf No. 7 (1901- 1980)

Criterion	Assessment
Criterion (a) *– an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).*	Campbells Cove has served as part of the Sydney Harbour shipping and trade hub for Sydney from 1810 when the first private wharf was constructed by Robert Campbell. Campbells Cove became part of the evolution of the wharves along the western side of Sydney Cove with the later developments made by the Australasian Steam and Navigation Company and Australasian United Steam Ship Company up until the turn of the century. Integrated as part of the larger wharfage schemes associated with both earlier shipping companies, the wharf at Campbells Cove would have been a well-known fixture of the commerce and trade in and out of Sydney. After the resumption of the wharves in Sydney Harbour, the wharf in Campbells Cove was demolished and replaced with a newer timber wharf. The wharf was 360 feet (110 m) long and 91 feet (28.5 m) wide and known as Wharf No. 7. The wharf was leased to shipping companies such as Gibbs, Bright & Co., China Navigation Company and Oceanic Company, who leased individual berths and store space on the wharf. The wharf was later used as part of the Maritime Services Board where it appears to have been used as a berth for smaller working vessels and no longer used as a warehouse. The remains of the former Campbells Cove Wharf (ca.1901-1980) is considered to be of ***local significance*** under this criterion.
Criterion (b) – an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local to area).	The 1901-1980 wharf was constructed by the shipping firm Norddeutscher Lloyd as part of the wharf upgrade works that stretched along the western side of Sydney Cove after the resumption of wharves in 1901. Berths and warehouse space were leased to individual companies until sometime after the 1960s when they were later used by the Maritime Services Board. As the ownership, and leases of the berths and warehouse, changed constantly overtime, the wharf is not considered to have had, or still have, a strong special association with the life or works of person or a group of people important to NSW. The archaeological remains of the wharf are ***not considered*** to meet the requirements of this criterion on a State or local level.
Criterion (c) *– an item is important in demonstrating aesthetic characteristics and/or a high degree of*	Archaeological remains associated with the ca.1901-1980 wharf are visible on the former site and there is a high potential for further maritime archaeological remains to be present below the seabed. These remains are likely to be

Criterion	Assessment
creative or technical achievement in NSW (or the local area).	associated with the structural remains of the wharf and are not unique to the former Wharf No. 7 at Campbells Cove. As such, the archaeological remains of the former wharf are not considered to demonstrate aesthetic characteristics or show a creative or technical achievement, and as such, the former wharf is ***not considered to meet the requirements*** of this criterion.
Criterion (d) *– an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons.*	The ca.1901-1980 wharf was part of the wharfage system present in Sydney Cove and was part of the larger wharf system in operation in Sydney Harbour. While the wharf at Campbells Cove was an integral part of the goods transportation and waterside warehousing needs from the turn of the century onwards, there were no single particular community or cultural groups who were associated with the wharf. As such the wharf built at Campbells Cove is ***not considered to meet the requirements*** of this criterion.
Criterion (e) *– an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area). Significance under this criterion must have the potential to yield new or further substantial information.*	There are known and potential archaeological remains of the former Wharf No. 7 (1901-1980) expected to exist on site. The historical information relating to the construction of the wharf is limited, with only primary sources, mostly photographs and maps, which reveal the construction of the wharf. Archaeological information that has been recorded on the site has already shown that the piles associated with the former wharf were sheathed to protect the submerged timbers from marine borer attack. Physical evidence that has survived in the archaeological record has the potential to provide additional information relating to the construction techniques and materials that were used. Information relating to repair works to the wharf, such as from the driving in of repair "sister" piles or the addition of extra bracing or fastenings, can also be determined from the remains in the archaeological record on wharf site. Artefacts discarded, accidentally or deliberately, from the wharf and vessels moored alongside can contribute towards knowledge of the variety of traffic and goods that passed between Sydney and the rest of the world during the 20th century. It can also contribute to our understanding of the working operation of the wharf. The archaeological site associated with the former wharf built at Campbells Cove has the potential to contribute to a greater understanding of wharf construction, repair and upgrading that has not been documented in the archaeological record previously. As such, the archaeological site associated with both former ca. 1901-1980 wharf built at Campbells Cove is considered to be of ***local significance*** under this criterion.
Criterion (f) – an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).	The early 20th century wharves constructed in Sydney Harbour are associated with the post resumption development of the harbour. There are wharves still standing in Sydney Harbour that relate to the development works directly associated with this redevelopment phase. Many of these wharves are still in use today, such as Woolloomooloo, Walsh Bay and Jones Bay wharves. While not all of these wharves still exist, there are surviving examples today that can be considered to be common. The former 1901 wharf constructed at Campbells Cove is likely to have been one of the earlier wharves that were constructed as part of the post wharf resumption works in Sydney Harbour. The archaeological site has the potential to reveal early design plans that were to

Criterion	Assessment
	become standard for all wharf construction built after the resumption of the wharves. This has the potential to include remains associated with pile type and construction, timbers and other materials used and fastenings. Compared to later constructed wharves that were built as part of the same redevelopment works, such as at Walsh Bay (1911), could show the changes to wharf design after the Campbells Cove was constructed. The maritime archaeological remains of the former ca. 1901-1980s Campbells Cove wharf are considered to be of ***local significance*** under this criterion. .
Criterion (g) *– an item is important in demonstrating the principal characteristics of a class of NSW's (or local area's):* • *cultural or natural places cultural; or* • *natural environments.*	The site of the former wharf at Campbells Cove is represented by the maritime archaeological remains that are present on and below the seabed and are not considered to be intact or complete. As such, the site is not considered to retain the principal characteristics of its type or design. Campbells Cove is ***not considered to meet the standards*** of this criterion.

8.2.1 Statement of significance

Campbells Cove has been associated with maritime transport in Sydney Harbour since 1810. Robert Campbell built the first private wharf in Campbells Cove in 1810 in association with other wharves being built in Sydney Cove. By the 1880s, the early wharves on the western side of Sydney Cove were bought and operated by the Australasian Navigation Company, including the wharves in Campbells Cove. The original wharves were removed and new ones built, including two new wharves in Campbells Cove. The wharves continued to operate until the resumption of wharves in 1900 by the Sydney Harbour Trust. Both of these wharves were removed and a new 110 m long by 28 m wide wharf was constructed in its place. Known as Wharf No. 7, the wharf continued operating until 1980 when the wharf was removed and replaced with a smaller finger wharf that is still present in the cove today.

Wharf No. 7 (1901-1980) was an integral part of maritime commerce and trade functioning in Sydney Harbour. Known as Wharf No. 7, the wharf was leased by international merchant shipping companies before being taken over by the Maritime Services Board.

The archaeological resource present on the seabed is considered a common resource as it relates to the early 20th century redevelopment of Sydney Harbour. The wharf was likely one of the earlier wharves constructed as part of this new development works, and the archaeological remains have the potential to further our understanding about the initial type and construction of these wharves and the evolution of the design with wharves constructed as part of the same earlier 20th century development after the initial wharves were constructed in Sydney Harbour.

9.0 Impact assessment

9.1 Proposed works

9.1.1 Overview

The proposed works at the OPT are to dredge the existing berth pocket to increase the underkeel clearance to allow cruise ships to safely berth. The depth of required capital dredging works varies across the berth pocket, with majority of the area requiring deepening less than 1.5 m. The northern portion of the existing berth pocket, in the vicinity of the mooring dolphin, would require to be deepened by up to 6 m (Figure 64).

Scour protection would be installed along the whole length of the quay wall to prevent undermining from hydraulic instability.

The proposal's key features are:

- Installing a sheet pile retaining wall of about 65 m long at the southern end of the OPT berth pocket.
- Dredging approximately 20,000 m^3 of sediment to deepen the berth pocket.

Installing scour protection of about 12,000 m^2 in the form of pumped concrete mattress or articulated concrete mattresses.

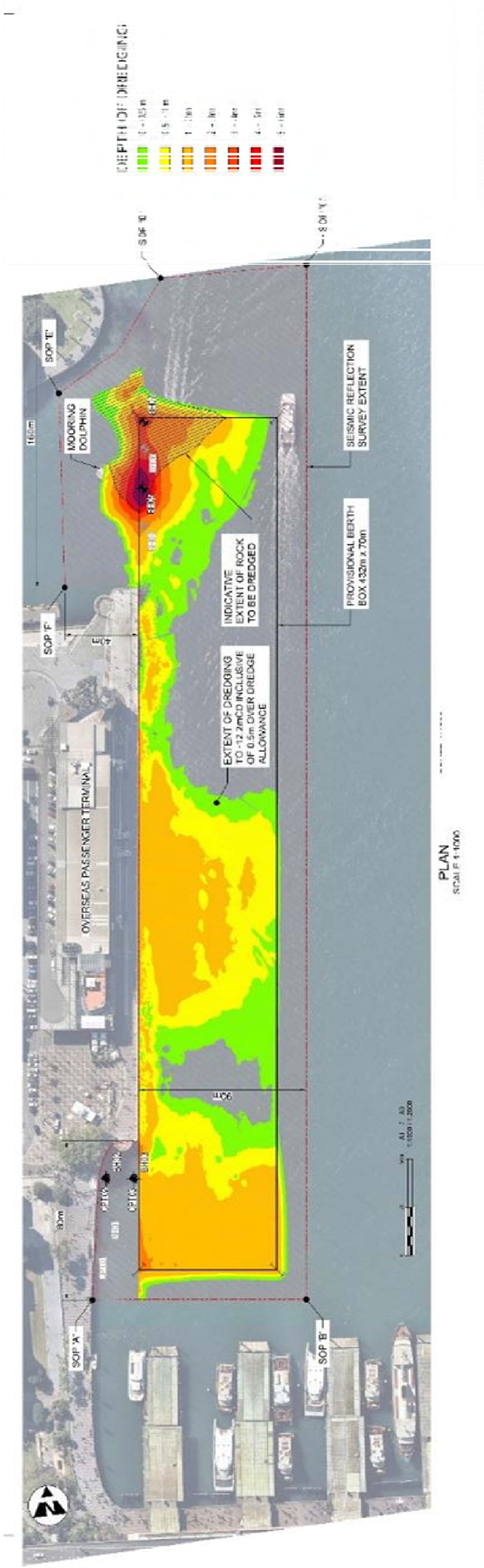


Figure 64: Proposed extent of dredging showing proposed depths to be dredged. Note: Dredging would only occur within the outlined "Provisional Berth" area

9.2 Aboriginal Heritage Assessment Key Findings

The key findings of this assessment are as follows:

- No registered Aboriginal sites are present within the Project Area; and
- Submerged environs within the Project Area were generally assessed is being of low to moderate archaeological sensitivity, with various factors influencing the survival of the various site types.

Table 4 provides a summary of the key questions asked as part of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW, 2010:10). Should the answer to Question 4 be 'yes', further investigation and impact assessment would be required.

Table 9 Due Diligence Process Questions

1	***Will the activity disturb the ground surface or any culturally modified trees?*** Yes. The proposed activity will require the removal of soil and sediment from a submerged context. No culturally modified trees will be impacted.	Proceed to Question 2
2a	***Are there any relevant confirmed site records or other associated landscape feature information on AHIMS?*** Yes. The AHIMS database holds a record of known Aboriginal sites near the Project area, with a search of the AHIMS database identifying that the nearest site approximately 280 m away. Reference to available geotechnical data suggests that assessment former terrestrial soils, suggestive of tidal delta and estuarine environs, are likely within the Project area, albeit in a submerged context.	Proceed to Question 2b
2b	***Are there any other sources of information of which a person is already aware?*** Yes. AECOM has reviewed all available literature and relevant sources of information pertaining to the known Aboriginal resource of the Project area.	Proceed to Question 2c
2c	***Are there any landscape features that are likely to indicate presence of Aboriginal objects?*** Yes. Geotechnical data suggests that sediment associated with tidal delta and estuarine environs are likely present within the Project area.	Proceed to Question 3
3	***Can harm to Aboriginal objects listed on AHIMS or identified by other sources of information and/or can the carrying out of the activity at the relevant landscape features be avoided?*** Impacts from dredging within the Project area is rated as Moderate. This assessed impact reflects that dredging would be relatively localised, even though any evidence surviving would be considered to be of high heritage significance due to its rarity and ability to reveal more about submerged sites and Aboriginal occupation in the Sydney area during the terminal Pleistocene.	Proceed to Question 4
4	***Does a desktop assessment and visual inspection confirm that there are Aboriginal objects or that they are likely?*** This Aboriginal Heritage Due Diligence Assessment has identified a low to moderate potential for intact Aboriginal sites.	Proposed activity can proceed subject to recommendations provided below.

9.3 Heritage impact assessment

9.3.1 Summary of impacts

The Project includes undertaking capital dredging works within the existing berth pocket to increase the depth underkeel of vessels. The additional capital dredging would require deepening the existing berth pocket by approximately 1.5 m to 6 m, with the proposed works to dredge up to 6 m below the current seabed depth. These dredging works would impact on the remains of the former Campbells Cove Wharf No. 7 (1901-1980) identified to be within the Project area. These impacts would remove up to an approximate 20 m section of the remains, that include *in situ* piles, sections of cut piles and other timber structural remains associated with the former wharf that are present within its original footprint. The depth of the proposed dredging in the area of the former wharf would also remove material remains that are present below the current seabed. There is the potential for maritime archaeological relics associated with the use of the wharf to also be present within the footprint of the former wharf. The dredging would likely also remove these remains. The maritime archaeological site on the seabed has been assessed as being up to 3,135 m^2. The total area of the wharf that is likely to be impacted from these works is expected to be approximately 570 m^2, or 18% of the site.

The extent of the dredging in the vicinity of the former wharf may also impact on relics present on and under the seabed associated with vessels that berthed at Wharf No. 7. These relics would be located in the area between the vessel and the wharf, and, on the opposite side of the vessel toward the middle of the cove. There is not expected to be any provenance to the relics that may be present within the seabed as stratigraphic deposits are not expected to be present. Artefact movement and sorting within the seabed deposits is also likely to have occurred due to natural influences, including wave motion and currents across the site. Movement and disturbance of the seabed can affect the location and positioning of relics, both horizontally and vertically within the seabed deposit. This is likely to occur until relics penetrate further through the soft silt deposits and reach firmer silt and or clay-based deposits. The action of dredging would remove relics that are present at this level if the dredging was to occur to this depth.

There is not expected to be any additional impacts from dredging within the other areas of the berth pocket. No previous historic wharves or other structures were located within this area prior to the reclamation and construction of the OPT. There are not expected to be any shipwrecks or shipwreck related material within the area of the OPT. Historic dredging practices within the existing berth pocket are also likely to have removed any maritime archaeological potential that may have existed.

The installation of rock armour along the quay wall is not expected to have an impact. The proposed works would repair and add to the existing armour wall already present.

As there would be expected impacts to potential archaeological deposits from this Project, a permit would be required from Heritage NSW, DPC, prior to any construction works commencing. The permit may also require a Research Design and Methodology Document to be prepared that outlines how archaeological work and the recording of these remains would be undertaken before, during and after the proposed works are completed.

9.3.2 Impacts to significance

Table 10 assesses the impact of the proposed works against each of the heritage criteria from the significance assessment undertaken in Section 8.2 of this report.

Table 10 Assessment of heritage impact of the Project against the significance assessment

Criterion	Statement
a) Historical significance: Campbells Cove has served as part of the Sydney Harbour shipping and trade hub for Sydney from 1810 when the first private wharf was constructed by Robert Campbell. Campbells Cove became part of the evolution of the wharves along the western side of Sydney Cove with the later developments made by the Australasian Steam and Navigation Company and Australasian United Steam Ship Company up until the turn of the century. Integrated as part of the larger wharfage schemes associated with both earlier shipping companies, the wharf at Campbells Cove would have been a well-known fixture of the commerce and trade in and out of Sydney. After the resumption of the wharves in Sydney Harbour, the wharf in Campbells Cove was demolished and replaced with a newer timber wharf. The wharf was 360 feet (110 m) long and 91 feet (28.5 m) wide and known as Wharf No. 7. The wharf was leased to shipping companies such as Gibbs, Bright & Co., China Navigation Company and Oceanic Company, who leased individual berths and store space on the wharf. The wharf was later used as part of the Maritime Services Board where it appears to have been used as a berth for smaller working vessels and no longer used as a warehouse.	The proposed capital dredging works and rock armour upgrade at the OPT are not expected to have an impact to the heritage significance associated with the former Wharf No. 7 at Campbells Cove. The proposed dredging would remove approximately 18% of the archaeological site on and under the seabed. The remainder of the extant site, approximately 82% of the site would remain undisturbed. This would include relics associated with the operation of the wharf, as well as relics that may be associated with vessels berthed at the former wharf.
e) Research significance. There are known and potential archaeological remains of the former Wharf No. 7 (1901-1980) expected to exist on site. The historical information relating to the construction of the wharf is limited, with only primary sources, mostly photographs and maps, which reveal the construction of the wharf. Archaeological information that has been recorded on the site has already shown that the piles associated with the former wharf were sheathed to protect the submerged timbers from marine borer attack. Physical evidence that has survived in the archaeological record has the potential to provide additional information relating to construction techniques and materials that were used. Information relating to repair works to the wharf, such as	The Project would have an impact to the known and potential maritime archaeological resource present on and below the seabed, however, it would not result in the total loss of the archaeological resource, both in terms of its rarity or significance. The Project would include the removal of approximately 18% of archaeological remains of the former Wharf No. 7. This impact is considered to be a major impact, however, the remainder of the site located in Campbells Cove would remain unaffected. The impact to the archaeological remains could be mitigated by a maritime archaeological program that allowed for research relating to the construction and operation of the former wharf to be assessed. This would be done through a

Criterion	Statement
from the driving in of repair “sister” piles or the addition of extra bracing or fastenings, can also be determined from the remains in the archaeological record on the wharf site. Artefacts discarded, accidentally or deliberately, from the wharf and vessels moored alongside can contribute towards knowledge of the variety of traffic and goods that passed between Sydney and the rest of the world during the 20th century. It can also contribute to our understanding of the working operation of the wharf. The archaeological site associated with the former wharf built at Campbells Cove has the potential to contribute to a greater understanding of wharf construction, repair and upgrading that has not been documented in the archaeological record previously.	combination of a recording of the *in situ* remains, an archaeological monitoring and test excavation program to understand the site formation, artefact patterning and distribution across the site. Sieving of the dredge spoil would allow for any relics across the impact area to be recovered from the site. Through this program a better understanding could be made of the working operation of the wharf and a better understanding the remaining archaeological site. Repair of the existing scour protection would not have an impact to the heritage significance associated with this heritage criterion. The proposal; includes the installation of additional scour protection works along the western side of the OPT. There are no maritime archaeological areas of potential identified within this area.
f) Rarity significance. The early 20th century wharves constructed in Sydney Harbour are associated with the post resumption development of the harbour. There are wharves still standing in Sydney Harbour that relate to the development works directly associated with this redevelopment phase. Many of these wharves are still in use today, such as Woolloomooloo, Walsh Bay and Jones Bay wharves. While not wharves from the post resumption era still exist, there are surviving examples today that can be considered to be common. The former 1901 wharf constructed at Campbells Cove is likely to have been one of the earlier wharves that was constructed as part of the post wharf resumption works in Sydney Harbour. The archaeological site has the potential to reveal early design plans that were to become standard for all wharf construction built after the resumption of the wharves. This has the potential to include remains associated with pile type and construction, fastenings, timbers and other materials. Compared to later constructed wharves that were built as part of the same redevelopment works, such as at Walsh Bay (1911), the site could show the changes to wharf design after the Campbells Cove was constructed.	The Project would include the removal of a portion of the archaeological site associated with former Wharf No. 7. The dredging works would remove those remains currently visible on the seabed and below. This total impact is expected to be less than 20% of the total archaeological site on the seabed and concentrated only to the seaward end of the wharf. The remainder of the site would remain *in situ*. The impact could be mitigated by undertaking a maritime archaeological program across the area of the site that would be impacted. This would include *in situ* recording of the structure on the seabed to better understand the post demolition site formation processes. Archaeological monitoring of the seabed surface remains would be used to assist with answering wharf construction techniques used for post resumption wharves in Sydney Harbour. Archaeological test excavations in a number of locations across the seabed would be carried out to understand artefact density, distribution and patterning that may exist within the seabed deposit. At the conclusion of the testing, dredged material removed from specific locations around the former wharf site would be undertaken to record the remainder of the maritime archaeological remains that may be present.

Criterion	Statement
	Archaeological monitoring of the surface timbers that have been removed would contribute to our understanding of the construction techniques, a series of test excavations would reveal any artefact patterning or distribution across the site and sieving the dredged material removed from this section of the site, in association with the archaeological test excavation, would reveal relics that relate to the use of the wharf, including relics associated with berthed vessels. Project works associated with the installation of the scour protection along the western side of the OPT would not be placed over the remains of the former Wharf No.7. As such, these works would not have an impact to this heritage criterion.

10.0 Statement of heritage impact

The objective of a Statement of Heritage Impact is to evaluate and explain how the proposed development, rehabilitation or land use change would affect the heritage value of the site and/or place. A Statement of Heritage Impact should also address how the heritage value of the site/place can be conserved or maintained, or preferably enhanced by the Project.

10.1 Sydney Opera House World Heritage Listing

A heritage impact assessment is required to be undertaken for works within the buffer zone associated with the Sydney Opera House on the WHL, as protected under the EPBC Act 1999. The guidelines for undertaking this assessment are outlined in the *Significant Impact Guidelines 1.1* prepared by the Commonwealth Government (Department of the Environment, 2013:17). The assessment determines if the proposed works (the action) is likely to have a significant impact on cultural heritage values of a World Heritage property. This assessment is detailed in Table 11 below.

Table 11: World Heritage properties impact assessment

Impact. Is there a real chance or possibility that the action will	Discussion
Permanently remove, destroy, damage or substantially alter the fabric of a World Heritage property	**NO** The proposed capital dredging and scour protection works would be undertaken within the buffer zone associated with the Sydney Opera House listing, but will not have a direct impact to the Sydney Opera House itself. .
Extend, renovate, refurbish or substantially alter a World Heritage property in a manner which is inconsistent with relevant values	**NO** The proposed works would take place within the buffer zone associated with the Sydney Opera House listing, but would not directly impact on the Sydney Opera House. All works would be contained underwater and would not be visible from the Opera House itself.
Permanently remove, destroy, damage or substantially disturb archaeological deposits or artefacts in a World Heritage property	**NO** The proposed works would take place within the buffer zone associated with the Sydney Opera House listing, but would not directly impact on the Sydney Opera House. This assessment has identified maritime archaeological relics and potential for relics to be present on and under the seabed that are not associated with the Sydney Opera House.
Involve activities in a World Heritage property with substantial and/or long-term impacts on its values	**NO** The proposed works would take place within the buffer zone associated with the Sydney Opera House listing, but would not directly impact on the Sydney Opera House. All works would be contained underwater and would not be visible from the Opera House itself.
Involve construction of buildings or other structures within, adjacent to, or within important sight lines of, a World Heritage property which are inconsistent with relevant values	**NO** The proposed works would take place within the buffer zone associated with the Sydney Opera House listing, but would not directly impact on the Sydney Opera House. All works would be contained underwater and would not be visible from the Opera House itself.

Based on the assessment made in Table 11, the proposed capital dredging works and scour protection would not have any direct or indirect impacts to the Sydney Opera House, relics, views or vistas to and from the World Heritage Listed property. As such, no referral under the EPBC Act is required for this project.

10.2 Maritime archaeological remains assocated with Wharf No.7

This statement of heritage impact has been prepared in accordance with the *NSW Heritage Office & Department of Urban Affairs and Planning NSW Heritage Manua*l (1996) and *NSW Heritage Office Statements of Heritage Impact* (NSW Heritage Office & Department of Urban Affairs & Planning, 2002). The guidelines pose a series of questions as prompts to aid in the consideration of impacts based on the type of Project. The Project involves a major addition adjacent to an area of known and potential maritime archaeological remains. The guideline suggests the following questions be used to direct discussion in relation to the Project.

These questions are addressed, based on the impacts to the heritage significance of the maritime archaeological site at Wharf No. 7 at Campbells Cove, as outlined in Section 9.2.

Table 12 Statement of heritage impact for the remains of Wharf No. 7 at Campbells Cove

Development	Discussion
How is the impact of the new development on the heritage significance of the item or area to be minimised	The proposed rock armour works would not have an impact to the heritage significance or any archaeological potential present within the Project area. The works would be undertaken within the area already containing scour protection and would not be added to any areas where potential historical archaeological remains have been assessed to be present. The capital dredging works would increase the depth of the berth pocket at the northern end by up to 6 m, removing the known archaeological remains associated with the former Wharf No. 7 (1901-1980). This impact would remove up to 18% of the archaeological site from the seabed. Physical impacts would be minimised by containing the dredge area to within the Project area only, leaving the remainder of the site *in situ*. The archaeological site located outside of the Project area would retain the site's current heritage significance, including research potential, as over 80% of the site would be retained. Timber remains associated with the former wharf are defined as 'works' under the *Heritage Act 1977*, however, there is potential for relics associated with the operation of the wharf, including from vessels berthed there, to be present within and adjacent to the wharf remains. As such, a permit would be required prior to the commencement of any project works. The impact would also be minimised by undertaking maritime archaeological investigation for the area that would be impacted. The maritime archaeological investigation would work towards answering questions related to the heritage significance associated with the former wharf, including construction techniques used in the early post resumption of wharves in Sydney Harbour.
Why is the new development required to be adjacent to a heritage item?	The OPT is the only capable wharf in Sydney Harbour that can berth the larger sized overseas cruise passenger ships. The project is required to deepen the berth pocket at the OPT to provide safe clearance underkeel of cruise ships.

Development	Discussion
Is the development sited on any known, or potentially significant archaeological deposits? If so, have alternative sites been considered? Why were they rejected?	Archaeological remains associated with the former Wharf No. 7 (1901-1980) have been identified on the seabed within Campbells Cove. Approximately 18% of the archaeological site is located with the Project area. Alternate locations for these works were not investigated as the OPT is the international cruise ship terminal wharf and the dredging works are required to maintain a safe depth of water underkeel.
Is the new development sympathetic to the heritage item? In what way (e.g. form, siting, proportions, design)	Rock armour works would not be visible as the scour protection would be placed along the western side of the OPT. As it would be hidden under water, there is not expected to have any direct or indirect impacts to any heritage items within the Project area. The capital dredging works cannot be modified as the size of vessels using the OPT require safe underkeel clearance within the whole of the berth pocket. The impact to the archaeological remains associated with the former Wharf No. 7 are limited to those that are present within the Project area only, and the remainder of the site would be left *in situ*.

10.3 Summary

The capital dredging works would require various depths of dredging below the current seabed within the existing berth pocket. At the northern end, adjacent to the mooring dolphin, the proposed works would dredge up to 6 m below the current seabed depth. Archaeological remains of the former Wharf No. 7 are present in this area, and the proposed dredging would directly impact on those remains that are within the project area.

This dredging would remove approximately 18% of the archaeological site associated with the former Wharf No. 7. The archaeological site within the project area include both *in situ* and cut sections of piles, timber substructure remains that include whalers. Relics associates with the use of the wharf, and relics deposited from berthed vessels are also predicted to be within the Project area, and the dredging works will impact on these.

The impact to the heritage significance and archaeological remains of the former Wharf No. 7 can be mitigated by undertaking a program of maritime archaeological work before and during construction works on the site. These include

- Recording the remains of the wharf on the seabed prior to impact works, which would help understand the site formation processes associated with the demolition of the wharf.
- During the removal of timbers on the seabed, an archaeologist would inspect and record elements associated with the timbers to better understand the construction techniques used.
- Once the timbers on the seabed had been removed from the Project area, a series of maritime archaeological test trenches should be excavated to understand the potential for relics, patterning and dispersal of relics across the site.
- At the conclusion of the archaeological works, and during dredging works, the spoil bright up from the dredge within the area of the former wharf would be sieved by archaeologists to collect any remaining relics that may be present.

This archaeological program of works would help better understand the technical building techniques used in the post resumption and construction of wharves in Sydney Harbour in 1900. Archaeological test excavation and sieving of material would help understand the potential for relics to be present, but also allows for an assessment of whether artefact patterning is occurring and what the dispersal of relics is across the site. The results of this work would provide an insight in understanding the remainder of the archaeological site in Campbell Cove, but also site formation processes and artefact distribution present under the former wharf remains elsewhere in Sydney Harbour.

As the proposed works have been assessed as having a direct impact to an archaeologist site assessed as potentially containing relics, a Section 140 permit would be required prior to the Project commencing.

The rock armour scour protection works would be located along the western side of the OPT berth pocket, and would repair the existing scour protection already installed. The works would be contained to areas already impacted by the existing scour protection. This work is not expected to have any impact to the heritage significance or historical archaeological potential that has been identified in this report.

11.0 Conclusion and recommendations

The proposed capital dredging works and scour protection works at the OPT are likely to have an impact on archaeological remains present at the northern end of the berth pocket, in the area adjacent to the mooring dolphin. The additional depth of dredging required to provide a safe depth underkeel of vessels berthed at the OPT is up to 6m. The archaeological site relates for the former Wharf No. 7 built in Campbell Cove in 1901 and removed from the site in 1980. The wharf was constructed after the resumption of wharves in Sydney Harbor in 1900 and is believed to have been built under the new standard for wharf construction.

Opportunities to relocate the proposed works are not possible as the OPT is required to function as the overseas passenger terminal for curse ships entering Sydney Harbour. Impact to the former Wharf No. 7 cannot be avoided, and the impacts need to be mitigated.

Proposed mitigation measures include undertaking a controlled maritime archaeological program that would include recording, testing and the sieving of any dredge deposit remains that are present within the location of the former wharf. As the project has been assessed as impacting on potential archaeological (relic) remains associated with the former Wharf No. 7, the following recommendations can be made.

Aboriginal Heritage Recommendations

In light of the above key findings and Due Diligence Process Questions presented in Table 4, this Aboriginal Heritage Due Diligence Assessment provides the following management recommendations

1. This assessment has determined that Aboriginal objects may be encountered during the proposed works. Investigations of Aboriginal cultural heritage undertaken in accordance with the requirements of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b) however, are impractical within submerged contexts. Therefore, a robust unexpected finds procedure for Aboriginal heritage should be developed prior to commencement of works. The procedure should be developed to run concurrently with historic investigations (refer below) and include protocols for identifying and managing Aboriginal cultural heritage.

2. Should any Aboriginal objects be identified at any stage of the project, Port Authority of New South Wales may be required to apply for an Aboriginal Heritage Impact Permit (AHIP) under Section 90 of the National Parks and Wildlife Act 1974 (NPW Act 1974). Generally, applications for AHIPs must be supported by an Aboriginal Cultural Heritage Assessment Report (ACHAR) compiled in accordance with Section 3 of the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011). A process of Aboriginal community consultation should be carried out accordance with OEH's Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010a) must also be demonstrated.

3. In the event that human skeletal material (remains), are identified at any point during the Project, the procedure outlined in Appendix B should followed.

4. In the event that Aboriginal objects, including possible human skeletal material (remains), are identified at any point during the Project, the procedure outlined in Appendix B should followed.

Maritime Archaeological Recommendations

5. A Section 140 permit application should be submitted to Heritage NSW, Department of Premier and Cabinet, prior to the commencement of works. The application must include a maritime archaeological research design and methodology must be prepared that details the methodology for how the maritime archaeologist works would be conducted in conjunction with the proposed works. The document should include
   - Principal heritage specialists working on the project;

- Details regarding the stages of works to be conducted on site, include methodology for each site;
- How the works would be undertaken;
- Recording methods for each stage of works, ;
- Method for collecting and location for the storage of relics collected from the site which the artefact analysis is under taken; and,
- Reporting at the conclusion of the project.

12.0 References

Attenbrow, V. (2010). Aboriginal Fishing on Port Jackson, and the Introduction of Shell Fish-Hooks to Coastal New South Wales, Australia. In P. Hutching, D. Lunney, & D. Hochuli (Eds.), *The Natural History of Sydney* (pp. 16–34). Royal Zoological Society of New South Wales.

Attenbrow, Val. (2010). *Sydney's Aboriginal Past: Investigating the Archaeological and Historical Records*. University of New South Wales Press.

Attenbrow, Val. (2012). *Archaeological Evidence of Aboriginal Life in Sydney*. Dictionary of Sydney. http://dictionaryofsydney.org/entry/archaeological_evidence_of_aboriginal_life_in_sydney

Bradley, W. (1792). *A Voyage to New South Wales. The Journal of Lieutenant William Bradley RN of HMS Sirius 1786-1792*. Unpublished manuscript [Republished 1961 by The Trustees of the Public Library of NSW in assoc. with Ure Smith].

Coffey Pty Ltd. (2019). *Port Authority of NSW OPT Berth Deepening Investigations. Geotechnical and Geophysical Investigations Report*.

Collins, D. (1798). *An Account of the English Colony in New South Wales. Vol. 1.* (B. H. Fletcher (ed.)). T. Cadell Jun. & W. Davies [Republished 1975 by AH & AW Reed in assoc. with the Royal Australian Historical Society, Sydney].

Collins, D. (1802). *An Account of the English Colony in New South Wales. Vol. 2.* (J. Collier (ed.)). T. Cadell Jun. & W. Davies [Reproduced 1971 by the Libraries Board of South Australia. Australiana Facsimile Editions No. 76] Sydney].

Conybeare Morrison International. (2005). *Sydney Cove Passenger Terminal Extendible Gangways Heritage Impact Statement* (Issue November 2005). Prepared for Sydney Ports Authority.

Cosmos Archaeology Pty Ltd. (2014). *Overseas Passenger Terminal Wharf Extension , Sydney Cove Maritime Archaeological Survey and Circular Quay. Report Prepared for Sydney Ports* (Issue June).

Dawes, W. (1790). *Vocabularly of the Language of N.S. Wales, in the Neighbourhood of Sydney, Native and English*. Unpublished manuscript [Original in the Library of the School of Oriental & African Studies, London. Marsden Collection Ms 41645 (b). Microfilm in the ML of the SLNSW].

Department of the Environment. (2013). *Matters of National Environmental Significance, Significant Impact Guidelines 1.1*. Australian Government.

Dortch, C. (2002). Preliminary underwater survey for rock engravings and other sea floor sites in the Dampier Archipelago, Pilbara region, Western Australia. *Australian Archaeology*, *54*.

Dortch, C. E., & Morse, K. (1984). Prehistoric stone artefacts on some offshore islands in Western Australia*. *Australian Archaeology*, *May*, 31–47.

Etheridge, R. (1905). The further discovery of Dugong bones on the coast of New South Wales. *Records of the Australian Museum*, *6*(1), 17–19. https://doi.org/10.3853/j.0067-1975.6.1905.983

Horton, D. R. (1994). *The encyclopaedia of Aboriginal Australia: Aboriginal and Torres Strait Islander history society and culture* (D.R. Horton (ed.)). Aboriginal Studies Press: Australian Institute of Aboriginal and Torres Strait Islander Studies. https://doi.org/994/.0049915

Hunter, J. (1793). *An Historical Journal of the Transactions at Port Jackson and Norfolk Island, ...Including the Journals of Governors Phillip and King, and of Lieut. Ball; and the Voyages from the First Sailing of the Sirius in 1787 to the Return of that Ship's Company to*. J.Stockdale [Republished 1968 Australiana Facsimile Editions No.148, Libraries Board of South Australia, Adelaide].

Kohen, J. (1985). *Aborigines in the West: Prehistory to Present*. Western Sydney Project.

Kohen, J. (1988). The Dharug of the Western Cumberland Plain: Ethnography and Demography. In B. Meehan & R. Jones (Eds.), *Archaeology with Ethnography: An Australian Perspective* (pp. 238–250). Department of Prehistory, Research School of Pacific Studies, Australian National University.

Kohen, J., Knight, A., & Smith, K. V. (1999). *Uninvited Guests: An Aboriginal Perspective on Government House and Parramatta Park*. National Trust of Australia.

Kohen, J., & Lampert, R. (1987). Hunters and Fishers in the Sydney Region. In D. J. Mulvaney & J. P. White (Eds.), *Australians to 1788* (1st ed., pp. 343–365). Fairfax, Syme & Weldon Associates.

Kohen, James. (1995). *Aboriginal Environmental Impacts*. UNSW Press.

Lewis, S. E., Craig, B., Sloss, R., Murray-Wallace, Colin V Woodroffe, C. D., & Smithers, S. G. (2013). Post-glacial sea-level changes around the Australian margin: a review. *Quaternary Science Reviews*, *74*, 115–138.

NSW Heritage Division. (2014). *Sydney Cove West Archaeological Precinct*. http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=5054387

NSW Heritage Office. (2001). *Assessing Heritage Significance*. http://www.heritage.nsw.gov.au/docs/assessingheritagesignificance.pdf

NSW Heritage Office & Department of Urban Affairs & Planning. (2002). *Statements of Heritage Impact* (Issue 2). Heritage Office & Department of Urban Affairs & Planning. https://www.environment.nsw.gov.au/Heritage/publications/index.htm#S-U

NSW Heritage Office, & NSW Department of Urban Affairs and Planning. (1996). *NSW Heritage Manual*. Heritage Office & Department of Urban Affairs & Planning. http://www.heritage.nsw.gov.au/03_index.htm#M-O

Nutley, D. (2006). The Last Global Warming? Archaeological Survival in Australian Waters. *Flinders University Maritime Archaeology Monographs Series*, *10*.

Ross, A. (1988). Tribal and Linguistic Boundaries in Sydney at the Time of First British Settlement: A Reassessment of the Evidence. In G. Aplin (Ed.), *A Difficult Infant: Sydney Before Macquarie* (pp. 42–53). University of New South Wales Press.

Sydney Harbour Foreshore Authority. (2010). *The Rocks Heritage Management Plan: Strategies and Action* (Issue April). http://www.shfa.nsw.gov.au/content/library/documents/484E489C-F8E0-D933-8A58A3D803847A20.pdf

Sydney Harbour Foreshore Authority. (2012). *Campbell's Cove: Initial Archaeological Assessment*. Sydney Harbour Foreshore Authority.

Sydney Harbour Foreshore Authority. (2014). *The Rocks Conservation Area*. http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=4500458

Sydney Ports Corporation. (2014). *Sydney Cove Passenger Terminal*. http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=4560023

Tench, W. (1793). A Complete Account of the Settlement at Port Jackson. In T. Flannery (Ed.), *1788*. The Text Publishing Company.

Troy, J. (1994). *The Sydney Language*. J.Troy.

Westley, K., Trevor, B., Plets, R., & Rory, Q. (2011). Investigating Submerged Archaeological Landscapes: a research strategy illustrated with case studies from Ireland and Newfoundland, Canada. In *Submerged Prehistory* (pp. 129–134).

Yanko-Hombach, Valentina Mudie, P., & Gilbert, A. S. (2011). Was the Black Sea Catastrophically Flooded during the Holocene? – geological evidence and archaeological impacts. In *Submerged Prehistory* (pp. 245–261).

Appendix A – Cosmos Report

Sydney 46 Gale Road
Maroubra, NSW, 2035

Northern NSW 2 Queen St
Murwillumbah, NSW
P.O. Box 42 Condong, 2484

A.B.N. 83 082 211 498

General Inquiries +61 2 9568 5800
www.cosmosarch.com

Cosmos Archaeology Pty Ltd

Berthing Infrastructure Project Overseas Passenger Terminal

Maritime Archaeological Survey

DRAFT

Circular Quay
NSW

February 2020

Berthing Infrastructure Project – Overseas Passenger Terminal Maritime Archaeological Survey
Draft

Prepared for:
Ports Authority of NSW

By:
Jane Mitchell

February 2020

Cosmos Archaeology Job Number 20/01

Cover image: **Anon, 1860**. *Panorama of Circular Quay and Campbell's Cove from Dawes Point Battery, ca. 1860s,* Dixson Library, State Library of New South Wales, available at http://digital.sl.nsw.gov.au/delivery/DeliveryManagerServlet?embedded=true&toolbar=false&dps_pid=IE8795447&_ga=2.37822311.573868018.1580606235-1962520728.1528873966

TABLE OF CONTENTS

1 DIVE INSPECTION 2

1.1 DATES AND PERSONNEL 2

1.2 WEATHER AND TIDE CONDITIONS 2

1.3 CONDUCT OF SURVEY 3

1.3.1 Survey bias and accuracy *4*

2 SURVEY RESULTS 5

3 INTERPRETATION OF RESULTS 25

ANNEX A – VIDEO LOG 27

1 DIVE INSPECTION

1.1 Dates and Personnel

The archaeological dive inspection was carried out on 29th January, 2020. The inspection was undertaken by a commercial dive team from Professional Diving Services under the direction of a Maritime Archaeologist from Cosmos Archaeology. The team was made up of the following people:

Jane Mitchell	Maritime Archaeologist	Cosmos Archaeology Pty Ltd
Mal Venturoni	Supervisor	Professional Diving Services
Felix Venturoni	Supervisor/Diver	Professional Diving Services
Kent Clifton-Bligh	Supervisor/Diver	Professional Diving Services
Callum Harvey	Diver/Maritime Archaeologist	Professional Diving Services

1.2 Weather and Tide Conditions

Diving in Sydney Harbour near Circular Quay is not heavily affected by changes in tide however, previous rainfall carrying silt from land can severely dampen visibility. Fortunately minimal rainfall had occurred three days prior to the inspection and none had fallen on the diving day. The weather conditions that were taken into consideration in the approach to undertaking the inspection are outlined in Table 1 and Table 2.

Table 1: Tides for the survey day. [1]

29-Jan-2020	Time	0538	1159	1827
	Height (m LAT)	0.6	1.7	0.45

Table 2: Rain and wind conditions for the three days prior and for the day of the inspection. [2]

Date	Rain (mm)	Wind 09:00 (km/h)	Wind 15:00 (km/h)
26-Jan-2020	0.2	7 E	6 ENE
27-Jan-2020	0.0	54 S	17 ESE
28-Jan-2020	0.0	44 S	6 W
29-Jan-2020	0.0	17 S	17 SSE

[1] **Bureau of Meteorology, Australian Government, 2020,** Sydney tide table predictions, http://www.bom.gov.au/ntc/IDO59001/IDO59001_2020_NSW_TP007.pdf, accessed 29 January.

[2] **Bureau of Meteorology, Australian Government, 2020, '**Latest weather observations for Sydney Harbour', available http://www.bom.gov.au/climate/dwo/202001/pdf/IDCJDW2124.202001.pdf, accessed 29 January, 2020

1.3 Conduct of Survey

The survey was conducted by a commercial diver/maritime archaeologist under the direction of the maritime archaeologist. The inspection originally consisted of four transects in the area to the north of the overseas passenger terminal and two circular searches to the east of the terminal wharf. However, VTS restrictions, imposed on the day due to operational reasons, did not allow the completion of either of the originally proposed and approved circular searches or the 40 m eastern transect.

The surveys were conducted using Surface Supplied Breathing Apparatus (SSBA), with helmet mounted video and video lights. The diver also carried a hand-held Sony RX100-IV camera with video lights for taking still images. The diver was in communication with the boat and this allowed the maritime archaeologist to instruct the diver and receive observations of the seabed and any finds in real time. The diver carried a 100 m transect line marked at 5 m increments and a 1.3 m fibreglass probe marked in 0.1 m increments.

For Transect 1 South, the boat was moored to the southern side of the mooring dolphin. A shot line was dropped next to the dolphin as an attachment point for the transect line. The diver ran the transect line out 40 m to the south. Following the line back towards north, the diver took video footage of one side of the transect and then on the way back filmed the other side, thereby getting good coverage either side of the transect line. Once back at the starting point, the diver wound in the transect line stopping to probe either side of the line at every 5 m marker.

For Transect 2 North, Transect 3 South and Transect 5 West, a shot line was dropped at -33.856389°, 151.210556° and the diver ran the transect line out on the cardinal points to 40 m, 40 m and 20 m respectively. As VTS had restricted diving to the east of the central position it was decided to run a 20 m transect to the North-east (Figure 1).

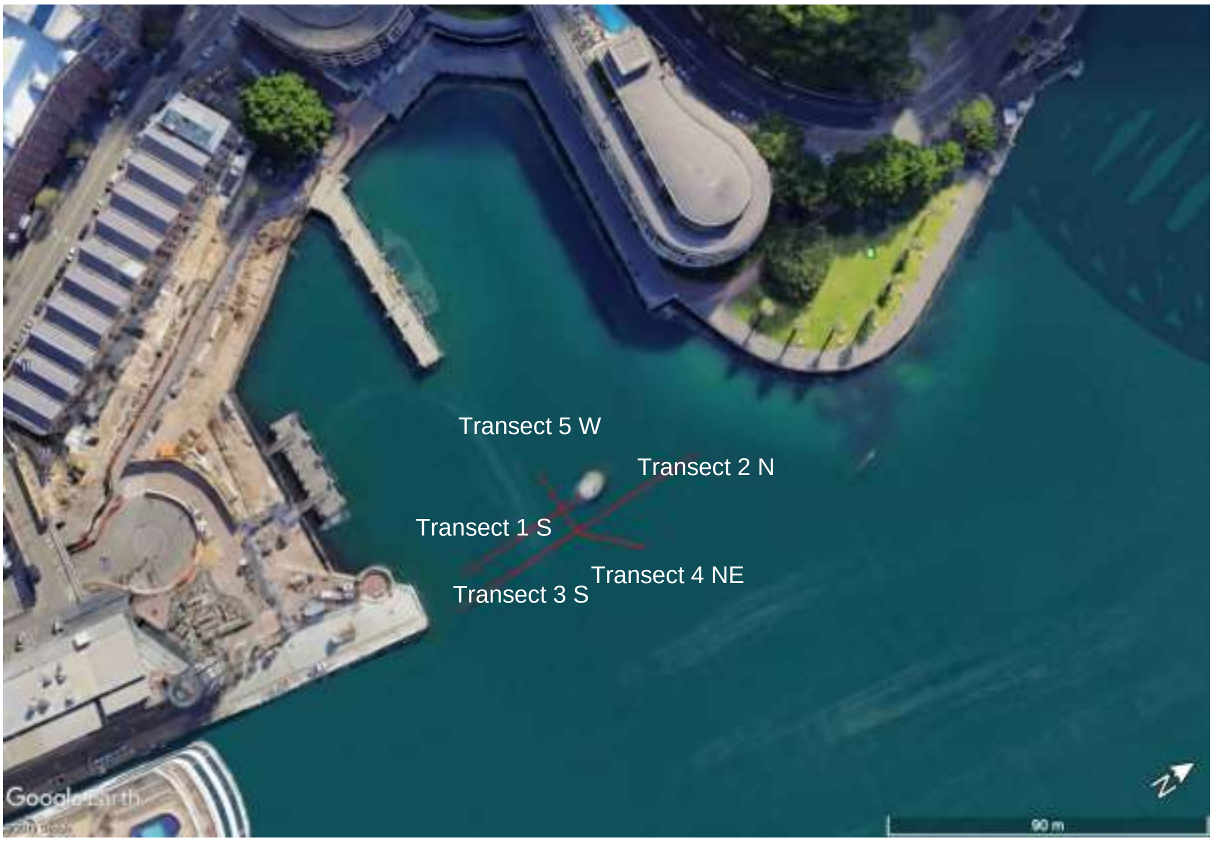


Figure 1: Transects run as part of the maritime archaeology survey at OPT. *(Base image Google Earth).*

1.3.1 Survey bias and accuracy

The following factors had an influence on the bias and accuracy of the survey:

Water visibility

The water visibility ranged from 0.2 m to 2 m which decreased as sediment was disturbed. On certain occasions during the inspection dive, the visibility dropped to 0 m due to current and direction of the dive. The water clarity had an effect on the width of the inspection corridor, which was on average, 2 m wide on either side of the baseline.

Sea bed visibility

For the majority of the survey area, the sea bed consisted of sand and silt with a covering of a shell grit and stands of kelp which reduced ground visibility dramatically. It is possible that smaller artefacts may have been overlooked.

Concretion and growth

The heavy covering of growth on many of the objects located during the survey, impeded the interpretation of the object. In particular, it was difficult to determine if there was copper sheathing on some of the recorded timber piles.

2 SURVEY RESULTS

The seabed throughout the study area was generally sandy with a light covering of silt and shell grit. Varying densities of kelp was spread throughout the study area. Visibility ranged mostly between 0.2 m through to 2 m throughout the diving surveys, although this was reduced depending upon the current and the direction of the dive. The depths of all the dives was under 15 m, with the surveys ranging between 7 m and 13 m.

Transect 1 S		
Date: *29 January, 2020*	***Method:*** *SSBA*	***Tide:*** *Flooding*
Distance and direction: *40 m south*	***Diver:*** *Callum Harvey*	
Time start (min): *0927*	***Time end (min):*** *0941*	***Total time (min):*** *14*
Depth: *7.2 - 11.1 m*	***Water visibility:*** *0.5 – 2 m*	***Seabed visibility:*** *Good*

The diver set the transect line, running 40 m to the south from the southern side of the dolphin. The depth on the southern side of the dolphin was 7.2 m while the depth at the southern end was 11.1 m. The seabed was sandy with scattered stands of kelp, lightly covered in silt with a heavy shell grit towards the southern end which became lighter as the diver moved north.

To the west of the transect at the 1 m mark a glass tube was recorded. The tube stood proud of the seabed 0.8 m with a diameter of 0.1 m. The tube was easily removed from the seabed and was hollow (Figure 2). It's function is currently unknown.

At the 3 m mark on the eastern side of the transect, a horse shoe and a small section of copper sheathing were recorded lying adjacent to each other (Figure 3). There was one visible fastening hole in the sheathing. From the 5 m mark, a 7 m length of pile lay in a SE to NW direction. The pile was 0.4 m diameter. The northern end appeared broken and heavily degraded (Figure 4). The pile was heavily encrusted with growth so any presence of metal sheathing was unable to be recorded.

A glass milk bottle was recorded just after the 15 m mark and a concrete block was lying crossing the centre of the transect at the 20 m mark. This block was embedded in the seabed at a 45° angle and measured 0.7 m x 0.3 m and was 0.15 m thick. A 2 m, 0.25 m wide plank lay across the transect in an east-west direction at the 25 m mark (Figure 5). Approximately one metre away a ceramic coffee cup was located, missing the handle (Figure 6).

On the western side of the transect a mobile piece of timber was recorded running parallel with the transect near the 30 m mark. The timber measured 0.4 m long, 0.05 m wide and 0.03 m high (Figure 7). On the eastern side of the transect between 30 m and 35 m there was brick rubble and bottles (Figure 8). On the western side there were two bricks and another bottle.

At the 40 m mark on the eastern side of the transect a concrete block measuring 0.3 x 0.4 m and 0.1 m thick. Immediately adjacent to the block were two links of a large chain heavily encrusted with growth (Figure 9).

No refusal was met when probing along the majority of the transect line. At the 25 m mark on the western side of the transect there was refusal at 0.9 m, while on the eastern side there was refusal between 0.4 to 0.8 m. There were no consistent depths of refusal around these points, so it is likely the obstruction was small rocks or concrete rubble. At 40 m, the probe hit refusal at 0.8 m but probing in the immediate area around this mark did not meet any further resistance.

For a digital representation of the transect see Figure 10.

Figure 2: Glass tube standing 800 mm proud of the seabed at 1 m mark west of transect line. *(PDS OPT Transect 1 South.)*

Figure 3: Horse shoe and sheet of copper sheathing at the 3 m mark on the east side of transect line. *(PDS OPT Transect 1 South).*

Figure 4: Northern (degraded) end of 7 m pile. *(PDS OPT Transect 1 South).*

Figure 5: Plank crossing transect at 25 m mark. *Top half of image indicated by red arrow. (PDS OPT Transect 1 South).*

Figure 6: Ceramic coffee cup with no handle at the 26 m mark to the east of the transect. *(PDS OPT Transect 1 South).*

Figure 7: Mobile timber recorded on the western side of transect near 30 m. *(PDS OPT Transect 1 South).*

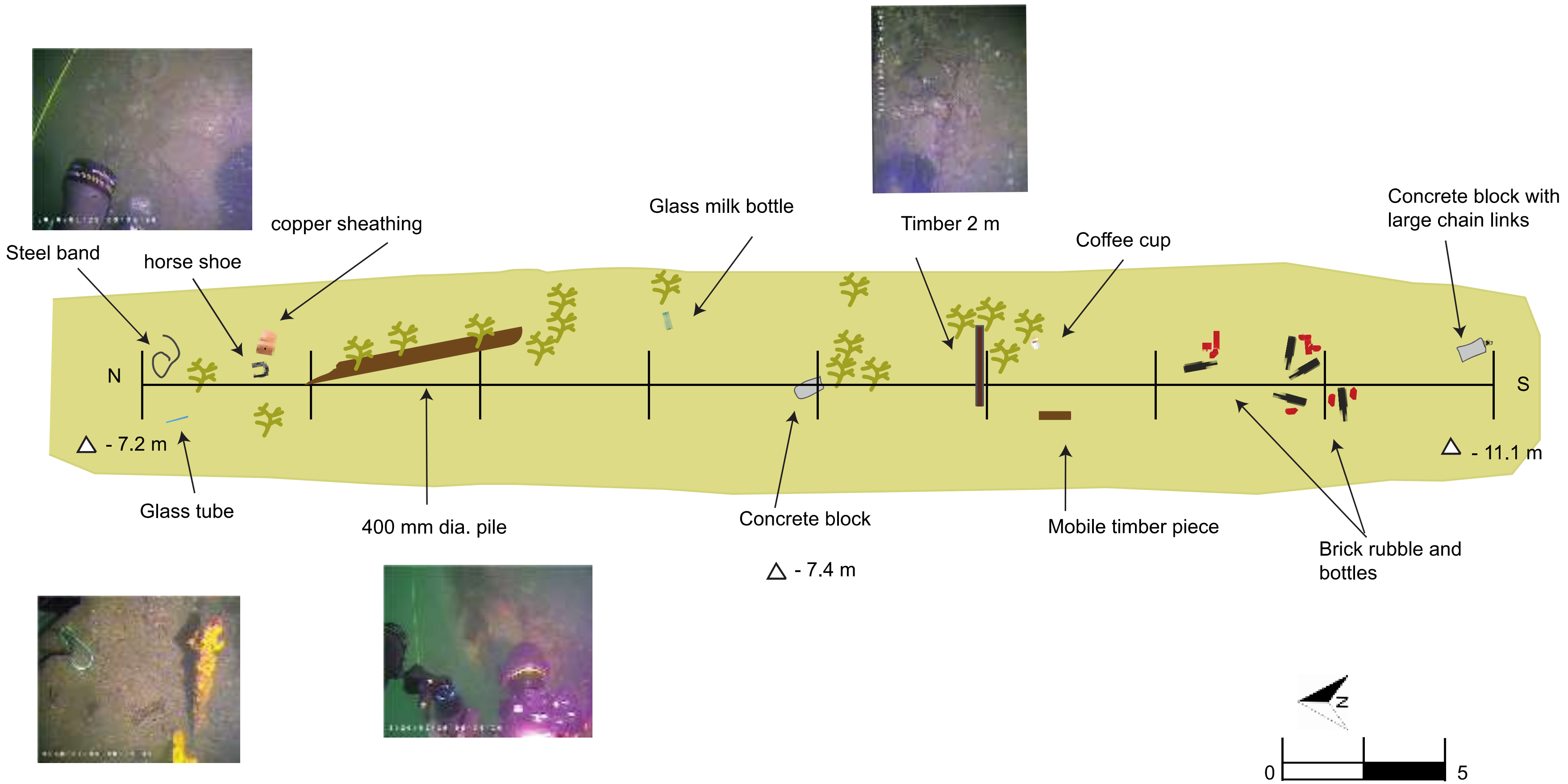
Figure 8: Example of bottles and brick rubble spread between 33 - 30 m. *(PDS OPT Transect 1 S).*

Figure 9: Chain link adjacent to concrete block to the east of the transect at 39 m. *(PDS OPT Transect 1 South).*

UNIT ID: ***Transect 1 South*** DATE: ***29 January 2020*** LOCATION: ***Circular Quay, Pverseas Passenger Terminal***

START TIME: ***0927*** FINISH: ***0941*** TOTAL TIME (MIN): ***14*** RECORDER: ***Jane Mitchell*** DIVER: ***Callum Harvey***

WATER VISIBILITY (METRES): ***0.5 - 2 m*** SEABED VISIBILITY: ***Good*** SPACING (METERS): ***5 m***



Cosmos Archaeology Pty Ltd

Figure 10: Digital representation of OPT Transect 1 South.

Transcect 2 N		
Date: *29 January, 2020*	***Method:*** *SSBA*	***Tide:*** *Flooding*
Distance and direction: *40 m north*	***Diver:*** *Callum Harvey*	
Time start (min): *1110*	***Time end (min):*** *1125*	***Total time (min):*** *15*
Depth: *8.3 – 9.9 m*	***Water visibility:*** *0.2 – 1 m*	***Seabed visibility:*** *Good*

The diver set the transect line, running 40 m to the north. The seabed had a gentle slope from 8.3 m down to a depth of 9.9 m at the northern end. The seabed was sandy, lightly covered in silt and shell grit, with scattered stands of kelp, apart from the area between 15 m and 30 m, which became very silty, reducing visibility in this area (Figure 11).

A concrete block was recorded on the eastern side of the transect at the 3 m mark (Figure 12). This block was rectangular, measured 0.3 x 0.4 mm and 0.1 mm thick and was resting at an approximate 45° angle into the seabed. Immediately adjacent to this block was a 1.2 m long ferrous pipe with a 0.5 m diameter running in a NE to SW direction (Figure 13).

Immediately passed the 5 m mark on the eastern side of the transect were two bottles, one broken at the neck. These appeared to be long neck beer bottles. A brick was partially buried at the base of a bottle (Figure 14). Another object, possible a piece of concrete, was recorded at 13 m and measured 0.6 m long x 0.1 m wide and 0.1 high.

An apparent concrete object was located at the 13 m mark. This was a thin piece of concrete measuring 0.6 long x 0.1 m wide and 0.1 m deep (Figure 15). A piece of what appeared to be concrete rubble was recorded on the western side of the transect at 18 m (Figure 17). At 23 m, a square concrete block was resting on the seabed. Measuring 0.4 m square, it was 0.25 m thick (Figure 15).

The only other material recorded was a bottle and a modern plastic bag (Figure 18).

No refusal was met when probing along the transect line, except for an area to the east of the line at the 5 m mark. The probe hit refusal at 1 m but probing in the immediate area around this mark did not meet any further resistance. In another area at the 20 m mark, there was refusal between 0.3 and 0.5 m beneath the seabed. There did not appear to be any pattern to the depth of refusal.

For a digital representation of the transect see Figure 19.

Figure 11: Example of seabed along Transect 2. *(PDS OPT Transect 2 N 0 to 40 m).*

Figure 12: Concrete block. *(PDS OPT Transect N 0 to 40 m).*

Figure 13: Ferrous pipe; 1.2 m long and 0.5 m diameter. *(PDS OPT Transect 2 N 0 to 40 m).*

Figure 14: Two long neck beer bottles with brick. *(PDS OPT Transect N 0 to 40 m).*

Figure 15: Concrete block at 45 degree angle. *(PDS OPT Transect 2 N 0 to 40 m).*

Figure 16: Square concrete block (0.4 m). *(PDS OPT Transect 2 N 0 to 40 m).*

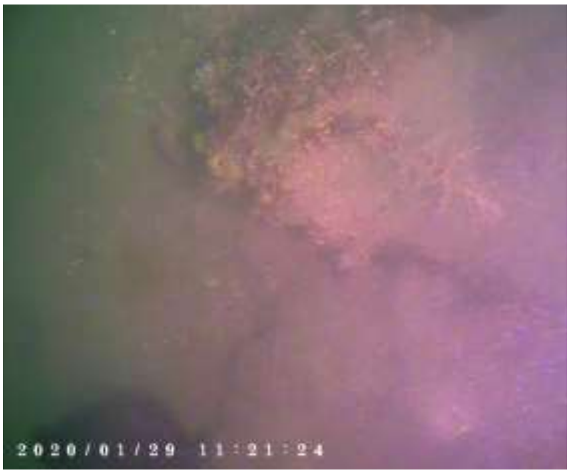


Figure 17: Concrete rubble. *(PDS OPT Transect N 0 to 40 m).*

Figure 18: Plastic shopping bag*. (PDS OPT Transect N 0 to 40 m).*

UNIT ID: ***Transect 2 North*** DATE: ***29 January 2020*** LOCATION: ***Circular Quay, Overseas Passenger Terminal***

START TIME: ***1110*** FINISH: ***1125*** TOTAL TIME (MIN): ***15*** RECORDER: ***Jane Mitchell*** DIVER: ***Callum Harvey***

WATER VISIBILITY (METRES): ***0.2 - 1 m*** SEABED VISIBILITY: ***Good*** SPACING (METERS): ***5 m***

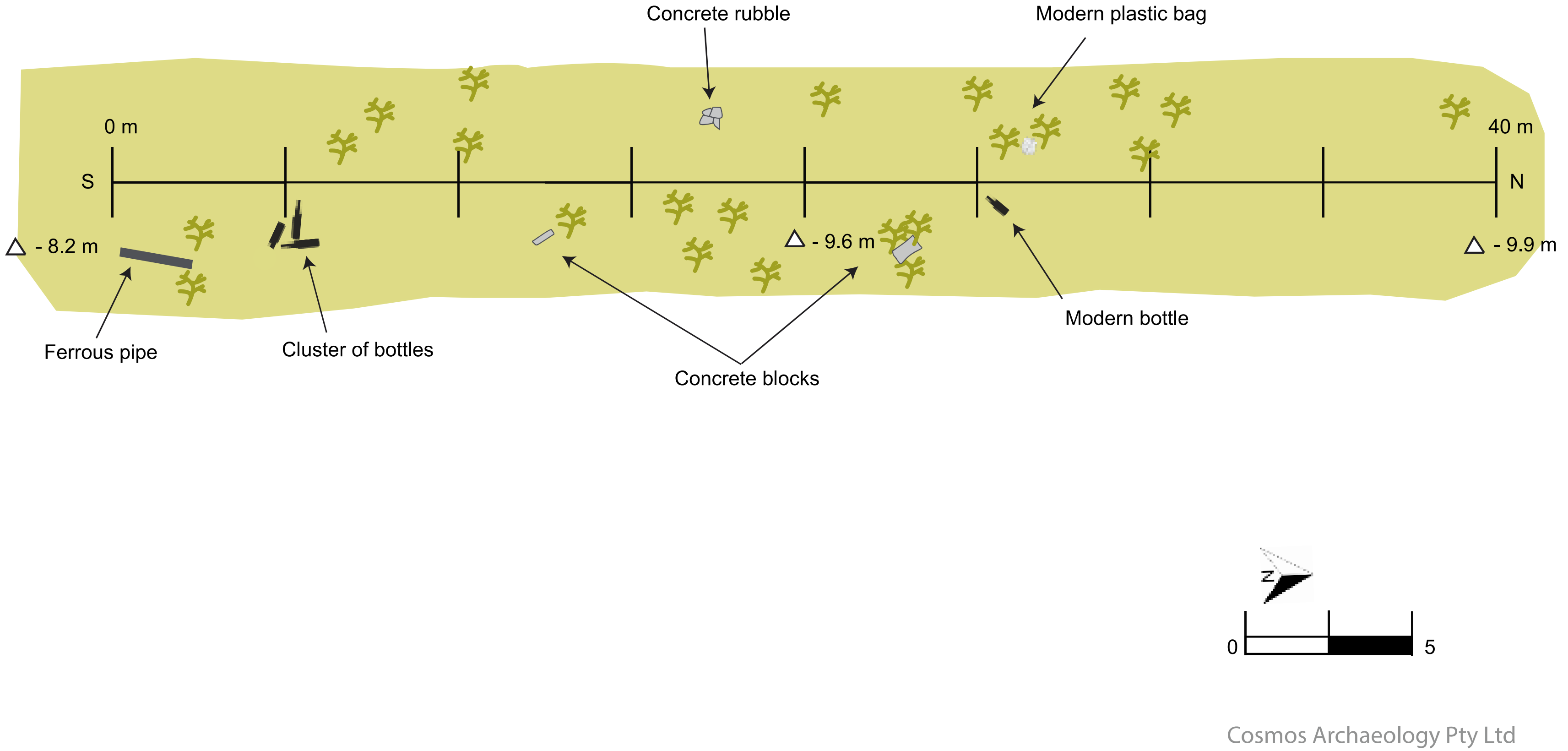


Figure 19: Digital representation of OPT Transect 2 North.

Transcect 3 S		
Date: *29 January, 2020*	***Method:*** *SSBA*	***Tide:*** *slack to ebbing*
Distance and direction: *40 m south*	***Diver:*** *Callum Harvey*	
Time start (min): *1147*	***Time end (min):*** *1214*	***Total time (min):*** *27*
Depth: *8.2 – 13.5 m*	***Water visibility:*** *0.5 – 1.5 m*	***Seabed visibility:*** *Good*

The diver set the transect line, running 40 m to the south. The depth at the southern end was 13.5 m. The seabed was sandy, lightly covered in silt and shell grit, with scattered stands of kelp. The seabed had a clay like texture between the 20 m and 30 m marks.

There was a length of flat hose, similar to a dredge or fire hose lying just underneath a light silt layer, on the eastern side of the transect between 5 m and 10 m (Figure 20). A concrete block was recorded running across the transect line at 6 m in an almost east to west alignment. The block was 2 m long and 0.3 m high. Immediately adjacent to the block, was a long ferrous pipe. The pipe was on the same alignment as the block, was 8 m long and had a diameter of 0.1 m. On the western side of the transect, the pipe had a right angled ferrous bracket made of flat bar attached to the southern side (Figure 21). On the eastern side of the transect, there were two ferrous spikes attached to the northern side of the pipe. Approximately, 2 m from the eastern end the pipe was bent as if something had tried to lift it or caught and dragged it. The pipe was bent in a V-shape for an approximately two metre section before disappearing into the seabed.

Twelve metres along the transect line, to the west a coil of lead or tin was buried in the sea bed. The material was coiled like a rope but the material acted more like a soft metal such as lead, as when bent it stayed in the bent position. The coil was heavily covered in sediment Figure 22). Just past the coil, there was a small collection of bottles, many broken and on the western side of the transect at 15 m a modern tyre was recorded. The tyre was embedded in the seabed at a 45° angle (Figure 23).

At 16m there was a thin strip of copper. The strip measured 0.20 long and 0.015 m wide. There were holes at regular intervals along the strip, potentially for fastenings (Figure 24). Continuing along the transect, there was more brick rubble and broken bottles. At 19 m along the transect there was a small piece of chain link (Figure 25). At 21 m along the transect a small piece of copper sheathing was recorded. Measuring 0.1 x 0.3 m, the metal was slightly concave and fastening holes were present. No fastenings were found with the sheathing piece (***Figure 26*** and Figure 25). Close to the piece of sheathing, a section of what appeared to be planking was buried in the sediment. The plank was 0.02 m thick and only a 0.05 m section was exposed (***Figure 27***).

A green glass bottle was recorded at 26 m along the transect. The bottle had a curved body and was 0.02 m tall. The body was lightly embedded in the silt (Figure 28).

On the eastern side of the transect, between the 30 m and 35 m mark a 4 m timber ran almost parallel with the transect line, measuring 0.25 m wide and 0.15 m thick. This is potentially a timber wale (Figure 29). A fastening hole 3 mm diameter was recorded at the northern end. No other fastening holes or fastenings were observed along the length of timber. The southern end was squared off. Sitting on top of this timber was another rounded timber running in a perpendicular direction (west to east). The western end was heavily degraded with a blackened appearance and the eastern end was degraded and heavily encrusted with growth. The timber was 0.30 m diameter and 2.5 m long (Figure 30).

At the 40 m mark there was brick rubble, bottles and a concrete block, resting on its edge measuring 0.6 x 0.7 and 0.05 m thick. There was also one bone fragment, large enough to be an animal bone such as cow or sheep.

The original probe was lost in the visibility and was replaced with a 2 m fibreglass pole marked at 0.1 m increments. No refusal was met when probing along the transect line, except for a ten metre area either side of the transect line of the line at 10 m. The probe hit refusal at 1 m but probing in the immediate area around this mark did not meet any further resistance.

For a digital representation of the transect see Figure 31.

Figure 20: Flat hose, potentially a dredge or fire hose recorded between 5 and 10 m along transect. *(PDS OPT Transect 3 South 40 to 0 m).*

Figure 21: Section of 8 m length of ferrous pipe with right angled bracket crossing the transect at 6.5 m mark. *Concrete block can be seen in the background. (PDS OPT Transect 3 South 40 - 0 m).*

Figure 22: Coil of soft metal material possibly lead or tin recorded 11 m along the transect. *(PDS OPT Transect 3 South 40 to 0 m).*

Figure 23: Tyre located 15 m along the transect. *(PDS OPT Transect 3 South).*

Figure 24: Short length of copper strip with fastening holes recorded at 17 m along the transect. *(PDS OPT Transect 3 South 40 to 0 m).*

Figure 25: Piece of chain link lying loose on the seabed at 19 m along the transect. *(PDS OPT Transect 3 South 40 to 0 m).*

Figure 26: Piece of metal sheathing with fastening holes. *The metal was slightly concave. (PDS OTP Transect 3 South 0 to 40 m).*

Figure 27: Buried timber, potentially a plank, measuring 0.02 m thick with only 0.05 m exposed. *Indicated by red arrow. (PDS OTP Transect 3 South 0 to 40 m).*

Figure 28: Green glass bottle with curved body at 26 m along transect*. (PDS OPT Transect 3 South 0 to 40 m).*

Figure 29: Timber, likely a waler, running almost parallel with the transect line between 30 and 35 m. *(PDS OPT Transect 3 South 40 to 0 m).*

Figure 30: Timber pile running perpendicular to wale timber (just visible underneath the pile) *[PDS OPT Transect 3 South 0 to 40 m).*

UNIT ID: ***Transect 2 South*** DATE: ***29 January 2020*** LOCATION: ***Circular Quay, Overseas Passenger Terminal***

START TIME: ***1147*** FINISH: ***1214*** TOTAL TIME (MIN): ***27*** RECORDER: ***Jane Mitchell*** DIVER: ***Callum Harvey***

WATER VISIBILITY (METRES): ***0.5 - 1.5 m*** SEABED VISIBILITY: ***Good*** SPACING (METERS): ***5m***

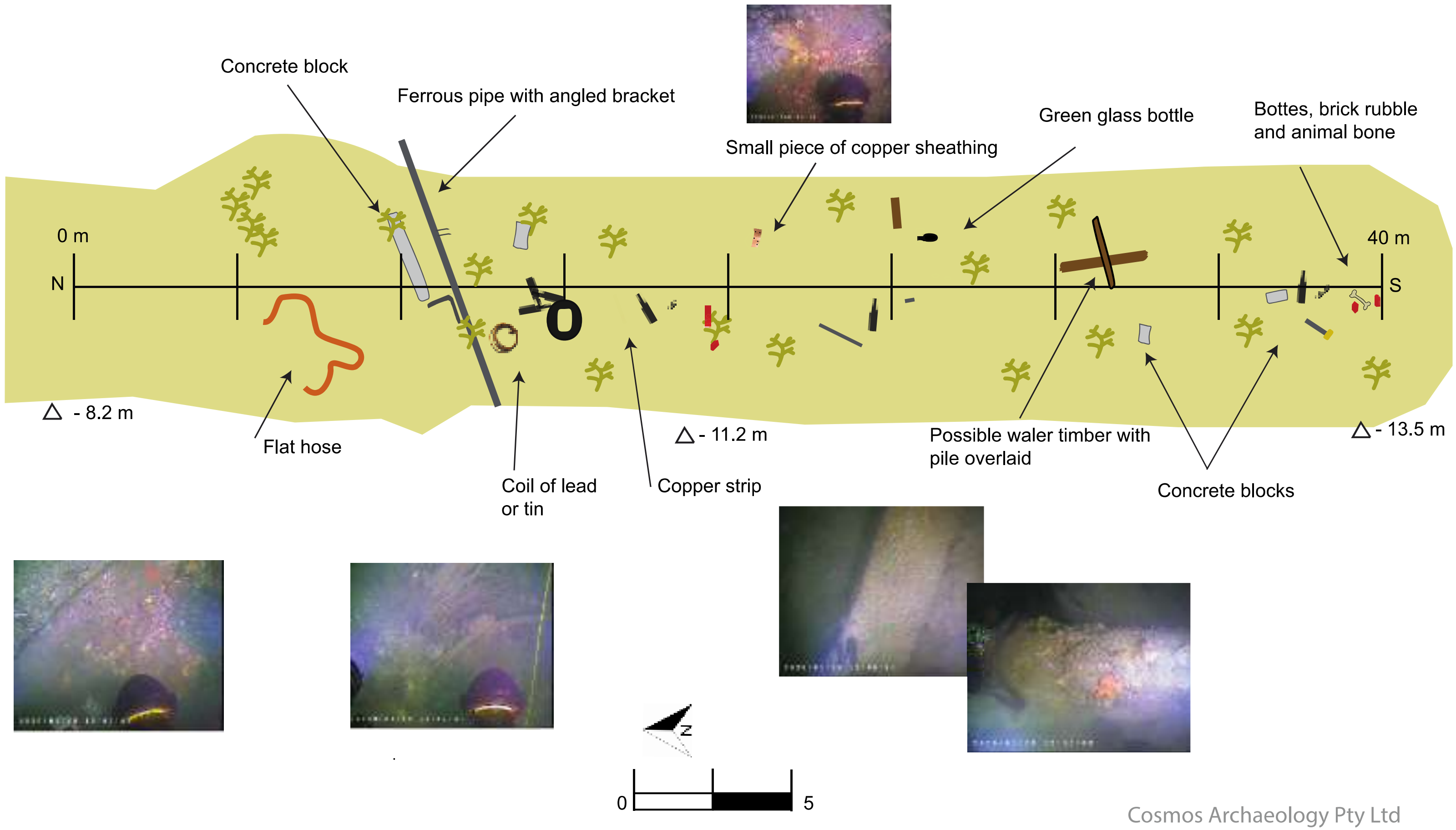


Figure 31: Digital Representation of OPT Transect 3 South.

Transect 4 NE			
Date: *29 January, 2020*	***Method:*** *SSBA*		***Tide:*** *Ebbing*
Distance and direction: *20 m north east*		***Diver:*** *Callum Harvey*	
Time start (min): *1240*	***Time end (min):*** *1253*		***Total time (min):*** *13*
Depth: *8.2 – 11.3 m*	***Water visibility:*** *0.5 to 1.5 m*		***Seabed visibility:*** *Good*

The diver set the transect line, running 20 m to the north west. The seabed was sandy, lightly covered in silt and shell grit, with scattered stands of kelp (Figure 32).

A pile stump was recorded along the transect line at the 2 m mark. The centre was heavily degraded making the top of the stump semi-circular. The pile stood 0.5 m proud of the seabed and measured 0.4 m in diameter. The pile was too degraded and heavily encrusted with growth obscuring any evidence of copper sheathing (Figure 33).

A timber branch was recorded loose on top of the seabed adjacent to this pile 1.5 m long x 50 mm diameter (Figure 34). Just past the 5 m mark on the transect a ferrous pipe, 1 m long x 80 mm in diameter. The pipe was hollow and appeared broken at both ends (Figure 35).

There was scattered concrete rubble along the rest of the transect (Figure 36) and the remnants of a shopping trolley were located on the western side of the transect just before the 15 m mark (Figure 37).

No refusal was met when probing along the transect line, except for one area to the west of the line at the 20 m mark. The probe hit refusal at 0.6 m but probing in the immediate area around this mark did not meet any further resistance.

For a digital representation of the transect see Figure 38.

Figure 32: Example of seabed on Transect 4. *(Professional Diving Services, OPT Transect 4 NE 0 to 40 m).*

Figure 33: Pile stump: 0.45 diameter and standing 0.5 m proud of the seabed. Very heavily eroded. *(PDS OPT Transect 4 NE 0 to 40 m).*

Figure 34: Tree branch resting loose on seabed. *Outline marked in blue. (PDS Transect OPT 4 NE 0 to 40 m).*

Figure 35: Ferrous pipe resting loose on seabed. *(PDS OPT Transect 4 NE 0 to 40 m).*

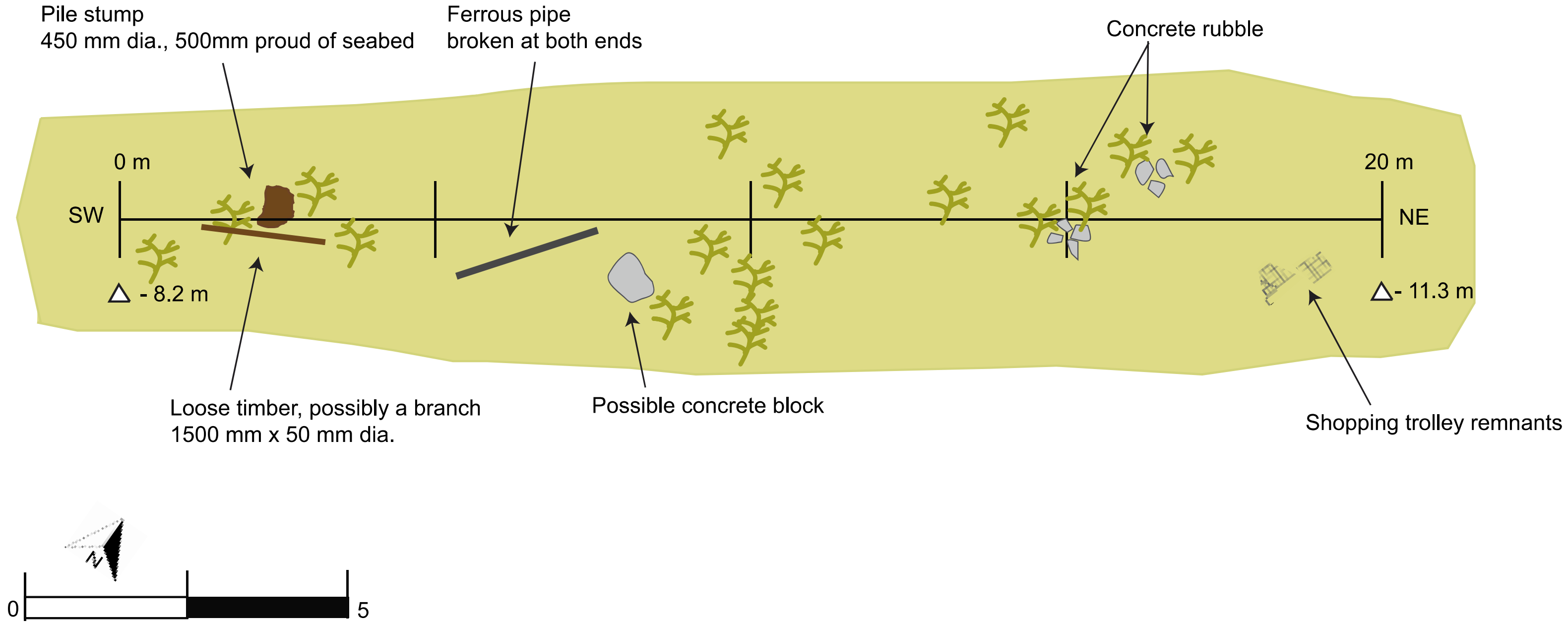
Figure 36: Concrete rubble *(PDS OPT Transect 4 NE 0 to 40 m).*

Figure 37: Grill from a shopping trolley, indicated with red arrow. *(PDS OPT Transect 4 NE 0 to 40 m).*

UNIT ID: ***Transect 4 North-east*** DATE: ***29 January 2020*** LOCATION: ***Circular Quay, Overseas Passenger Terminal***

START TIME: ***1240*** FINISH: ***1253*** TOTAL TIME (MIN): ***13*** RECORDER: ***Jane Mitchell*** DIVER: ***Callum Harvey***

WATER VISABILITY (METRES): ***0.5 - 1.5 m*** SEABED VISABILITY: ***Good*** SPACING (METERS): ***5 m***



Cosmos Archaeology Pty Ltd

Figure 38: Digital representation of Transect 4 North-east.

Transcect 5 W		
Date: *29 January, 2020*	***Method:*** *SSBA*	***Tide:*** *Ebbing*
Distance and direction: *20 m west*	***Diver:*** *Callum Harvey*	
Time start (min): *1258*	***Time end (min):*** *1310*	***Total time (min):*** *12*
Depth: *8.2 – 11.9 m*	***Water visibility:*** *0.5 – 2 m*	***Seabed visibility:*** *Good*

The diver set the transect line, running 20 m to the west, heading into Campbell's Cove. The depth at the western end was 11.9 m. The seabed was sandy, lightly covered in silt and shell grit, with scattered stands of kelp (Figure 39).

A small scattering of concrete rubble was present near the beginning of the transect line. At the 5 m mark, a 2 m length of concrete was recorded. This concrete was a rounded triangular shape and rose 0.1 m above the seabed. It appeared relatively new with only a small amount of growth, possible a piece of kerbing. A square potentially concrete block was located at the 11 m mark. Resting at a 45° angle, the block rose out of the seabed 0.1 m and measured 1 m x 0.3 m (Figure 40).

At the 13 m mark, a rounded object protruded 0.4 m from the seabed. Measuring 0.5 m x 0.3 m, the object appears narrow for a pile but was solidly embedded in the seabed and may have been heavily degraded (Figure 41). There was no obvious evidence of sheathing.

Another potential concrete block (0.4 x 0.4 x 0.3 m) was recorded at the 15 m mark and immediately adjacent to this block, a pile was recorded running in an approximate SE to NW direction (Figure 42). The pile measured 6 m long and was 0.4 m diameter. The SE end was heavily degraded, while the NW end appeared cut. It was heavily covered in growth obscuring any presence of copper sheathing.

No refusal was met when probing along the transect line, except for one area to the north of the line at 10 m. The probe hit refusal at 1 m but probing in the immediate area around this mark did not meet any further resistance.

For a digital representation of the transect see Figure 43.

For an overview of all five transects see Figure 44.

Figure 39: Example of the sandy seabed, lightly silted with a covering of shell grit and scattered strands of kelp. *(Professional Diving Services: OTP Transect 5 West 0 to 20 m)*

Figure 40: Potential concrete block at a 45 degree angle at the 11 m south of the transect line. *(Professional Diving Services: OTP Transect 5 West 0 to 20 m)*

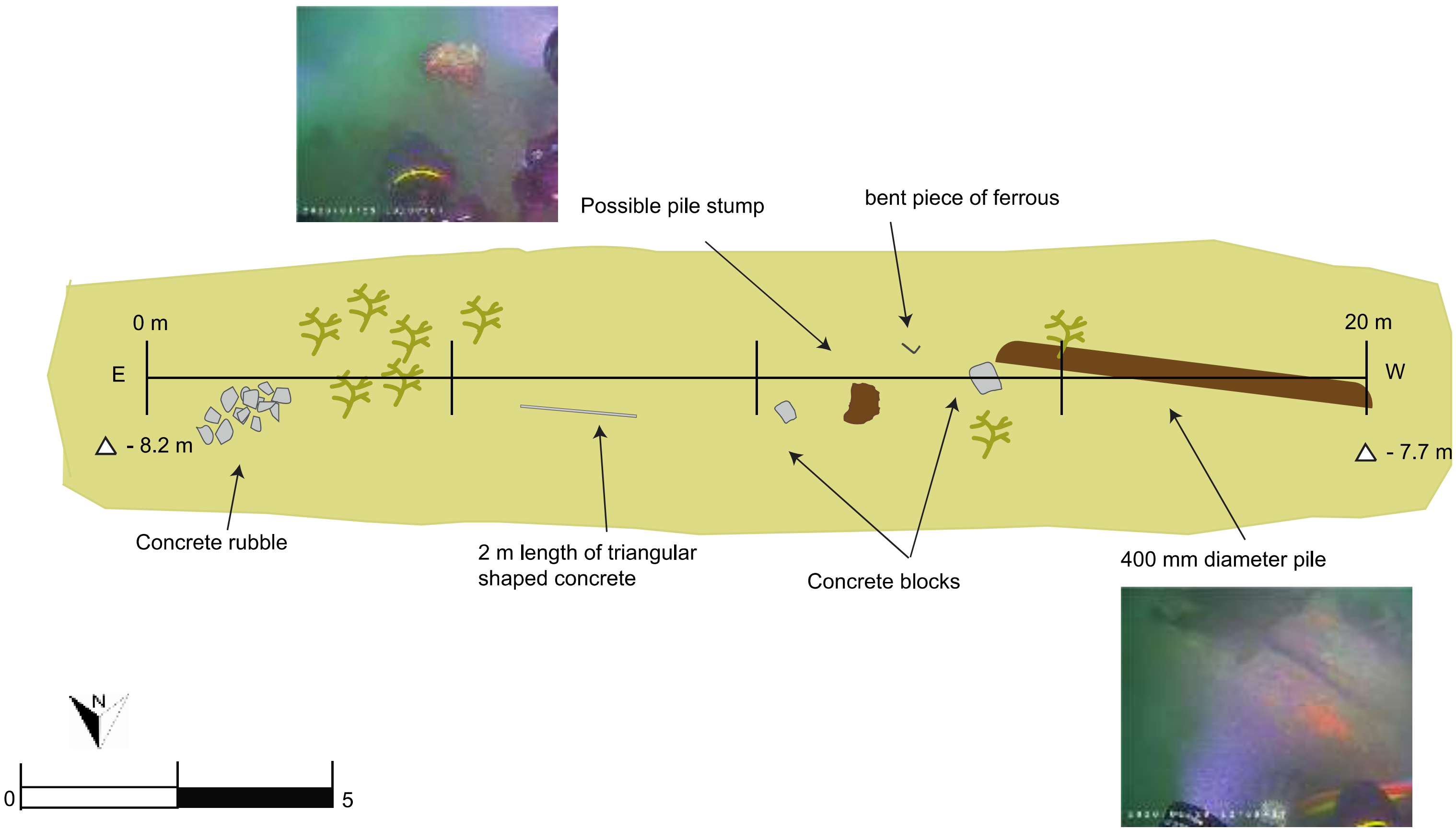
Figure 41: Potential pile stump, heavily degraded, south of the transect line at the 13 m mark. *(Professional Diving Services: OTP Transect 5 West 0 to 20 m (Professional Diving Services: OTP Transect 5 West 0 to 20 m)*

Figure 42: Pile recorded crossing the transect line at the 15 m mark running in a SE to NW direction. *(Professional Diving Services: OTP Transect 5 West 0 to 20 m)*

UNIT ID: ***Transect 5 West*** DATE: ***29 January 2020*** LOCATION: ***Circular Quay, Overseas Passenger Terminal***

START TIME: ***1258*** FINISH: ***1310*** TOTAL TIME (MIN): ***12*** RECORDER ***Jane Mitchell*** DIVER: ***Callum Harvey***

WATER VISIBILITY (METRES): ***0.5 - 2 m*** SEABED VISABILITY: ***Good*** SPACING (METERS): ***5 m***



Cosmos Archaeology Pty Ltd

Figure 43: Digital representation of Transect 5 West

Figure 44: Digital overview of all transects. *(Base image Google Earth).*

3 INTERPRETATION OF RESULTS

This maritime archaeological survey conducted to the east of the OPT mooring dolphin located near Campbell's Cove recorded items very similar in nature and variety to the maritime survey conducted in 2014.[3] (See Figure 45 for the areas covered by the 2014 and 2020 surveys). The archaeological remains present on the seabed included *in situ* pile stumps, cut sections of piles lying on the seafloor and other structural timbers, including possible timber walers. The amount of growth on these timbers prohibited the identification of any remnant copper sheathing, however, two loose pieces of sheathing were recorded lying loose on the seabed. The long ferrous pipe in transect 3 South likely carried water or other services along a structure and was attached lengthways with the angled bracket. These items are likely remains of the former Wharf No. 7 (1901-1980) in Campbell's Cove. Wharf No.7 was a longer and wider structure than the previous structure (built in 1876) in the Cove, and the location of the Dolphin is located at the western end of the 1901 wharf, beyond the eastern of the previous constructed 1876 wharf.

No relics were recorded on the seabed in the survey area. Other material such as bricks, a modern tyre, concrete rubble and bottle scatters were recorded. Some of this modern material is likely from the building of the OPT wharf extension.

Diver probing during the survey did not record any evidence of timbers lying underneath the seabed. Where refusal was felt underneath the seabed, it was unpredictable and random indicating rock or concrete scatter rather than lengths of timber or wharf remains.

[3] **Cosmos Archaeology Pty Ltd, 2014**, *Overseas Passenger Terminal Wharf Extension, Sydney Cove. Maritime Archaeological Survey and Statement of Heritage Impact.* Report prepared for Sydney Ports.

Figure 45: 2014 survey area (green) and 2020 survey area (red). *(Base image: Google Earth.)*

ANNEX A – VIDEO LOG

Video File	Description	File size
OPT Transect 1 S 0 to 40 m.mp4	Transect from southern side of dolphin 40 m to south	354.2 MB
OPT Transect 2 N 0 to 40 m.mp4	Transect from centre point 40 m to north	274.5 MB
OPT Transect 3 S 40 to 0 m.mp4	Transect from southern point to centre point 40 m	331.8 MB
OPT Transect 3 S 0 to 40 m.mp4	Transect from centre point to southern point 40 m	267.5 MB
OPT Transect 4 NE 0 to 20 m.mp4	Transect from centre point 20 m to north east	258.8 MB
OPT Transect 5 W 0 to 20 m.mp4	Transect from centre point 20 m to west	255.4 MB

Appendix B – Skeletal Remains: Stop Work Procedures

This section outlines the procedure that should be followed in the case that potential human remains are discovered during the life of the Proposed Activity. The procedure takes into account the following documents:

- Manual for the Identification of Aboriginal Remains (NSW Department of Environment & Conservation 2006);
- Skeletal Remains - Guidelines for the management of human skeletal remains under the Heritage Act 1977 (NSW Heritage Office 1998); and
- The Aboriginal Cultural Heritage Standards and Guidelines Kit (NSW NPWS 1997).

In the event that potential human skeletal remains are identified within the Proposed Activity area at any point during the Proposed Activity, the following standard procedure should be followed.

1. All work in the vicinity of the remains should cease immediately;
2. The location should be cordoned off - construction work can continue outside of this area as long as there is no risk of interference to the remains or the assessment of the remains;
3. Where uncertainty over the origin (i.e., human or non-human) of the remains exists, a physical or forensic anthropologist should be commissioned to inspect the exposed remains in situ and make a determination of origin, ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or modern):
    a. If the remains are identified as modern and human, the area will become a crime scene under the jurisdiction of the NSW Police;
    b. If the remains are identified as pre-contact or historic Aboriginal, the site should be secured and the relevant DPC office notified; and
    c. If the remains are identified as historic (non-Aboriginal), the site should be secured and the Heritage NSW (DPIE) notified.

Appendix G– Sediment Contamination Assessment Report

Port Authority of New South Wales

Overseas Passenger Terminal, Circular Quay

Sediment Contamination Assessment Report

August 2020

Executive summary

Port Authority of New South Wales (PANSW) is developing a plan to address sedimentation and rock outcrop issues at the sea bed in the vicinity of the Overseas Passenger Terminal (OPT) at Circular Quay. It is anticipated this plan will include dredging works to deepen the berth pocket resulting in the removal of an estimated 22,185 m^3 of sediment.

Dredging will involve the removal and disturbance of likely contaminated sediments within the berth of the OPT. This report provides the results of the contamination assessment of the sediments within the proposed dredging area.

The primary objectives of this investigation were to assess the results of the investigation with reference to relevant guidelines for the purpose of onshore and offshore disposal, including consideration of the potential for acid sulphate soils (ASS), in order to provide recommendations to PANSW for potential disposal options.

This summary should be read in conjunction with the statement of limitations outlined in Section 1.4 of this report.

Background

The site is the berth area off the OPT operated by PANSW is used to dock large commercial cruise liners. The area is also within the route of ferry traffic docking at Circular Quay. The site has been used as a commercial shipping port since the 1880s, with the OTP operating as a cruise terminal since 1960.

Limited historical information pertaining the contamination status of the site was available. GHDs review of previous investigations at the site noted the previous identification of mercury and polycyclic aromatic hydrocarbons (PAHs) above the ANZECC (2000) guideline levels and the presence of potential acid sulphate soils (PASS).

Sampling Approach

Sampling was conducted in October and November 2019 using vibrocoring methods. Fourteen sample locations within the dredging footprint of the OPT were targeted. Sampling locations were selected on a grid basis to obtain a representative assessment of the contamination within the sediments.

Samples were analysed under the NSW EPA (2014 Waste Classification Guidelines and the National Assessment Guidelines for Dredging (2009) – the NAGD (2009).

Key Findings

Two distinct groupings of units of marine/estuarine sediments were identified in the dredging footprint. Upper units (one or two units) consisting of a dark grey to dark brown clay to sand unit were present in the majority of cores (with the exception of VC04, VC09, VC10) with organic odour and shell fragments. Units below this were more variable with yellow-grey, pale grey, yellow-brown and ranged in grain size from sand to clay. No units showed any visual or olfactory evidence of gross contamination. Furthermore, PID readings from all sediments were at or below 1.2 ppm.

Under the waste classification guidelines, identified exceedances of the General Solid Waste CT1 criteria were for lead, mercury and benzo(a)pyrene (B(a)P) across the dredging footprint and at varying depths. A single exceedance of the Restricted Solid Waste CT2 criterion was identified for B(a)P. Analytical results for all other COPCs were below the guideline criteria

Following TCLP, all analytes were below the TCLP1 criteria for general solid waste. These results are considered to be representative of the larger dataset on which TCLP was not undertaken. For those analytes for which TCLP was performed, concentrations were also below the SCC1 (with TCLP) criteria for all samples.

Under the NAGD (2009) the following was identified:

- Exceedances of the screening levels (SQG_{low}) were identified for copper, lead, mercury, silver and zinc and exceedances of the NAGD (2009) SQG-high values for zinc and lead. The 95% UCLs for the exceeding metals also exceeded the SQG_{low} for copper, lead, mercury and silver and the SQG_{high} for zinc.
- The concentration of TPH in the fraction C_{10}-C_{36} (normalised to 1% TOC) were below the SQG_{low} of 550 mg/kg with the exception of VC12_0.0-0.5, and all samples were below concentrations of volatile TRH in the fraction C_6-C_{10} and BTEXN were reported below the laboratory limit of reporting (LOR) in all samples selected for analysis.
- PAHs were detected in samples VC02_0.0-0.5, VC07_0.0-0.5 and VC12_0.0-0.5 with exceedances of the SQG_{low} for a number of individual PAH d in these samples. The 95 % UCL is exceeded for Acenaphthylene, Benz(a)anthracene, Dibenz(a,h)anthracene, Fluorene and Phenanthrene.
- Concentrations of TBT (normalised to TOC) were above the LOR in three of eight samples submitted for analysis. The detected concentrations normalised to TOC were 19.4 µg Sn/kg, 20.3 µg Sn/kg and 1 µg Sn/kg, two of which (VC07_0.0-.5 and VC12_0.0-0.5) were above the NAGD (2009) SQG low of 9 µg Sn/kg.
- Total organic carbon ranged from 0.05 to 2.82 %.
- Total PCBs were detected, and exceeded the SQG_{low} in VC07_0.0-0.5 and VC12_0.0-0.5. The total PCBs is entirely comprised of Arochlor 1254 in both samples. The 95% UCL also exceeds the SQG_{low} with a value of 0.0566 mg/kg.
- Cyanide, herbicides, chlorinated hydrocarbons, explosives, nitroaromatics, nitrosoamines and phthalates were below the limit of reporting in all samples.

Due to 95% UCL exceedances of SQG_{low} the NAGD (2009) requires a Phase III analysis including elutriate analysis, which measures the release of contaminants from sediments into seas water. A sea water blank and three samples with exceedances of the SQG_{low} were analysed for PAH, PCB, copper, mercury and silver. No detects for any analytes were identified in the elutriate samples or the seawater blank.

Copper and silver were also assessed by the 1M HCl extractable metals method, this gives a closer estimate of the bioavailable fraction of the metals than the whole sediment analysis. Silver was not detected by the method in any of the three samples tested. Copper was below the SQG_{low} in all three samples.

Scattered occurrences of TBT were in the sediments, thought it appears the majority of the sediments only contain low levels of TBT, which is demonstrated by the fact that six of the eight tested samples reported TBT concentration at or below the laboratory PQL of 1 µg Sn/kg. While elutriate or bioavailability testing for TBT could not be completed for the two samples containing higher TBT concentrations due to limited amount of sediment samples available, elutriate testing of these two samples for other chemicals (including metals) showed no detections of COPC in the elutriate analysis or sea water blanks.

In regard to potential acid sulphate soils the results indicate the presence of PASS and potential acid generating capacity of the sediments.

Some dioxin compounds were present in all eight samples reporting WHO $TEQ_{(0.5\ LOR)}$ and I-$TEQ_{(0.5\ LOR)}$ averages of 19 and 34 respectively. Whilst Australian guidelines for dioxins are not currently available, these levels are within the range of background concentrations reported for Australian sediments (Muller et al., 2004)

Under the NSW EPA (2014) dioxin contaminated waste is subject to the Chemical Control Order in Relation to Dioxin-Contaminated Waste Materials (1986) (The Dioxin Waste CCO). This document defines dioxin contaminated waste as waste materials containing more than one part in 100 million (by weight; equivalent to 0.01 ppm, or 10 µg/kg) of dioxin. 2,3,7,8-TCDD was detected in two of the five samples analysed at a highest concentration of 6.5 ng/kg, therefore below the concentration regulated by The Dioxin Waste CCO and are not considered classified as dioxin contaminated waste.

Conclusions and recommendations

Overall, the findings of the investigation indicate the presence of contaminated sediments within the proposed dredging area. With reference to the objectives of this investigation, the following conclusions are made:

- **Suitability for on-shore disposal**: The chemical analysis of the material under NSW EPA (2014) and the Dioxin Waste CCO (1986) indicates the sediments would be suitable for disposal as GSW and should be disposed of to a facility with the appropriate license to receive material based on this classification.
- **Suitability for off-shore disposal:** Based on the finding of this investigation, the dredge sediment may be suitable for offshore disposal. It is recommended that PANSW seek information regarding the background contaminant levels at the preferred disposal site, particularly with reference to TBT and dioxin, to establish if offshore disposal would be appropriate, and to inform on the most suitable disposal location.
- **Consideration of potential for Acid Sulphate Soils**: Based on the results of the analysis for PASS it is indicated that PASS conditions are present within the dredge footprint. The ASSMP will be prepared to identify, manage and treat the PASS encountered during dredging to minimise the production of acid leachate. The dredging strategy should be designed to limit the timeframe for potential for oxidisation of the sediments. If offshore disposal were chosen the potential for ASS generation would reduce greatly due to sediments being transferred to the disposal area immediately after dredging, limiting time for oxidation. If onshore disposal was chosen, an ongoing monitoring of the excavated sediments is recommended to assess the liming requirements. To assist in outlining the procedures for PASS monitoring during excavation, GHD recommends that an Acid Sulphate Soil Management Plan (ASSMP) is prepared, as recommended by National Acid Sulfate Soil Guidance – Guidelines for the dredging of acid sulfate soil sediments and associated dredge spoil management (Water Quality Australia, 2018).

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.4 and the assumptions and qualifications contained throughout the Report.

Table of contents

1. Introduction....1
1.1 Background....1
1.2 Objectives....1
1.3 Scope....1
1.4 Limitations....1
2. Site setting....3
2.1 Geology and acid sulphate soils....3
3. Existing information....4
3.1 Previous sediment investigations....4
4. Basis for assessment....7
4.1 Offshore disposal....7
4.2 Onshore disposal....7
4.3 Acid sulphate soils....7
5. Methodology....8
5.1 Sediment sampling event....8
5.2 Sample analysis....9
5.3 Data evaluation....12
6. Results....14
6.1 Subsurface conditions....14
6.2 Waste classification results....14
6.3 NAGD results....17
6.4 Acid sulphate soils....20
6.5 Dioxins....21
6.6 Quality assurance and quality control....22
7. Discussion and conclusions....24
7.1 Waste classification....24
7.2 Analysis under NAGD (2009)....25
7.3 Acid sulphate soils....26
8. Recommendations....27
9. References....28

Table index

Table 1 Site identification details....3
Table 2 Summary of cores....8
Table 3 Summary of analysed samples....10

Table 4 Summary of viborocores and samples analysed for PSD....14
Table 5 Summary of information required by the NSW EPA for Waste Classification 15
Table 6 Summary of exceedances of the CT1 and CT2 criteria 16
Table 7 Summary of analytes exceeding nominated criteria 17
Table 8 Summary of Dioxin results 21
Table 9 Summary of quality control parameters 22

Appendices

Appendix A - Figures
Appendix B - Borehole Logs
Appendix C - Analytical results
Appendix D - Pro UCL outputs
Appendix E - Laboratory certificates
Appendix F - Calibration certificates

List of Acronyms

Abbreviation	Description
AASS	Actual Acid Sulphate Soils
ANC	Acid Neutralising Capacity
ANZECC/ARMCANZ	Australian and New Zealand Environment and Conservation Council/Agriculture and Resource Management Council of Australia and New Zealand
ASS	Acid Sulphate Soils
ASSMAC	Acid Sulfate Soils Management Advisory Committee
AVS-SEM	Acid Volatile Sulfide/Simultaneously Extracted Metals
BTEXN	Benzene, Toluene, Ethylbenzene, Xylene and Naphthalene
CD	Chart Datum
COC	Chain of Custody
COPC	Contaminant of Potential Concern
CRS	Chromium Reducible Sulphur
CSP	Continuous Seismic Profiling
DECC	Department of Environment Climate Change
DEMP	Dredging Environmental Management Plan
GSW	General Solid Waste
ISQG	Interim Sediment Quality Guidelines
JSEA	Job Safety and Environmental Analysis
LOR	Limit of Reporting
NAGD	National Assessment Guidelines for Dredging (2009)
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NODGDM	National Ocean Disposal Guidelines for Dredged Material (EA 2002)
NSW EPA	New South Wales Environmental Protection Authority
OCDD	octachlorodibenzo-p-dioxin
OCP	Organochlorine Pesticides
OPT	Overseas Passenger Terminal
PAH	Polycyclic Aromatic Hydrocarbons
PANSW	Port Authority of NSW
PASS	Potential Acid Sulphate Soils
PCB	Polychlorinated Biphenol
PID	Photo-ionization Detector
PQL	Practical Quantification Limits
PSD	Particle Size Distribution
RAP	Remedial Action Plan
RSW	Restricted Solid Waste
SOP	Standard Operating Procedure
TBT	Tributyltin

Abbreviation	Description
TCLP	Toxic Characteristic Leaching Procedure
TEQ	Toxic Equivalent Quantity
TOC	Total Organic Carbon
TRH	Total Recoverable Hydrocarbons
UCL	Upper Confidence Limit

1. Introduction

1.1 Background

Port Authority of New South Wales (PANSW) is developing a plan to address sedimentation and rock outcrop issues at the sea bed in the vicinity of the Overseas Passenger Terminal (OPT) at Circular Quay.

It is anticipated this plan will include dredging works to deepen the berth pocket resulting in the removal of an estimated 22,185 m^3 of sediment. PANSW is considering onshore and offshore disposal options which will be assessed based on the outcomes of geotechnical and geochemistry investigations.

PANSW has engaged GHD to assess the contamination status of the sediments in the overseas passenger berth, within the dredging footprint. It is understood that PANSW currently considers onshore disposal as the preferred option due to the limited design timeframe, however, offshore disposal is also being considered should the project timeframe allow.

1.2 Objectives

The objective of this report is to document the following regarding the contamination status of the sediments in the berth off the OPT at Circular Quay:

- The analysis results of the sediment samples collected by GHD in October and November 2019.
- The results of the analysis in relation to the NSW EPA (2014) *Waste Classification Guidelines* (“the waste classification guidelines”).
- The results of the analysis in relation the National Assessment Guidelines for Dredging (2009) (“the NAGD”).
- The potential presence of Acid Sulphate Soils (ASS)
- Recommendations for PANSW regarding further action required in regards to the contamination for both onshore and offshore disposal options.

1.3 Scope

To achieve the stated objectives GHD undertook the following scope of works:

- Prepared a Job Safety and Environmental Analysis (JSEA) for site works
- Undertook sub-sampling of sediments from vibrocore cores
- Submitted sediment samples to the National Association of Testing Authorities (NATA) accredited laboratory for analysis of the contaminants of potential concern as outlined in Section 5.2.
- Prepared this report in accordance with the NSW EPA (2014) and the NAGD (2009).

1.4 Limitations

This report: has been prepared by GHD for Port Authority of New South Wales and *may only be used and relied on by Port Authority of New South Wales for the purpose agreed between GHD and the Port Authority of New South Wales as set out in section 1.2 of this report.*

GHD otherwise disclaims responsibility to any person other than Port Authority of New South Wales arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Port Authority of New South Wales and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

2. Site setting

Table 1 Site identification details

Feature	Details
Address	10 – 48 Circular Quay West, Sydney, NSW, 2000
Lot/DP	1/DP876516 (OPT building)
Site coordinates	33.8580°S 151.2101°E
Site operator	Ports Authority of New South Wales (PANSW)

The site is the berth area off the OPT operated by PANSW is used to dock large commercial cruise liners. The area is also within the route of ferry traffic docking at Circular Quay.

The site has been used as a commercial shipping port since the 1880s, with the OTP operating as a cruise terminal since 1960.

The area is tidally influenced and the seabed is at approximately -10.7 m chart datum (CD) with some variation from -16 m CD to 0 m CD across the site, as shown in the bathymetric survey provided to GHD by PANSW. Chart datum is -0.95 m AHD. The elevated sea bed is at north-west and south-west of the site.

2.1 Geology and acid sulphate soils

The Sydney 1:100,000 Geological Sheet (Herbert, 1983) shows the bedrock as Hawkesbury Sandstone overlain by alluvial and estuarine sediments and anthropogenically derived fill.

The units which comprise the geology are described as follows:

- Hawkesbury Sandstone – medium to course grained sandstone with minor shale and laminite.
- Alluvial and estuarine sediments – Quaternary age sediments ranging from clay to sand with shell layers.
- Anthropogenically derived fill – dredged sediments, demolition waste, and industrial and household waste.

Top of rock was interpreted by Coffey (2019) at -39 m CD to -5 m CD with the shallowest rock outcropping in the north-east of the site and the change in elevation approximately corresponding to the changes in sediment thickness.

Continuous seismic profiling (CSP) by Coffey (2019) shows that sediment ranges from 0 to 30 m. With the thinnest sediment at the north-west of the site and along the western wall of the berth, closest to the OTP.

The sediments in the area are mapped as a high probability occurrence for ASS (Land & Water Conservation, 1997). Sediments containing ASS will require classification and / or treatment in accordance with NSW Environment Protection Authority (EPA)'s Waste Classification Guidelines -Part 4: Acid Sulfate Soils (2014), should they be proposed for onshore disposal.

3. Existing information

The following reports on previous works at the site were provided to GHD by PANSW:

- Douglas Partners (2014) Report on Sediment Quality Assessment – Overseas Passenger Terminal – Wharf Extension, Mooring Dolphin and Caisson Protection (Circular Quay)
- Arup (2019) OPT Berth Infrastructure – Desktop Study – Existing Geotechnical Data (Arup Memorandum)
- Coffey (2019) OPT Berth Deepening Investigations – Geotechnical and Geophysical Investigations Report (draft)

Of these reports, two (summarised below) are relevant to the site contamination. Arup (2019) and Coffey (2019) provide information on geotechnical conditions only and were reviewed for background information.

3.1 Previous sediment investigations

3.1.1 Douglas Partners (2014) Sediment Quality Assessment

Location	Overseas Passenger Terminal - Circular Quay
Scope / objectives	To determine the likely contaminants, potential acid sulphate soils (PASS) and preliminary in situ waste classification of material for land-based disposal. To provide advice on the options of either re-using the dredged spoil as filling on other parts of the site or disposal of the spoil off-site.
Sampling	Sampling consisted vibro coring or Petite Ponar bottom sampling dredge of 6 sediment samples to a maximum of 0.2m depth. Samples were taken from locations approximately evenly spaced around the wharf extension, Mooring Dolphin and Caisson Protection. Visual assessment and chemical testing was conducted on 5 sediment samples. Visual assessment consisted of inspection of samples for signs of concern (e.g. staining, odours, hydrocarbon sheen and asbestos cement etc.). Chemical testing included analysis for metals, Polycyclic Aromatic Hydrocarbons (PAH), Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene and Xylenes (BTEX), Organochlorine Pesticides (OCP), Organophosphorus Pesticides (OPP), total phenols, Polychlorinated Biphenyls (PCB), asbestos, Tributyltin (TBT) and potential acid sulphate soil (PASS).

Relevant findings

The following findings were made regarding sediment contamination:

- Sediments contained PASS but there was a significant quantity of shells which could partially neutralise acids formed from the exposure of soils to air and oxidation.
- The disposal of the dredged spoil off site to a landfill could have a soil classification of General Solid Waste (TCLP1) (according to the DECCW Waste Classification Guidelines 2009) provided a confirmation that no liming is required as a result of ex-situ PASS testing.

- Levels of mercury and PAH in some samples exceeded the high trigger values of the ANZECC (2000) Interim Sediment Quality Guidelines (ISQG). Indicated potential risk to the marine environment and the need for further investigations to determine bioavailability.
- No asbestos was present in samples.

Conclusions and recommendations

Based on the findings of the works completed by Douglas Partners (2014), the following conclusions were made:

- The two main options for disposal of the dredged spoil were re-use as reclamation fill on site, behind retaining walls or disposal to landfill.
- If used as reclamation fill then the high levels of contaminants, such as mercury and PAH, would not have a significant impact on the marine environment. Although if the PASS spoil is placed above the water table and can oxidise it should be tested ex-situ for actual acid sulphate soils (Quantification Limits)
- If the spoil is disposed off-site to a landfill the solid and liquid phases need to be separated. The solid phase should be tested for ASS and the need for liming prior to landfilling as General Solid Waste (non-putrescible). The liquid phase should be tested for pH and suspended solids prior to disposal into the harbour.

3.1.2 GHD Geotechnics (2006) Preliminary Geotechnical and Geochemical investigation as summarised in Arup Memorandum (2019)

Location Campbells Cove – Circular Quay

Scope / objectives To determine the geochemistry of the proposed dredged sediment and likely foundation materials for vessel anchorages.

Sampling Sampling consisted of 10 vibrocoring from the seabed to 3.5m depth until refusal within the Campbells Cove area.

Physical properties testing and chemical testing was conducted on 6 soil samples. Physical properties testing consisted of soil classification tests by particle size distribution, Atterberg limits and moisture content. Chemical testing included acid sulphate soil assessment and geochemical analysis.

Acid sulphate soil assessment involved PASS indicator tests and Peroxide Oxidised Combined Acidity and Sulphate (POCAS) testing. Geochemical analysis determined levels of metals, TPH/BTEX, PAH, OCP, and toxicity characteristic leaching procedure (TCLP).

Relevant findings

The following findings were made regarding sediment contamination:

- Total Potential Acidity (TPA) of 660 Mol H+/tonne of the sediment exceeding the trigger level of 62 Mol H+/tonne set by the Acid Sulphate Soils Advisory Committee (ASSMAC, 1998).

Conclusions and recommendations

Confirmation of PASS nature of the sediment by the ASSMAC guidelines.

Classification of the material as inert waste due to Practical Quantification Limits (PQL) being consistent with the Waste Guidelines PQL requirements.

4. Basis for assessment

Relevant assessment criteria for onshore and offshore disposal are presented in the following sections, with the specific criteria presented in the tables in Appendix C.

4.1 Offshore disposal

The assessment criteria for dredged sediment for potential offshore disposal were sourced from:

- National Assessment Guidelines for Dredging (NAGD 2009).
- ANZECC/ ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality (as recommended in the NAGD ((Commonwealth of Australia, 2009)).
- ANZAST (2018) Australia and New Zealand Guidelines for Fresh and Mine Water Quality - Toxicant default guideline values for sediment quality (ANZAST, 2018)

4.2 Onshore disposal

For waste classification purposes to support potential onshore disposal, the results were reviewed with reference to:

- NSW EPA (2014) *Waste Classification Guidelines*
- Chemical Control Order in Relation to Dioxin-Contaminated Waste Materials (1986) (The Dioxin Waste CCO).
- Chemical Control Order in Relation to TBT-Contaminated Waste Materials (1988) (The TBT Waste CCO)

4.3 Acid sulphate soils

The assessment for acid sulphate soils was based on the following:

- QLD (2014) Acid Sulfate Soils Technical Manual – Soil management Guidelines V4.0 based on greater than 1,000 tonnes of fine texture soils to be disturbed. Which is based on the guidelines of the Acid Sulphate Soils Management Advisory Committee (ASSMAC 1998).
- Dear, S-E., Ahern, C. R., O'Brien, L. E., Dobos, S. K., McElnea, A. E., Moore, N. G. & Watling, K. M., 2014. Queensland Acid Sulfate Soil Technical Manual (QASSTM): Soil Management Guidelines. Brisbane: Department of Science, Information Technology, Innovation and the Arts, Queensland Government (Dear et al 2014).
- National Acid Sulfate Soil Guidance – Guidelines for the dredging of acid sulfate soil sediments and associated dredge spoil management (Water Quality Australia, 2018).

It is generally accepted that the 1998 ASSMAC Guidelines, whilst still useful as a reference document, have been superseded in terms of up to date scientific research and management practices and therefore the QASSTM takes precedence. The National Acid Sulfate Soil Guidance is adopted as a reference for potential management measures during the dredging process.

5. Methodology

5.1 Sediment sampling event

Sample locations consisted of 14 vibrocore locations VC01-VC14, these locations are shown on Figure 1, Appendix A and summarised in Table 2.

Table 2 Summary of cores

Borehole	Date	Penetration Achieved	Sample recovery	% recovery
VC01	30/10/2019	1.58	1.10	70
VC02	31/10/2019	2.45	1.60	65
VC03	30/10/2019	1.32	1.10	83
VC04	31/10/2019	1.10	1.00	91
VC05	30/10/2019	0.90	0.90	100
VC06	31/10/2019	1.00	1.00	100
VC07	30/10/2019	1.55	1.20	77
VC08	31/10/2019	2.45	1.60	65
VC09	30/10/2019	0.95	1.00	105[1]
VC10	31/10/2019	1.30	0.80	62
VC11	30/10/2019	3.00	1.20	40
VC12	31/10/2019	1.36	1.20	88
VC13	31/10/2019	1.60	1.10	69
VC14	31/10/2019	2.43	1.40	49

Notes:

[1] Recovery of more than 100 % is due to swelling of sediment upon retrieval.

Drilling was conducted from a 13 m dedicated workboat, fitted with a Hiab crane and winch.

The vibrocore comprises a tripod frame with the vibrocore tube attached in the centre. Drilling was advanced using 3 m long, 80 mm diameter aluminium vibrocore tubes with a plastic liner and a detachable core catcher on the base. The crane was used to lower the vibrocore frame to the seabed, at which point it was advanced into the sediment with a motor. Once refusal or target depth was achieved, the vibrocore was raised back to the boat and the liner with contained sediment removed to allow subsampling.

Core recovery was continuous with variable recoveries as described in Table 2. Reduced sample recovery can often be attributed to the stiffness of sediment preventing the core catcher from closing immediately, leading to loss of sediment from the base of the core.

Additional opportunistic sampling was conducted by GHD during Coffey's geotechnical assessment (Coffey, 2019) at locations BH05, BH06 and BH07 as marked on Figure 1, Appendix A on 7 November 2019.

All samples were collected with a new pair of nitrile gloves directly from the vibrocore liner. Sub sampling comprised:

- One subsample over a 0.1 m interval at 0.5 m increments along the entirety of the core e.g. 0.0 m to 0.1 m; 0.5 to 0.6 m for acid sulphate soil.
- One subsample over a 0.1 m or 0.2 m interval at as many increments along the entirety of the core as were possible with the available sediment volume e.g. 0.0-0.1, 0.0-0.2, 0.3-0.4.
- A bulk homogenised samples representing a 0.5 m interval at 0.5 m increments along the entirety of the core, e.g. 0 m to 0.5 m; 0.5 m to 1.0 m, as per the NAGD (2009).

Samples were collected in 250 ml glass sample jars and filled to the brim and sealed with Teflon lined caps to lower the potential for loss of volatile contaminants. Samples for acid sulphate soil analysis and sealed in designated zip lock bags, providing approximately 100 g of sediment. Samples for particle size distribution analysis sediment was collected and sealed in designated zip lock bags providing approximately 500 g of sediment. Samples were stored on ice immediately after being sampled.

Samples collected in bags for acid sulphate soil analysis were measured in the field with phot-ionization detector (PID), fitted with a 10.6eV lamp and calibrated with isobutylene gas at a concentration of 100 ppm, as per GHD's standard operating procedure (SOP). The instruments calibration certificate is provided in Appendix F. PID readings are presented on the borehole logs in Appendix B.

Quality control samples were taken to represent 10% of the samples collected. These were labelled FD01 – FD10.

Rinsate samples were taken from the trowel used for sediment sampling, for confirmation of correct decontamination protocol. One rinsate sample was taken for each day of sediment sampling (three in total).

For each day of sampling a trip spike and trip blank was also analysed (three in total).

The test reports, chains of custody (COC), and sample receipts are provided in Appendix E.

The samples number of samples selected for analysis and the analytes are summarised in Section 5.2.

5.2 Sample analysis

Sampling frequency was derived based on 22,185 m^3 of material to be dredged on the assumption that the total amount dredged will not exceed this, should this volume be increased, further sampling may be required.

The NSW EPA (2014) *Waste Classification Guidelines* do not describe a minimum number of samples required for the classification of waste. As such, GHD referred to Table A of the NSW EPA (1995) *Sampling Design Guidelines* and the recommended sample density for stockpiled material as described in the VIC EPA (2009) *Industrial Waste Resource Guidelines*. These guidelines advise that when utilising the 95% UCL for contaminants a sampling frequency of 1:250 should be used, i.e. one sample for every 250 m^3 of waste material.

Table 6 of the NAGD (2009) outlines a sampling frequency based on the volume of material to be dredged, based on the volume estimate provided by PANSW, eight sampling locations were required in order to accurately assess the contamination at the site.

The following analytes were selected and are based on the limited prior contamination information at the site, information in the NAGD (2009), common contaminants in urban marine environments in Australia and Table 1 and Table 2 of the NSW EPA (2014).

- Particle size distribution (PSD)
- Metals
- Benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN)
- Total recoverable hydrocarbons (TRH)
- Polycyclic aromatic hydrocarbons (PAHs)
- Organochlorine pesticides and organophosphate pesticides (OCP and OPP)
- Polychlorinated biphenyls (PCBs)
- Dioxins
- Tributyltin (TBT)
- Total organic carbon (TOC)
- Fluoride
- Cyanide
- Semi volatile organic compounds (SVOC) including halogenated hydrocarbons, chlorinated hydrocarbons, explosives, Promanide, nitroaromatics, nitrosoamines, MAHs, phalates.

Table 3 Summary of analysed samples

Disposal option	Guideline	Initial Screen (# samples)	Secondary round (# samples)	Tier 2 analyses (# samples)
Onshore	NSW EPA (2014)	• Total Cyanide (17) • Weak Acid Dissolved Cyanide (8) • Fluoride (12) • TOC (14) • Metals – arsenic (17) – aluminium (9) – beryllium (8) – cadmium (17) – chromium (17) – cobalt (9) – copper (17) – iron (9) – lead (17) – molybdenum (8) – manganese (9)	Lead (65) Mercury (15) PAH (65) PCB (5)	TCLP • Lead (18) • Mercury (16) • Benzo(a)pyrene (19)

Disposal option	Guideline	Initial Screen (# samples)	Secondary round (# samples)	Tier 2 analyses (# samples)
		– mercury (17) – nickel (17) – selenium (17) – silver (17) – vanadium (9) – zinc (9) • PCBs (17) • PAH (17) • OC/OP (17) • Halogenated hydrocarbons (4) • MAHs (4, 12 Styrene)		
Offshore	NAGD (2009)	• PSD (8) • TRH/BTEXN (8) • Metals (8) – aluminium (8), – antimony(8) – arsenic (8), – cadmium (8) – chromium (8) – copper (8) – cobalt (8) – iron (8) – lead (8) – manganese (8), – nickel (8), – selenium (8), – silver (8) – vanadium (8) – zinc (8) – mercury (8) • PAH (8) • Phenols (8) • VOC (5) • tributyltin (8) • dioxins (8)		Elutriate • copper (4) • silver (4) • mercury (4) • PAHs (4) • PCBs (3) Simultaneously extractable metals • copper (3) • silver (3)

Disposal option	Guideline	Initial Screen (# samples)	Secondary round (# samples)	Tier 2 analyses (# samples)
		• TOC (8) • Cyanide (8) • PCB (8) • OCP/OPP (8) • Chlorinated hydrocarbons (5) • Explosives (5) • Promanide (5) • Nitroaromatics (5) • Nitrosoamines (5) • Phalates (5)		
Onshore offshore	Acid sulphate soils	Acid sulphate soil field screen (43)	22 samples Chromium reducible sulphur suite	

Tiered analyses were undertaken including an initial screening round of analysis of selected samples, followed by a second round of analyses for waste classification purposes., This approach allowed the analyses to be targeted for the contaminants of most concern, disregarding those analytes which were not detected as part of the initial screen.

Two duplicate samples were submitted to the primary laboratory for analyses and one to the secondary laboratory. One duplicate analyses was performed on a homogenised sample under the NAGD (2009) methodology, which meets the 10 % requirement. Duplicate sampling frequency is not specified under the NSW EPA (2014) guidelines, however one inter-laboratory and one intra-laboratory duplicate were analysed to verify the precision of the analyses.

5.3 Data evaluation

5.3.1 Data normalisation

Most natural and anthropogenic substances, including metals and organic contaminants, show a higher affinity to fine grained particulate matter than coarse fraction sediments, with organic matter and clay minerals generally exhibiting the strongest adsorption capacity for contaminants (OSPAR, 2001)[1].

The objective of using normalisation techniques is to reduce the variability between samples arising from differences in sediment properties, such as grain size distribution. However, it is noted that the correlation between contaminant and co-factor concentrations may be weak or absent in some areas (OSPAR, 2009).

[1] OSPAR (2009) Update of *JAMP guidelines for monitoring contaminants in sediment: Technical annex on normalisation of contaminant concentrations in sediment.*

For organic contaminants, values are normalised to 1% organic carbon, as recommended in (ANZAST (2018). If the sediment organic carbon content is higher than 0.2%, ANZAST (2018) recommends that the guideline values should be adjusted owing to the presence of additional carbon binding sites which act to reduce the contaminants bioavailability. For the purpose of this data, the following points are made:

- Where TOC was less than 0.2%, normalisation was not required and the actual reported concentration of organic contaminants has been used.
- Where TOC was greater than 0.2%, normalisation of the total PAH concentration was undertaken and the normalised concentration was used in statistical calculations. Calculations used in normalising the data were as follows:
  - Where TOC is greater than 0.2% but less than 10%, the concentration was divided by the TOC.
  - Where the TOC is greater than 10%, the concentration was divided by 10.

5.3.2 Calculation of 95% upper confidence limit

In accordance with the requirements of the NAGD (2009) and the NSW EPA (2014) *Waste Classification Guidelines*, the upper 95 per cent confidence limit (95% UCL) is used to determine compliance with the screening levels. Outputs from ProUCL for calculation of the 95% UCL are presented in Appendix D.

6. Results

6.1 Subsurface conditions

Logs of all cores taken are presented in Appendix B and PSD for selected samples is presented Table C1, Appendix C.

Composition of the cores vary from one to four units of marine and estuarine sediments ranging from clay to sand. Upper units were predominantly dark grey to dark brown in colour with organic odour and shell fragments. No olfactory or visual indicators of gross contamination were observed. These units were present in all cores (with the exception of VC04, VC09, VC10) and range from 0.1 m to 1.2 m in thickness, with one or two units present.

Units below this were more variable with yellow-grey, pale grey, yellow-brown and ranged in grain size from sand to clay. The lower units showed no visual or olfactory evidence of gross contamination.

Table 4 Summary of viborocores and samples analysed for PSD

Borehole	Date	Sample recovery	Number of units	PSD conducted
VC01	30/10/2019	1.10	2	0.5-1.0 m
VC02	31/10/2019	1.60	3	0.0-0.5 m
VC03	30/10/2019	1.10	3	0.0-0.5 m
VC04	31/10/2019	1.00	2	0.5-1.0 m
VC05	30/10/2019	0.90	2	-
VC06	31/10/2019	1.00	2	-
VC07	30/10/2019	1.20	2	0.0-0.5 m
VC08	31/10/2019	1.60	3	1.0-1.5 m
VC09	30/10/2019	1.00	1	-
VC10	31/10/2019	0.80	2	0-0.5 m
VC11	30/10/2019	1.20	1	-
VC12	31/10/2019	1.20	4	0.0-0.5 m
VC13	31/10/2019	1.10	2	-
VC14	31/10/2019	1.40	3	-

6.2 Waste classification results

The information in Table 5 is required by the NSW EPA when conducting a waste classification.

Table 5 Summary of information required by the NSW EPA for Waste Classification

Details	Information
The full name, address, Australian Company Number (ACN) or Australian Business Number (ABN) of the organisation and person(s) providing the waste classification	GHD Pty Ltd Level 15, 133 Castlereagh Street, Sydney, NSW 2000 ACN: 008 488 373 / ABN: 39 008 488 373
Location of the site where the waste was generated including the site address	Berth off Overseas passenger terminal. Circular Quay, Sydney NSW 2000
History of the material and the processes and activities that have taken place to produce the waste	The site is the berth area off the OPT operated by PANSW is used to dock large commercial cruise liners. The area is also within the route of ferry traffic docking at Circular Quay. The site has been used as a commercial shipping port since the 1880s, with the OTP operating as a cruise terminal since 1960. Due to the nature of the material as marine sediment it is possible the sediment has been transported to the location from anywhere within the Sydney harbour area.
Potential contaminating activities that may have occurred at the site where the waste was generated	The likely contaminating activity at the site are relating to shipping such as fuel spillages and shedding of anti-fouling paints from the hulls of vessels.
Description of the waste, including photographs, visible signs of contamination, such as discolouration, staining, odours, etc.	Refer to section 6.1 and Appendix B of this report.
Quantity of the waste (estimated)	22, 185 m^3
Sampling method including pattern, depth, locations, sampling devices, procedures, and photos of the sample locations and samples	Refer to section 5 of this report
Contaminants tested	Refer to section 5.2 of this report
Laboratory documentation – chain-of-custody, sample receipt, laboratory report	Laboratory analytical certificates and chain-of-custody documentation from GHD's sampling event in October and November 2019 is provided in Appendix E

Details	Information
All results regardless of whether they are not used in the classification process	All laboratory analytical certificates generated from GHD's sampling event in October and November 2019 is provided in Appendix E. GHD is not aware of any other results which are relevant to this classification.

6.2.1 Primary analyses

Twenty-two samples were initially analysed under the waste classification suite outlined in section 5.2, with the sample numbers and analytes in Table 3.

In the initial screening, sample exceedances of the General Solid Waste CT1 criteria were identified for lead, mercury and benzo(a)pyrene (B(a)P). A single exceedance of the Restricted Solid Waste CT2 criterion was identified for B(a)P.

Analytical results for all other COPCs were below the guideline criteria

Based on these exceedances the remaining waste classification samples were analysed for lead and B(a)P, to meet the required frequency. A selection of samples were also submitted for mercury analysis.

Exceedances of the CT1 and CT2 criteria are summarised in Table 6 and the results present in full in Table C3, Appendix C. All laboratory certificates are presented in Appendix E.

Table 6 Summary of exceedances of the CT1 and CT2 criteria

Analyte	Criterion	Number of samples exceeding criterion	Criterion value	Maximum concentration (mg/kg)	95% UCL
Lead	CT1	11 of 90	100	318	63.53
Mercury	CT1	1 of 40	4	4.25	1.057
Benzo(a)pyrene	CT1 CT2	10 of 90 1 of 90	0.8 3.2	4.0	0.546

For analytes with exceedances, the 95 % UCL was calculated using all samples that had been analysed for the COPCs (including those also analysed under the NAGD (2009) guidelines). For those analytes with exceedances of the NSW EPA (2014) CT1 and CT2 criteria, the 95% UCL did not exceeded the guideline. Outputs from ProUCL for calculation of the 95 % UCL are presented in Appendix D.

It should be noted that the NSW EPA (2014) guidelines do not include criteria for dioxins or tributyltin. The NSW EPA has advised that the current policy with respect to the disposal of organotin waste is that for waste to be compared to the ANZAST (2018) Default Guideline for Sediment Quality – High Value for classification. All measured tributyltin concentrations (TBT as Sn) were below the guideline value of 70 µg/kg. Further discussion of dioxin and tributyltin are included in section 6.5 and section 7.1 of this report.

6.2.2 Toxicity characteristics leaching procedure

Due to exceedances of the CT1 Criteria for lead, B(a)P and mercury additional analyses were undertaken using the toxicity characteristics leaching procedure (TCLP, the results of which are presented in Table C4, Appendix C.

Following TCLP extraction and analyses, all analytes were reported below the TCLP1 criteria for general solid waste. These results are considered to be representative of the larger dataset on which TCLP was not undertaken and are consistent with historical waste classification data reported as part of previous investigations within the area. For those analytes for which TCLP was performed, concentrations were also below the SCC1 (with TCLP) criteria for all samples.

6.3 NAGD results

6.3.1 Whole sediment

Eight homogenised samples were analysed for the COPCs. A number of exceedances of the NAGD (2009) and ANZECC (2000) ISQG were identified, and are summarised in Table 7 and shown on Figure 2, Appendix A.

Hereafter the following definitions apply:

- The term SQG_{low} is used to refer to both the NAGD (2009) screening value, ANZECC (2000) ISQG – low and the ANZAST (2018) DGV.
- The term SQG_{high} refers to the NAGD (2009) SQG-high values, the ANZECC (2000) ISQG – high and the ANZAST (2018) DGV - High as the relevant assessment criteria set out in the NAGD (2009).

The results of the inorganics analysis are presented in Table C5, Appendix C and the organics analysis in Table C6, Appendix C.

Table 7 Summary of analytes exceeding nominated criteria

Analyte	SQG Low	SQG HIGH	Detects	Min. (mg/kg)	Max. (mg/kg)	95% UCL	Guideline exceedances (a)
Metals							
Copper	65	270	3 of 8	<1.0	189	**95.95**	SQG low 2 of 8
Lead	50	220	8 of 8	<5	318	***318[1]***	SQG low 4 of 8 SQG high 1 of 8
Mercury	0.15	1	5 of 8	0.01	4.25	***1.823***	SQG low 2 of 8
Silver	1	3.7	5 of 8	<0.1	3.0	**1.421**	SQG low 2 of 8
Zinc	200	410	7 of 8	<1.0	445	***445[1]***	SQG high 1 of 8

Analyte	SQG Low	SQG HIGH	Detects	Min. (mg/kg)	Max. (mg/kg)	95% UCL	Guideline exceedances (a)
PAHs							
Acenaphthene [2]	0.016	0.5	1 of 8	<0.004	0.024	Unable to calculate	SQG low 2 of 8
Acenaphthylene [2]	0.04	0.64	3 of 8	<0.004	0.192	**0.126**	SQG low 3 of 8
Anthracene [2]	0.085	1.1	3 of 8	<0.004	0.11	0.0835	SQG low 3 of 8
Benz(a)anthracene [2]	0.261	1.6	4 of 8	<0.004	0.8	**0.414**	SQG low 4 of 8
Benzo(a) pyrene [2]	0.43	1.6	5 of 8	<0.004	0.830	**0.541**	SQG low 3 of 8
Chrysene [2]	0.384	0.28	4 of 8	<0.004	0.666	0.359	SQG low 1 of 8
Dibenz(a,h)anthracene [2]	0.063	0.26	4 of 8	<0.004	0.121	**0.0835**	SQG low 3 of 8
Fluoranthene [2]	0.6	5.1	5 of 8	<0.004	1.4	**0.718**	SQG low 2 of 8
Fluorene [2]	0.019	0.54	3 of 8	<0.004	0.039	**0.0261**	SQG low 3 of 8
Phenanthrene [2]	0.24	1.5	4 of 8	<0.004	0.667	**0.338**	SQG low 3 of 8
Pyrene [2]	0.665	2.6	4 of 8	<0.004	1.429	0.719	SQG low 1 of 8
PAHs (Sum of total) [2]	10	50	4 of 8	<0.004	7.14	4.731	SQG low 0 of 8
Other							
Tributyltin	0.009	0.07	3 of 8	<0.0005	0.0194	**0.0123** [3]	SQG low 2 of 8
PCBs	0.034	-	2 of 8	<0.0018	0.0645	**0.0566** [3]	SQG low 2 of 8
TRH C_{10}-C_{36}	550	-	5 of 8	<3	221	280.1	SQG low 1 of 8

Notes:

[1] Maximum value is used as 95% UCL is greater than highest value

[2] Concentrations normalised to TOC content as discussed in Section 5.3.1.

[3] Dataset not considered statistically valid for 95% UCL calculation

BOLD 95% UCL exceeds SQG_{low}

Italic 95% UCL exceeds SQG_{high}

Heavy metals in sediments

Exceedances of the NAGD (2009) screening levels were identified for copper, lead, mercury, silver and zinc and exceedances of the NAGD (2009) $SQG\text{-}_{high}$ values for zinc, lead and mercury.

The highest metal concentrations were reported in samples VC02_0.0-0.5, and VC07_0.0-0.5 with exceedances of the SQG_{low} for copper, lead, mercury and silver. Zinc exceeded the SQG_{high} in VC02_0.0-0.5 with a value of 445 mg/kg compared to the guideline of 410 mg/kg.

The 95% UCLs for the exceeding metals also exceeded the SQG_{low} for copper, lead, mercury and silver and the SQG_{high} for lead and zinc. The Zinc 95% UCL however is unlikely to be an accurate representation as it is skewed by a single elevated value, rather than being representative of the dataset as a whole.

Concentrations of TRH and BTEX

NAGD (2009) presents a screening level of 550 mg/kg for total petroleum hydrocarbons (TPH). The concentration of TPH in the fraction C_{10}-C_{36} (normalised to 1% TOC) ranged from below the limit of reporting to 650 mg/kg with a 95% UCL average of 280.1 mg/kg (standard deviation 264.9), below the SQG_{low} of 550 mg/kg.

Concentrations of volatile TRH in the fraction C_6-C_{10} and BTEXN were reported below the laboratory limit of reporting (LOR) in all samples selected for analysis.

Concentrations of PAH

PAHs were detected in samples VC02_0.0-0.5, VC07_0.0-0.5 and VC12_0.0-0.5.

In these samples there were a number of exceedances of the SQG_{low} for individual PAH compounds as listed in Table 7 and in Table C6 in Appendix C. Total PAHs did not exceeded the SQG_{low} in any samples. The 95 % UCL is exceeded for Acenaphthylene, Benz(a)anthracene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Fluoranthene, Fluorene and Phenanthrene.

Concentrations of other parameters

- Cyanide was below the LOR in all samples
- Concentrations of TBT (normalised to TOC) were above the LOR in three of eight samples submitted for analysis. The detected concentrations normalised to TOC were 19.4 µg Sn/kg, 20.3 µg Sn/kg and 1 µg Sn/kg, two of which (VC07_0.0-0.5 and VC12_0.0-0.5) were above the NAGD (2009) SQG low of 9 µg Sn/kg.
- Total organic carbon ranged from 0.05 to 2.82 %.
- Total PCBs were detected, and exceeded the SQG_{low} value of 0.034 mg/kg in VC07_0.0-0.5 and VC12_0.0-0.5 with values of 0.064 mg/kg and 0.102 mg/kg respectively. The total PCBs is entirely comprised of Arochlor 1254 in both samples. The 95% UCL also exceeds the SQG_{low} with a value of 0.0566 mg/kg.

- Herbicides, chlorinated hydrocarbons, explosives, nitroaromatics, nitrosoamines and phthalates were below the limit of reporting in all samples.

6.3.2 Toxicity

The NAGD requires that those analytes where the 95% UCL exceeds the screening criteria are subjected to a Phase III analysis, to assess their potential toxicity to marine organisms.

The results of the Phase III analyses are presented in Table C7, in Appendix C.

This Phase III analysis included elutriate analysis, which measures the release of contaminants from sediments into seas water. A sea water blank and three samples with exceedances of the SQG_{low} were analysed for PAH, PCB, copper, mercury and silver.

No detects for any analytes were identified in the elutriate samples or the seawater blank.

Copper and silver were also assessed by the 1M HCl extractable metals method, this gives a closer estimate of the bioavailable fraction of the metals than the whole sediment analysis. Silver was not detected by the method in any of the three samples tested. Copper was below the SQG_{low} in all three samples.

6.4 Acid sulphate soils

6.4.1 Field screen

Samples for potential acid sulphate soil (PASS) were initially submitted to the lab for a pH field screen, the results of the field screen are presented in Table C2 in Appendix C.

The results for initial pH of the sample (pH_F) range from 7.3 to 8.9. pH after digestion with hydrogen peroxide (pH_{Fox}) ranged from 5.2 to 6.5. Samples showed a reaction rate of 3 with one sample showing a reaction rate of 4 and one of 2. The decrease in pH for all samples ranged from 1.3 to 3.5. While a final pH of less than 3.5 is considered an indicator of potential acid sulphate soils (PASS), and the lowest final PH in these samples was 5.2 the presence of PASS cannot be excluded as pH is often higher when samples are from a marine source.

6.4.2 Acid sulphate soils – Chromium Reducible Sulphur method

In order to supplement the acid sulphate soil (ASS) field screen, 22 samples were selected for laboratory analyses at the primary laboratory using the chromium reducible sulphur suite (CRS), with one or two samples per core selected.

The results were compared to the action criteria provided in the QLD (2014) Acid Sulfate Soils Technical Manual – Soil management Guidelines V4.0 based on more than 1000 tonnes of fine texture soils to be disturbed.

The laboratory report is included in Appendix E. The results are summarised in Appendix C, Table C2.

Of 22 samples analysed, 13 exceeded the action criteria of 0.03 % sulphur and 18 M H^+/t at all depths. These samples all had pHKCl greater than 8.6 pH units and acid neutralising capacity that ranged from 254 to 9,590 M H^+/t. The liming rates were less than 1 kg $CaCO_3$/t.

The acid neutralising capacity of the sediments (ANC) indicates that there is the potential for the sediments to self-neutralise. However, it is common for not all neutralising capacity to be available to the reaction, thus the actual ANC may be reduced compared to that measured by the laboratory.

It should be noted that measurement of ANC does not measure the effectiveness of the material in neutralising acidity, large fragments of carbonate material (i.e. shell) are be ineffectual at neutralising acidity, however are still measured by the laboratory. Therefore, the presence of shell fragments in the sediments sampled, as recorded on the borehole logs in Appendix B, suggests the possibility that not all ANC in the analysed sediments would be available to the neutralising reaction.

The National Acid Sulfate Soil Guidance – National acid sulfate soils identification and laboratory methods manual (Water Quality Australia, 2018) recommends that where the ANC is not corroborated with other data, as is the case in this instance, the net acidity calculation should not incorporate the ANC.

6.5 Dioxins

'Dioxins' refers to a group of persistent chlorinated chemical compounds known as polychlorinated dibenzodioxins (PCDD), which share certain similar chemical structures, properties and biological characteristics, including toxicity (Mueller, et al, 2004). Dioxins are not deliberately produced, but are released into the environment as a result of combustion activities including power generation, waste incineration, metal smelting and manufacture of some chemicals (EPHC, 2005).

Dioxins occur as a complex mixture in most environmental media and as such, toxic equivalents (TEQs) are used to assist with interpretation of data, allowing the toxicity to be expressed as a single number. TEQs are calculated by normalising individual compounds to 2,3,7,8-tetrachlorodibenzo-p-dioxin, the most toxic PCDD. The total toxicity of any mixture is then expressed as the sum of the individual TEQs (Mueller, et al, 2004)

Samples were analysed for dioxins across the dredge footprint. A total of eight samples were analysed as per the sampling frequency requirement of the NAGD (2009).The results are reported in full in the laboratory report provided in Appendix E and presented in Table C8, Appendix C and summarised in Table 8. Both the World Health Organisation (WHO) TEQ and International TEQ (I-TEQ) are reported by the laboratory and summarised in Table 8. For the purpose of this report, the following TEQ values were applied

- WHO TEQ $_{(0.5\ LOR)}$ where value of half LOR was used to calculate the TEQ where results were reported by the laboratory as non detect
- I-TEQ $_{(0.5\ LOR)}$ where value of half LOR was used to calculate the TEQ where results were reported by the laboratory as non detect.

Table 8 Summary of Dioxin results

Sample ID	WHO TEQ $_{(0.5\ LOR)}$	I-TEQ $_{(0.5\ LOR)}$
VC01_0.5-1.0	10.50	26.46
VC02_0.5-1.0	134.61	156.94
VC03_0.0-0.5	24.96	69.14
VC04_0.5-1.0	14.73	38.61
VC07_0.0-0.5	40.45	51.46
VC08_1.0-1.5	13.79	25.92
VC10_0.0-0.5	28.16	79.27
VC12_0.0-0.5	17.79	27.16

Sample ID	WHO TEQ (0.5 LOR)	I-TEQ (0.5 LOR)
Mean Average Total TEQ	**36**	**59**

Results from all samples were strongly dominated by 1234678-HpCDD, Octa-dioxin, Hexa-dioxin and OCDD (octachlorodibenzo-p-dioxin) which all had concentrations a number of orders of magnitude above the LOR and other dioxin compounds in the same samples. The results were relatively consistent across all samples with the variation in dioxin TEQs not appearing to possess an identifiable spatial pattern, laterally or with depth. It is noted that the highest TEQ is in a sample at 0.5 – 1.0 m depth.

6.6 Quality assurance and quality control

Sediment samples were transported in ice-cooled chests (eskys) to the following NATA accredited laboratories under chain of custody:

- ALS Environmental Services Pty Ltd, Sydney, NSW – primary samples and intra-laboratory duplicates.
- Eurofins|MGT laboratory, Lane Cove, NSW – inter-laboratory duplicates.

A copy of the chain of custody for all batches is attached. The laboratories selected to carry out analysis are NATA accredited for the analysis performed. Test methods are listed on the attached laboratory reports, in Appendix E.

Samples were selected for analysis to include a sample set which was representative of all sediment types encountered and to be spatially distributed across the entire dredging area and therefore are considered to be representative of material to be excavated, as far as practicable.

6.6.1 Field and laboratory quality control assessment

All fieldwork was conducted in general accordance with GHD standard operating procedures. Laboratory and field quality control and quality assurance procedures are summarised in Table 9.

Table 9 Summary of quality control parameters

Parameter	Assessment
Laboratory	
Laboratory Duplicates	All laboratory duplicates were within acceptable RPDs.
Laboratory control spikes (LCS)	No LCS non-conformances were identified.
Matrix Spikes (MS)	The following MS non-conformances in the form of recovery outside of the assigned limits were identified: • ES1936029 – 1,1-Dichloroethene, organotins • ES1936922 – hexavalent chromium • ES1936183 – hexavalent chromium, tributyltin • ES1937111 - hexavalent chromium
Method blanks	No method blank non-conformances were identified.

Parameter	Assessment
Limits of reporting	Limits of reporting were equal to or below the assessment criterion for all analytes.
Field	
Rinsate Blanks	Results of the rinsate blanks are presented in table C10, Appendix C. No detections of any analytes were found in the rinsate blank samples, indicating that the equipment decontamination protocol was effective.
Duplicates	Results of the relative percentage difference (RPD) calculations are presented in Table C9, Appendix C. All duplicates were within the acceptable limits of 30 % RPD for inorganics and 50% RPD for organics, where the measured concentration was more than 10 times the LOR, with the exception of the intra-lab duplicate sample FD05, where the iron concentrations had an RPD of 41%. This is likely due to the natural heterogeneity of contamination in sediments.
Trip spikes and trip blanks	All trip spikes and trip blanks were within acceptable limits.
Holding Times	Holding time exceedances were identified in the following reports: • ES1937111 • ES1937483 • ES1936029 These holding time exceedances were for analytes that are generally considered to be stable, and given the samples were correctly stored by the laboratory, are unlikely to have a detrimental effect on the results to the analysis.

Overall the instances of non-conformance of the QA/QC parameters are not considered to affect the conclusions drawn from the results provided.

7. Discussion and conclusions

Referring to the objectives of this report outlined in Section 1.2, and the limitations of this investigation as outlined in Section 1.4, the following sections provide a summary of conclusions made on the basis of the analytical results obtained during the course of these works

7.1 Waste classification

Based on observations made during sampling, and GHD's understanding of the site, the samples collected are considered to be generally representative of site conditions. Historical samples have not been taken into account as the available information is not representative of the entire samples depth, and also were sampled more than five years prior to this sampling event.

Under NSW EPA (2014) step one of classifying waste is to determine if the waste is 'special waste'. Due to the presence of dioxin and tributyltin the waste may be considered special waste this is discussed further below.

Special waste considerations - Dioxins

Dioxin contaminated waste is subject to the Chemical Control Order in Relation to Dioxin-Contaminated Waste Materials (1986) (The Dioxin Waste CCO). The Dioxin Waste CCO is currently under review by NSW EPA. This document defines dioxin contaminated waste as waste materials containing more than one part in 100 million (by weight; equivalent to 0.01 ppm, or 10 µg/kg) of dioxin. Dioxin is in turn defined as 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). The Dioxin Waste CCO prohibits the disposal of 2,3,7,8-TCDD wastes and the NSW EPA states that "*You must get a licence from the EPA for processing, storing, selling, distributing or conveying these wastes".*

2,3,7,8-TCDD was detected in four of the eight samples analysed at a highest concentration of 18.4 ng/kg and an average concentration of 3.6 ng/kg. Concentrations of dioxin, reported as 2,3,7,8-TCDD are therefore below the concentration regulated by The Dioxin Waste CCO and are not considered classified as dioxin contaminated waste.

Special waste considerations - TBT

Tributyltin waste is subject to the Chemical Control Order in Relation to Organotin Wastes (1989) (The Organotin Waste CCO). However, the NSW EPA's organotin waste management framework is currently under review.

In correspondence during this project, the NSW EPA has advised that the current policy with respect to the disposal of organotin waste is that for waste to be classified as General Solid Waste (GSW), the ANZAST (2018) Default Guideline for Sediment Quality – High Value should be used as guidance as follows:

- Concentrations of tributyltin below the guideline being classified as GSW,
- Concentrations of tributyltin above the guideline being classified as Restricted Solid Waste (RSW).

Based on the results of this sampling, the concentration of tributyltin in the sediments meet the criteria to be classified as GSW.

Waste classification – general considerations

The following summarises the chemical analysis of the waste:

- Analytical results indicated exceedances of the General Solid Waste CT1 criteria for lead, mercury and B(a)P and a single exceedance of the Restricted Solid Waste CT2 criterion for B(a)P.
- The 95% UCL for the COPCs which exceeded the Waste Classification criteria were all below the CT1 criteria
- Based on the exceedances, selected samples were submitted for TCLP extraction and analysis for lead, mercury and B(a)P all samples were below the General Solid Waste SCC1 criteria and TCLP 1 criteria.

Based on the above analysis results the materials can be classified as General Solid Waste (GSW) and should be disposed of to a facility with appropriate license to accept material based on this.

7.2 Analysis under NAGD (2009)

For the purpose of potential off-shore disposal, data was reviewed with reference to NAGD (2009). In summary, the following points are noted:

- Homogenised bulk sediment analysis identified exceedances of the SQG_{low} for total PCBs, TBT, a number of individual PAHs, copper, lead, mercury and silver, and one exceedance of the SQG_{high} for zinc and lead.
- Elutriate testing was conducted for copper, silver, mercury, PAHs and PCBs, and 1M HCl extractable metals for copper and silver.
- No detections of any COPCs were identified during elutriate analyses or on the seawater blank and the results of the 1M HCl extractable metals analysis showed results below the relevant guidelines. It is considered unlikely that the COPCs are bioavailable in the current marine environment.
- While elutriate testing was not conducted for lead, it should be noted that TCLP testing conducted as part of the waste classification, showed no exceedances of the ANZAST (2018) 95% Marine Water Guideline of 0.004 mg/L for lead.
- It should also be noted that the result for zinc, appears anomalous.
- The investigation identified scattered occurrences of TBT in the sediments, thought it appears the majority of the sediments only contain low levels of TBT, which is demonstrated by the fact that six of the eight tested samples reported TBT concentration at or below the laboratory PQL of 1 µg Sn/kg. While elutriate or bioavailability testing for TBT could not be completed for the two samples (VC07_0.0-0.5 and VC12_0.0-0.5) containing higher TBT concentrations due to limited amount of sediment samples available from this sampling event, it is noted elutriate testing of these two samples for other chemicals (including metals) showed no detections of COPC in the elutriate analysis or sea water blanks.
- Samples VC02_0.0-0.5 and VC07_0.0-0.5 have the most exceedances of the COPCs, however there does not appear to be a spatially relationship regarding contamination at the site.
- Some dioxin compounds were detected in all of the eight samples analysed. These levels fall within the range that has been identified for background in Australia.

Given these results, the dredge sediment may be suitable for offshore disposal, with reference to the recommendations in Section 8 of this report.

7.3 Acid sulphate soils

The analytical results for chromium reducible sulphur indicate the presence of PASS and the potential acid generating capacity of the sediments throughout the lateral and vertical extent of the sediments.

8. Recommendations

Based on the findings of these works, and subject to the limitations outlined in Section 1.4 the following recommendations are made with respect to waste disposal options for dredged sediment:

- For the option of offshore disposal, it is recommended that PANSW seek information regarding the contaminant levels at the preferred disposal site, particularly with reference to tributyltin and dioxin. This site characterisation is recommended in the NAGD (2009) in order to inform selection of the most appropriate disposal location and to establish how a disposal site may be impacted.
- PASS conditions are present within the dredge footprint. The dredging strategy should be designed to limit the timeframe for potential for oxidisation of the sediments. If offshore disposal were chosen the potential for ASS generation would reduce greatly due to sediments being transferred to the disposal area immediately after dredging, limiting time for oxidation. Should onshore disposal be selected, it is recommended that the liming requirements are assessed during dredging by ongoing monitoring of the excavated sediments. To assist in outlining the procedure for PASS monitoring during excavation GHD recommends that an Acid Sulphate Soil Management Plan (ASSMAP) is prepared, as recommended by National Acid Sulfate Soil Guidance – Guidelines for the dredging of acid sulfate soil sediments and associated dredge spoil management (Water Quality Australia, 2018).

9. References

ANZAST. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG).* Australian and New Zealand Governments and Australian State and Teritory Governments (ANZAST).

ANZECC/ARMCANZ. (2000). *Australian Water Quality Guidelines for Fresh and Marine Water Qaulity.* Canberra, October 2000: Australian and New Zealand Environemnt and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand.

Arup. (2019). *OPT Berth Infrastructure - Desktop Study - Existing Geotechnical Data.*

ASSMAC. (1998). *Acid Sulfate Soil Manual.* Acid SUlfate Soil Management Advisoriy Committee.

Coffey. (2019). *OPT Berth Deepening Investigations Geotechical and Geophysical Investigations Report (draft).* Coffey Services Australia Pty Ltd.

Commonwealth of Australia. (2009). *National Assessment Guidelines for Dredging.* Canberra, 2009: Commonwealth of Australia.

Dear SE, M. N. (2002). *Soil Management Guidelines. In Queenalnd Acid Sulfate Soil Technical Manual v4 (2014).* Infooroopilly, Queensland, Australia: Department of Natural Resources and Mines.

Douglas Partners. (2014). *Sediment Quality Assessment Overseas Passenger termianl - Circular Quay.*

EPHC. (2005). *National Dioxins Program: National Action Plan for Addressing Dioxins in Australia.* July 2005.

GHD Geotechnics. (2006). *Preliminary Geotechnical and Geochemcial investigation.*

Mueller J, M. R. (2004). *Dioxins in Aquatic Environments in Australia, National Dioxin Program Technical Report No. 6, .* Canberra: Australian Government Department of Enviornment and Heritage.

NSW EPA. (1995). *Contaminated Sites: Sampling Design Guidelines.* NSW Environmental Protection Authority.

NSW EPA. (2014). *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014. The excavated natural matrial order 2014.* NSW Environmental Protection Authority.

NSW EPA. (2014). *Waste Classification Guidelines.* New South Wales Environmental Protection Authority (NSW EPA).

OSPAR. (2009). *Update of JAMP guidelines for monitoring contaminants in sediment: Technical annex on normalisation of contaminant concentrations in sediment.*

Water Quality Australia. (2018). *National Acid Sulfate Soil Guidacne - Guidelines for the dredging of acid sulfate soil sediments and associated dredge spoil management.* Water Quality Australia.

Water Quality Australia. (2018). *National Acid Sulfate Soil Guidance - National acid sulfate soils identification and laboratory methods manual.* Water Quality Australia.

Appendices

Appendix A - Figures

Legend

Vibrocore Sampling Locations

Investigation Locations (Coffey, Nov 2019)

Borehole Locations

Borehole / CPT Locations

Site Boundary

Lot Boundary

Paper Size ISO A4

0 10 20 30 40

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Port Authority of New South Wales
Circular Quay Investigation
Proposal for Technical Advice on Geochemistry

Site Location

Project No. **21-12517046**
Revision No. **A**
Date **16 Dec 2019**

FIGURE 1

G:\21\12517046\GIS\Maps\Deliverables\21_12517046_Z001_SiteLocation.mxd
Print date: 16 Dec 2019 - 20:15

Data source: General Topo - NSW LPI DTDB 2019. Cadastre - NSW LPI DCDB 2019. Aerial Imagery - Sixmaps 2019 . Created by: kqvelasco

Legend

- Vibrocore Sampling Locations
- Site Boundary

Investigation Locations (Coffey, Nov 2019)

- Lot Boundary
- Borehole Locations
- Borehole / CPT Locations

Paper Size ISO A4

0 10 20 30 40

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Port Authority of New South Wales
Circular Quay Investigation
Proposal for Technical Advice on Geochemistry

Project No. 21-12517046
Revision No. A
Date 16 Dec 2019

Exceedances of Nominated Guidelines for Offshore Disposal

FIGURE 2

Data source: General Topo - NSW LPI DTDB 2019. Cadastre - NSW LPI DCDB 2019. Aerial Imagery - Sixmaps 2019 . Created by: kqvelasco

Appendix B - Borehole Logs

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

Client PANSW	**Drill Co.**	**Easting** 344418
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6251919
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -10.77 m AHD
Location VC01	**Total Depth (m)** 1.1	**Logged By** SE
Date Drilled 30/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	VC	0.9	VC01__0-0.2		Clayey SAND, dark grey, with shell and wood fragments.	W	L	organic odour, no staining.	
0.2			VC01__0-0.5		Clayey SAND, medium grained, pale yellow-grey, weathered sandstone.	W	L	no odour, no staining.	-0.2
0.4			VC01__0.4-0.6						-0.4
		0.8	VC01__0.5-0.6						
0.6			VC01__0.5-1.0						-0.6
0.8									-0.8
1		0.7	VC01__1-1.1						-1
1.2					Core recovery: 1.10 m Total penetration: 1.58 m Refusal in residual				-1.2
1.4									-1.4
1.6									-1.6
1.8									-1.8
2									-2
2.2									-2.2
2.4									-2.4
2.6									-2.6
2.8									-2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC-Vibracore, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE VC02

Client PANSW	**Drill Co.**	**Easting** 334466
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6251945
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -11.57 m AHD
Location VC02	**Total Depth (m)** 1.6	**Logged By** SE
Date Drilled 31/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0.0	VC	1.2	VC02__0-0.2		Clayey SILT with sand, low to medium plasticity, dark grey, shell fragments.	W	S	organic odour, no staining	
0.2			VC02_0.0-0.5						-0.2
0.5		1.0	VC02__0.5-0.6						
0.6			VC02_0.5-1.0		Clayey SAND, fine and medium grained, dark grey-brown, shell fragments.	W	L	organic odour, no staining	-0.6
0.9		1.1	VC02__0.9-1		CLAY with sand, medium to high plasticity, grey.	M	ST	no odour, no staining.	
1			VC02__1-1.2						-1
1.2			VC02__1-1.5						-1.2
1.5			VC02__1.5-1.6						
1.6					Core recovery: 1.60 m Total penetration: 2.45 m Refusal on bedrock				-1.6

Depth scale: 0.2, 0.4, 0.6, 0.8, 1, 1.2, 1.4, 1.6, 1.8, 2, 2.2, 2.4, 2.6, 2.8

Elevation scale: -0.2, -0.4, -0.6, -0.8, -1, -1.2, -1.4, -1.6, -1.8, -2, -2.2, -2.4, -2.6, -2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC-Vibracore, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE VC03

Client PANSW	**Drill Co.**	**Easting** 334437
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6251990
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -12.61 m AHD
Location VC03	**Total Depth (m)** 1.1	**Logged By** SE
Date Drilled 30/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	VC	0.9	VC03__0-0.2		Sandy CLAY, low to medium plasticity, dark grey, trace shells.	S	VS	weak organic odour, no staining.	
					Clayey SAND with silt, medium to fine grained, pale grey.	W	D	no odour, no staining.	
0.2			VC03__0-0.5						-0.2
			VC03__0.3-0.4						
0.4			VC03__0.4-0.6						-0.4
		1.0	VC03__0.5-0.6						
0.6			VC03__0.6-0.7		SAND, pale grey.	W	D	no odour, no staining.	-0.6
			VC03__0.5-1						
0.8									-0.8
1									-1
		1.1	VC03__1-1.1						
1.2					Core recovery: 1.10 m Total penetration: 1.32 m Refusal in residual				-1.2
1.4									-1.4
1.6									-1.6
1.8									-1.8
2									-2
2.2									-2.2
2.4									-2.4
2.6									-2.6
2.8									-2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC-Vibracore, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE VC04

Client PANSW	**Drill Co.**	**Easting** 334464
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6251999
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -12.76 m AHD
Location VC04	**Total Depth (m)** 1.0	**Logged By** SE
Date Drilled 31/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0.0	VC	0.7	VC04__0-0.1		CLAY with sand, medium plasticity, pale grey, with shell fragments.	W	F	no odour, no staining	
0.1			VC04__0-0.5						
0.2									-0.2
0.4			VC04__0.4-0.5						-0.4
0.5			VC04__0.5-0.6						
0.6			VC04__0.5-1.0		Clayey SAND with silt, fine to medium grained, pale yellow-brown.	VM	D	no odour, no staining.	-0.6
0.7			VC04__0.7-0.8						
0.8									-0.8
0.9		0.9	VC04__0.9-1						
1					Core recovery: 1.00 m Total penetration: 1.10 m Refusal in residual				-1
1.2									-1.2
1.4									-1.4
1.6									-1.6
1.8									-1.8
2									-2
2.2									-2.2
2.4									-2.4
2.6									-2.6
2.8									-2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	**Moisture Abbreviations**	**Consistency Abbreviations**	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC-Vibracore, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

ESlog

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE VC05

Client PANSW	**Drill Co.**	**Easting** 334450
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6252060
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -11.86 m AHD
Location VC05	**Total Depth (m)** 0.9	**Logged By** SE
Date Drilled 30/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	VC	0.7	VC05__0-0.1		Sandy CLAY, low to medium plasticity, dark grey, trace shells.	S	S	weak organic odour, no staining.	
			VC05__0-0.5		Clayey SAND, fine to medium grained, poorly graded, pale yellow-brown and pale grey.	W	L	no odour, no staining.	
0.2									-0.2
0.4									-0.4
		0.6	VC05__0.5-0.7						
0.6									-0.6
			VC05__0.5-0.9						
0.8		0.8	VC05__0.8-0.9						-0.8
1					Core recovery: 0.90 m Total penetration: 0.90 m Refusal in residual				-1
1.2									-1.2
1.4									-1.4
1.6									-1.6
1.8									-1.8
2									-2
2.2									-2.2
2.4									-2.4
2.6									-2.6
2.8									-2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	**Moisture Abbreviations**	**Consistency Abbreviations**	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC-Vibracore, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE VC06

Client PANSW	**Drill Co.**	**Easting** 334482
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6252048
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -12.86 m AHD
Location VC06	**Total Depth (m)** 1.0	**Logged By** SE
Date Drilled 31/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	VC	0.5	VC06__0-0.1		CLAY, medium plasticity, dark grey, trace shells.	W	F	weak organic odour, organic staining, metal bolt at 0.3 m.	
			VC06__0-0.5						
0.2									-0.2
			VC06__0.3-0.4		CLAY with sand, medium plasticity, pale grey mottled yellow-brown.	W	S	no odour, no staining.	
0.4									-0.4
		0.6	VC06__0.5-0.6						
0.6			VC06__0.5-1.0						-0.6
			VC06__0.7-0.8						
0.8			VC06__0.8-0.9 & FD06						-0.8
1					Core recovery: 1.0 m Total penetration: 1.0 m Refusal in residual				-1
1.2									-1.2
1.4									-1.4
1.6									-1.6
1.8									-1.8
2									-2
2.2									-2.2
2.4									-2.4
2.6									-2.6
2.8									-2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC-Vibracore, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE VC07

Client PANSW	**Drill Co.**	**Easting** 334458
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6252136
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -11.56 m AHD
Location VC07	**Total Depth (m)** 1.2	**Logged By** SE
Date Drilled 30/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0.0	VC	0.5	VC07__0-0.1		Clayey SAND with silt, fine to medium grained, dark grey, trace shells.	W	L	weak organic odour, no staining.	
			VC07__0-0.2 & FD03						
0.2			VC07__0-0.5						-0.2
0.4									-0.4
0.5		0.8	VC07__0.5-0.6		Sandy CLAY, low plasticity, pale grey mottled red.	W	ST	no odour, no staining.	
0.6			VC07__0.5-1						-0.6
			VC07__0.7-0.8						
0.8									-0.8
1		0.8	VC07__1-1.1						-1
			VC07__1-1.2						
1.2					Core recovery: 1.20 m Total penetration: 1.55 m Refusal in residual				-1.2
1.4									-1.4
1.6									-1.6
1.8									-1.8
2									-2
2.2									-2.2
2.4									-2.4
2.6									-2.6
2.8									-2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC-Vibracore, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE VC08

Client PANSW	**Drill Co.**	**Easting** 334499
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6252126
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -12.07 m AHD
Location VC08	**Total Depth (m)** 1.6	**Logged By** SE
Date Drilled 31/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	VC	0.7	VC08__0-0.1 & FD07		Sandy CLAY, low to medium plasticity, dark brown-grey, trace shells.	W	S	weak organic odour, no staining.	
			VC08__0-0.5						
0.2									-0.2
			VC08__0.3-0.4						
0.4									-0.4
		0.8	VC08__0.5-0.6						
0.6			VC08__0.5-1		Clayey SAND, fine to medium grained, grey.	W	MD	no odour, no staining.	-0.6
			VC08__0.7-0.8						
0.8									-0.8
1		0.9	VC08__1-1.1 & FD08		Sandy CLAY, high plasticity, pale grey.	W	S	no odour, minor organic staining.	-1
			VC08__1-1.5						
1.2									-1.2
			VC08__1.3-1.4						
1.4									-1.4
		0.8	VC08__1.5-1.6						
1.6					Core recovery: 1.60 m Total penetration: 2.45 m Refusal on bedrock				-1.6
1.8									-1.8
2									-2
2.2									-2.2
2.4									-2.4
2.6									-2.6
2.8									-2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC-Vibracore, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE VC09

Client PANSW	**Drill Co.**	**Easting** 334474
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6252211
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -13.62 m AHD
Location VC09	**Total Depth (m)** 1	**Logged By** SE
Date Drilled 30/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	VC	1.8	VC09__0-0.1		Clayey SAND, medium grained, orange-brown and grey, with shells in top 100 mm.	W	MD	weak organic odour, organic staining.	
			VC09__0-0.2 & FD02						
0.2			VC09__0-0.5						-0.2
0.4			VC09__0.4-0.6						-0.4
		0.9	VC09__0.5-0.6						
0.6			VC09__0.5-1						-0.6
			VC09__0.7-0.8						
0.8			VC09__0.8-1						-0.8
		0.5	VC09__0.9-1						
1					Core recovery: 1.00 m Total Penetration: 0.95 m Refusal in residual				-1
1.2									-1.2
1.4									-1.4
1.6									-1.6
1.8									-1.8
2									-2
2.2									-2.2
2.4									-2.4
2.6									-2.6
2.8									-2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC_Vibracore, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE VC10

Client PANSW	**Drill Co.**	**Easting** 334452
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6251976
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -11.99 m AHD
Location VC10	**Total Depth (m)** 0.8	**Logged By** SE
Date Drilled 31/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	VC	0.9	VC10__0-0.1		Clayey SAND with silt, pale grey, shell fragments.	W	D	weak organic odour, organic staining.	
			VC10__0-0.2						
0.2			VC10__0-0.5 & FD05						-0.2
0.4									-0.4
		0.8	VC10__0.5-0.6						
0.6			VC10__0.5-1		Clayey SAND, fine to medium grained, pale grey.	W	MD	no odour, no staining.	-0.6
			VC10__0.7-0.8						
0.8					Core recovery: 0.80 m Total penetration: 1.3 m Refusal in sediment				-0.8
1									-1
1.2									-1.2
1.4									-1.4
1.6									-1.6
1.8									-1.8
2									-2
2.2									-2.2
2.4									-2.4
2.6									-2.6
2.8									-2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	**Moisture Abbreviations**	**Consistency Abbreviations**	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC-Vibracore, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE VC11

Client PANSW	**Drill Co.**	**Easting** 334478
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6252271
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -12.87 m AHD
Location VC11	**Total Depth (m)** 1.2	**Logged By** SE
Date Drilled 30/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	VC	0.6	VC11__0-0.1		Clayey SAND, fine to medium grained, grey, increase in sand content with depth, trace shells.	W	MD	no odour, no staining.	
0.1			VC11__0-0.2						
0.2			VC11__0-0.5						-0.2
0.4									-0.4
0.5		0.8	VC11__0.5-0.6						
0.6			VC11__0.5-0.7 & FD01						-0.6
0.7			VC11__0.5-1						
0.8									-0.8
1		1.2	VC11_1.0-1.1						-1
1.1			VC11__1-1.2						
1.2					Core recovery: 1.20 m Total penetration: 3.0 m Target depth acheieved				-1.2
1.4									-1.4
1.6									-1.6
1.8									-1.8
2									-2
2.2									-2.2
2.4									-2.4
2.6									-2.6
2.8									-2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	**Moisture Abbreviations**	**Consistency Abbreviations**	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC-Vibracore, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE VC12

Client PANSW	**Drill Co.**	**Easting** 334472
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6252092
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -12.07 m AHD
Location VC12	**Total Depth (m)** 1.1	**Logged By** SE
Date Drilled 31/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0.0	VC	0.8	VC12__0-0.1		Clayey SAND with silt, dark grey, trace shells.	W	MD	weak organic odour, no staining.	
			VC12__0-0.5						
0.2					SAND with clay, fine-medium grained, poorly graded, orange-brown mottled red.	W	MD	no odour, minor iron oxide staining.	-0.2
			VC12__0.3-0.4						
0.4									-0.4
		0.9	VC12__0.5-0.6						
0.6			VC12__0.5-1						-0.6
0.7					Clayey SAND, fine-medium grained, poorly graded, pale grey.	W	D	no odour, no staining.	
0.8			VC12__0.8-0.9						-0.8
0.9					CLAY, high plasticity, pale grey.	M	ST	no odour, no staining.	
1		0.8	VC12__1-1.1						-1
1.2					Core recovery: 1.20 m Total penetration: 1.36 m Refusal in residual				-1.2
1.4									-1.4
1.6									-1.6
1.8									-1.8
2									-2
2.2									-2.2
2.4									-2.4
2.6									-2.6
2.8									-2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC-Vibracore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE VC13

Client PANSW	**Drill Co.**	**Easting** 334505
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6252316
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -12.73 m AHD
Location VC13	**Total Depth (m)** 1.1	**Logged By** SE
Date Drilled 31/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	VC	1.0	VC13__0-0.1		Sandy CLAY, low to medium plasticity, dark grey, trace shells.	W	S	weak organic odour, no staining.	
			VC13__0-0.5						
0.2									-0.2
			VC13__0.3-0.4						
0.4					Clayey SAND, fine-medium grained, poorly graded, pale grey mottled orange-red, trace rootlets.	M	D	no odour, minor organic staining.	-0.4
		1.2	VC13__0.5-0.6 & FD09						
0.6			VC13__0.5-1						-0.6
			VC13__0.7-0.8						
0.8									-0.8
1									-1
		1.1	VC13__1-1.1						
1.2					Core recovery: 1.10 m Total penetration: 1.60 m Refusal in residual				-1.2
1.4									-1.4
1.6									-1.6
1.8									-1.8
2									-2
2.2									-2.2
2.4									-2.4
2.6									-2.6
2.8									-2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC-Vibracore, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE VC14

Client PANSW	**Drill Co.**	**Easting** 334528
Project Circular Quay Investigation	**Driller** Darren Skene	**Northing** 6252314
Project No. 12517046	**Rig Type**	**Grid** MGA94
Site Overseas Passenger Terminal	**Drill Method** Vibrocore	**Elevation** -13.18 m AHD
Location VC14	**Total Depth (m)** 1.4	**Logged By** SE
Date Drilled 31/10/2019	**Diameter (mm)** 100	**Checked By** CY

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	VC	0.9	VC14__0-0.1		Sandy CLAY, low to medium plasticity, dark brown, trace shells.	W	S	weak organic odour, no staining.	
			VC14__0-0.5						
0.2									-0.2
			VC14__0.3-0.4						
0.4									-0.4
		1.1	VC14__0.5-0.6 & FD10						
0.6			VC14__0.5-1		SAND with clay, medium grained, poorly graded, dark grey, trace shells (increase in shell fragments content at 1.1 m).	W	MD	no odour, no staining, .	-0.6
			VC14__0.7-0.8						
0.8									-0.8
1		0.4	VC14__1-1.1						-1
1.2					Sandy CLAY, medium to high plasticity, orange-brown mottled red.	M	F	no odour, minor iron oxide staining.	-1.2
		0.6	VC14__1.3-1.4						
1.4					Core recovery: 1.40 m Total penetration: 2.43 m Refusal in residual				-1.4
1.6									-1.6
1.8									-1.8
2									-2
2.2									-2.2
2.4									-2.4
2.6									-2.6
2.8									-2.8

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, VC-Vibracore, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

Appendix C - Analytical results

				Particle Size Analysis																
				Cobbles (>6cm)	Gravel (>2mm)	Sand (0.06-2.00 mm)	Silt (2-60 µm)	Clay (<2 µm)	+75µm	+150µm	+300µm	+425µm	+600µm	+1180µm	+2.36mm	+4.75mm	+9.5mm	+19.0mm	+37.5mm	+75.0mm
				%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
EQL				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Location Code	**Date**	**Field ID**	**Depth**																	
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1	<1	<1	72	8	20	70	64	43	26	9	<1	<1	<1	<1	<1	<1	<1
VC02	31/10/2019	VC02_0.0-0.5	0 - 0.5	<1	<1	22	52	26	10	4	2	<1	<1	<1	<1	<1	<1	<1	<1	<1
VC03	30/10/2019	VC03_0.0-0.5	0 - 0.5	<1	<1	51	12	37	48	42	27	14	4	<1	<1	<1	<1	<1	<1	<1
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1	<1	<1	80	4	16	80	72	36	16	3	<1	<1	<1	<1	<1	<1	<1
VC07	30/10/2019	VC07_0.0-0.5	0 - 0.5	<1	5	64	9	22	68	63	47	31	16	8	4	2	<1	<1	<1	<1
VC08	31/10/2019	VC08_1.0-1.5	1 - 1.5	<1	<1	48	19	33	44	35	18	10	3	<1	<1	<1	<1	<1	<1	<1
VC10	31/10/2019	VC10_0.0-0.5	0 - 0.5	<1	<1	56	12	32	51	40	19	10	3	<1	<1	<1	<1	<1	<1	<1
VC12	31/10/2019	VC12_0.0-0.5	0 - 0.5	<1	<1	81	4	15	81	75	52	29	10	1	<1	<1	<1	<1	<1	<1
Statistics																				
Number of Results				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects				0	1	8	8	8	8	8	8	7	7	2	1	1	0	0	0	0
Minimum Concentration				<1	<1	22	4	15	10	4	2	<1	<1	<1	<1	<1	<1	<1	<1	<1
Maximum Concentration				<1	5	81	52	37	81	75	52	31	16	8	4	2	<1	<1	<1	<1

Acid sulphate soils analytical results

				ASS - Field				ASS - pH	ASS - Acidity Trail		ASS - Potential		ASS - ANC		ASS - Acid Base Accounting							SPOCAS
				pHF	pH-FOX	pHF minus pH-fox	Reaction Rate	pHKCl	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	Acid Neutralising Capacity	Acid Neutralising Capacity (acidity units)	s-Net Acidity without ANCE	s-Net Acidity without - ANCE	ANC Fineness Factor	Net Acidity (acidity units)	Net Acidity (sulfur units)	Liming Rate	Liming Rate excluding ANC	Acid Neutralising Capacity (sulfur units)
				pH Units	pH Units	pH Units	-	pH Units	mole H+/t	%S	%S	mole H+/t	% CaCO3	mole H+/t	%S	mole H+/t	-	mole H+/t	%S	kg CaCO3/t	kg CaCO3/t	%S
EQL				0.1	0.1		1	0.1	2	0.02	0.005	10	0.01	10	0.02	10	0.5	10	0.02	1	1	0.01
QLD (2014) Acid Sulfate Soils Technical Manual – Soil management Guidelines V4.0											0.03	18										
Location Code	**Date**	**Field ID**	**Depth**																			
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7	8.1	6.3	1.8	4	8.6	<2	<0.02	1.20	746	16.5	3,300	1.20	746	1.5	<10	<0.02	<1	56	5.28
VC01	30/10/2019	VC01_0.0-0.1	0 - 0.1	8.5	6.2	2.3	3	9.0	<2	<0.02	0.161	101	9.53	1,900	0.16	101	1.5	<10	<0.02	<1	8	3.05
	30/10/2019	VC01_0.5-0.6	0.5 - 0.6	7.7	5.7	2	3															
	30/10/2019	VC01_1.0-1.1	1 - 1.1	7.3	5.2	2.1	3	9.2	<2	<0.02	0.023	14	0.47	93	0.02	14	1.5	<10	<0.02	<1	1	0.15
VC02	30/10/2019	VC02_0.0-0.1	0 - 0.1	8.8	6.0	2.8	3	8.9	<2	<0.02	0.274	171	14.8	2,960	0.27	171	1.5	<10	<0.02	<1	13	4.75
	30/10/2019	VC02_0.5-0.6	0.5 - 0.6	8.8	6.3	2.5	3															
	30/10/2019	VC02_0.9-1.0	0.9 - 1	7.8	6.3	1.5	3															
	30/10/2019	VC02_1.5-1.6	1.5 - 1.6	7.4	5.9	1.5	3	8.1	<2	<0.02	0.022	14	0.76	151	0.02	14	1.5	<10	<0.02	<1	1	0.24
VC03	30/10/2019	VC03_0.0-0.1	0 - 0.1	7.9	6.2	1.7	2															
	30/10/2019	VC03_0.5-0.6	0.5 - 0.6	7.5	5.7	1.8	3															
	30/10/2019	VC03_1.0-1.1	1 - 1.1	7.4	5.4	2	3	7.0	<2	<0.02	0.021	13	0.25	50	0.02	13	1.5	<10	<0.02	<1	<1	0.08
VC04	31/10/2019	VC04_0.0-0.1	0 - 0.1	7.5	5.8	1.7	3	7.2	<2	<0.02	0.011	<10	0.43	86	<0.02	<10	1.5	<10	<0.02	<1	<1	0.14
	31/10/2019	VC04_0.9-1.0	0.9 - 1	7.4	5.6	1.8	3															
VC05	30/10/2019	VC05_0.0-0.1	0 - 0.1	8.3	6.2	2.1	3	9.1	<2	<0.02	0.020	12	0.98	196	0.02	12	1.5	<10	<0.02	<1	<1	0.31
	30/10/2019	VC05_0.5-0.6	0.5 - 0.6	8.0	6.0	2	3															
	30/10/2019	VC05_0.8-1.0	0.8 - 1	7.4	5.3	2.1	3	7.4	<2	<0.02	0.010	<10	0.22	45	<0.02	<10	1.5	<10	<0.02	<1	<1	0.07
VC06	31/10/2019	VC06_0.0-0.1	0 - 0.1	8.7	5.2	3.5	3	8.9	<2	<0.02	0.610	381	12.5	2,500	0.61	381	1.5	<10	<0.02	<1	28	4
	31/10/2019	VC06_0.5-0.6	0.5 - 0.6	8.1	5.7	2.4	3															
VC07	30/10/2019	VC07_0.0-0.1	0 - 0.1	8.6	6.3	2.3	3	9.2	<2	<0.02	0.107	67	28.0	5,590	0.11	67	1.5	<10	<0.02	<1	5	8.96
	30/10/2019	VC07_0.5-0.6	0.5 - 0.6	8.3	6.2	2.1	3															
	30/10/2019	VC07_1.0-1.1	1 - 1.1	7.9	5.9	2	3	8.9	<2	<0.02	0.023	14	1.34	269	0.02	14	1.5	<10	<0.02	<1	1	0.43
VC08	31/10/2019	VC08_0.0-0.1	0 - 0.1	8.2	6.3	1.9	3															
	31/10/2019	VC08_0.5-0.6	0.5 - 0.6	8.5	6.4	2.1	3	9.2	<2	<0.02	0.295	184	21.2	4,230	0.29	184	1.5	<10	<0.02	<1	14	6.78
	31/10/2019	VC08_1.0-1.1	1 - 1.1	7.9	5.9	2	3															
	31/10/2019	VC08_1.5-1.6	1.5 - 1.6	8.1	6.3	1.8	3	9.0	<2	<0.02	0.056	35	1.27	254	0.06	35	1.5	<10	<0.02	<1	3	0.41
VC09	30/10/2019	VC09_0.0-0.1	0 - 0.1	8.8	6.4	2.4	3															
	30/10/2019	VC09_0.5-0.6	0.5 - 0.6	8.0	6.0	2	3															
	30/10/2019	VC09_0.9-1.0	0.9 - 1	8.1	5.6	2.5	3	8.9	<2	<0.02	0.015	<10	0.77	153	<0.02	<10	1.5	<10	<0.02	<1	<1	0.24
VC10	31/10/2019	VC10_0.0-0.1	0 - 0.1	7.7	6.4	1.3	3	6.7	<2	<0.02	0.019	12	0.35	69	<0.02	12	1.5	<10	<0.02	<1	<1	0.11
	31/10/2019	VC10_0.5-0.6	0.5 - 0.6	7.5	5.8	1.7	3															
VC11	30/10/2019	VC11_0.0-0.1	0 - 0.1	8.8	6.2	2.6	3	9.2	<2	<0.02	0.195	121	35.1	7,010	0.19	121	1.5	<10	<0.02	<1	9	11.2
	30/10/2019	VC11_0.5-0.6	0.5 - 0.6	8.8	6.4	2.4	3															
	30/10/2019	VC11_1.0-1.1	1 - 1.1	8.9	6.3	2.6	3	9.2	<2	<0.02	0.286	178	22.1	4,410	0.29	178	1.5	<10	<0.02	<1	13	7.07
VC12	31/10/2019	VC12_0.0-0.1	0 - 0.1	8.7	6.1	2.6	3	9.1	<2	<0.02	0.087	54	16.4	3,280	0.09	54	1.5	<10	<0.02	<1	4	5.26
	31/10/2019	VC12_0.5-0.6	0.5 - 0.6	8.2	5.9	2.3	3															
	31/10/2019	VC12_1.0-1.1	1 - 1.1	7.3	5.6	1.7	3															
VC13	31/10/2019	VC13_0.0-0.1	0 - 0.1	8.3	6.4	1.9	3															
	30/10/2019	VC13_0.5-0.6	0.5 - 0.6	8.2	6.2	2	3	9.0	<2	<0.02	0.040	25	1.11	222	0.04	25	1.5	<10	<0.02	<1	2	0.36
	30/10/2019	VC13_1.0-1.1	1 - 1.1	7.8	6.3	1.5	3															
VC14	31/10/2019	VC14_0.0-0.1	0 - 0.1	8.4	6.4	2	3	9.1	<2	<0.02	0.358	224	48.0	9,590	0.36	224	1.5	<10	<0.02	<1	17	15.4
	31/10/2019	VC14_0.5-0.6	0.5 - 0.6	8.6	6.5	2.1	3															
	31/10/2019	VC14_1.0-1.1	1 - 1.1	8.6	6.5	2.1	3															
	31/10/2019	VC14_1.3-1.4	1.3 - 1.4	8.1	6.3	1.8	3	8.9	<2	<0.02	0.030	18	1.65	330	0.03	18	1.5	<10	<0.02	<1	1	0.53

Statistics

Number of Results	43	43	43	43	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Number of Detects	43	43	43	43	22	0	0	22	19	22	22	18	19	22	0	0	0	16	22
Minimum Concentration	7.3	5.2	3.5	2	6.7	<2	<0.02	0.01	<10	0.22	45	0.02	<10	1.5	<10	<0.02	<1	1	0.07
Maximum Concentration	8.9	6.5	1.3	4	9.2	<2	<0.02	1.2	746	48	9,590	1.2	746	1.5	<10	<0.02	<1	56	15.4

				Cyanides	Inorganics		Major Ions	TOC	Metals																			Organo Metals	BTEXN			
				Cyanide (WAD)	Moisture (%)	Cyanide (Total)	Fluoride	Total Organic Carbon	Aluminium	Antimony	Arsenic	Beryllium	Cadmium	Chromium (III+VI)	Chromium (hexavalent)	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Vanadium	Zinc	Tributyltin (as Sn)	Benzene	Toluene	Ethylbenzene	Xylene (o)
				mg/kg	%	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				1	0.1	1	40	0.02	50	0.5	1	1	0.1	1	0.5	0.5	1	50	1	10	0.01	2	1	0.1	0.1	2	1	0.0005	0.1	0.1	0.1	0.1
NSW EPA (2014) General Solid Waste CT1 (No Leaching)						320	3,000				100	20	20	100	100				100		4	100	40	20	100				10	288	600	
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)						1,280	12,000				400	80	80	400	400				400		16	400	160	80	400				40	1,152	2,400	
Location Code	**Date**	**Field ID**	**Depth**																													
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7	<1	47	<1	160				10	<1	<1		<0.5				127		1.1	<2	5	<5	<2				<0.2	<0.5	<0.5	<0.5
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45	<1	23.7	<1	170				6	<1	<1		<0.5				68		0.2	<2	2	<5	<2				<0.2	<0.5	<0.5	<0.5
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95	<1	18.2	<1	40				<5	<1	<1		<0.5				<5		<0.1	<2	5	<5	<2				<0.2	<0.5	<0.5	<0.5
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2		29														156		1.9											
VC01	30/10/2019	VC01_0.4-0.6	0.4 - 0.6		13.8														<5													
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0		13.5	<1		0.06	3870	<0.50	<1.00		<0.1	3		<0.5	<1.0	1470	1.4	<10	<0.01		<1.0	<0.1	<0.1	3.8	<1.0	<0.0005	<0.2	<0.2	<0.2	<0.2
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1		14.5	<1		0.04	2820	<0.50	<1.00		<0.1	2.5		<0.5	<1.0	1020	1.1	<10	<0.01		<1.0	<0.1	<0.1	2.5	<1.0		<0.2	<0.2	<0.2	<0.2
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2		43.8														223													
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5		49.1	<1		2.82	12200	<0.50	16.1		0.5	42		4.2	120	34900	318	88	4.25		10.4	0.6	3	32.6	445	0.0028	<0.2	<0.2	<0.2	<0.2
VC02	31/10/2019	VC02_0.5-0.6	0.5 - 0.6		22.4														66		0.9											
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0		21.4														6													
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2		20.7														13		<0.1											
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5		17.6														8													
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6		13	<1		0.07	8610	<0.50	1.22		<0.1	8.9		<0.5	<1.0	5400	3.1	<10	<0.01		1	0.2	<0.1	14.8	1.9		<0.2	<0.2	<0.2	<0.2
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2		20.4														14													
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5		13.1	<1		0.15	11300	<0.50	<1.00		<0.1	10.7		0.5	<1.0	1290	33.6	<10	0.05		2	0.1	<0.1	5.5	16.7	<0.0005	<0.2	<0.2	<0.2	<0.2
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4		12.1	<1	40	0.16	11800	<0.50	<1.00		<0.1	12.5		<0.5	<1.0	1240	13.5	<10	0.04		1.9	<0.1	0.1	5.1	6.2		<0.2	<0.2	<0.2	<0.2
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6		20.2														29													
VC03	30/10/2019	VC03_0.5-1.0	0.4 - 1.0		18.5														<5													
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7		19.3														5													
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2		17.3														<5													
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1		24														16		<0.1											
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4		17.1	<1		0.1	14800	<0.50	<1.00		<0.1	13.2		<0.5	<1.0	2510	28	<10	<0.01		2	0.2	0.1	10.4	3.4		<0.2	<0.2	<0.2	<0.2
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6		15.9														7													
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0		64.3	<1		0.05	14600	<0.50	<1.00		<0.1	12		<0.5	<1.0	3080	4.9	<10	<0.01		1.6	0.1	0.3	8.9	2.3	<0.0005	<0.2	<0.2	<0.2	<0.2
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8		19.2														<5													
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0		20.1														<5													
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1		23.5														56		0.6											
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7		17.8														<5													
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9		14.7														5													
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9		4.3	<1	<40	0.11	4150	<0.50	3.22		<0.1	4.3		<0.5	<1.0	3840	1.6	<10	<0.01		<1.0	<0.1	0.1	15.6	1.5		<0.2	<0.2	<0.2	<0.2
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1	<1	48.2	<1	90	2.05			18	<1	<1		<0.5				224		3.4	<2	10	<5	<2				<0.2	<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5		20														11													
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4		18.1														8		<0.1											
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6		18.9														11													
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0		21.4														30													
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8		22.1														36													
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9		21.6														18													
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2		1.5	<1	80	1.28	3930	<0.50	6.28		<0.1	12.5		1.4	38.2	11800	67.7	34	0.84		3	0.2	0.3	11.9	96.6		<0.2	<0.2	<0.2	<0.2
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5		31.3	<1		1.05	5550	<0.50	9.04		<0.1	16.6		2.4	189	15600	110	37	1.61		4.4	0.3	1.5	16.2	158	0.0204	<0.2	<0.2	<0.2	<0.2
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4		32.7														89		1											
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6		19														10		<0.1											
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0		22.3														7													
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.8		20.6														6													
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2		17.4														198		<0.1											
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1	<1	31.1	<1	120	1.2			14	<1	<1		<0.5				117		1.8	<2	6	<5	<2				<0.2	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_0.0-0.5	0.0 - 0.5		36.7														111													
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4		46														216		2.5											
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6		31.3														19													
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0		27.3														7													
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8		27.1														6													
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1		18.6														6													
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5		17.5	<1		0.15	7220	<0.50	3.11		<0.1	10.8		<0.5	<1.0	3460	14.6	<10	0.05		1.2	0.3	0.2	21.3	3.2	<0.0005	<0.2	<0.2	<0.2	<0.2
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4		18.7														9													
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6		15.4														11													
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2		34.5	<1		0.08	8120	<0.50	1.74		<0.1	10.3		0.8	<1.0	4720	10.7	20	0.02		1.8	0.2	0.1	15.4	2.9		<0.2	<0.2	<0.2	<0.2
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5		14.5														<5													
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6		16.3														17													
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0		17.8														22													
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8		17.2														10													

				Cyanides	Inorganics		Major Ions	TOC	Metals																			Organo Metals	BTEXN			
				Cyanide (WAD)	Moisture (%)	Cyanide (Total)	Fluoride	Total Organic Carbon	Aluminium	Antimony	Arsenic	Beryllium	Cadmium	Chromium (III+VI)	Chromium (hexavalent)	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Vanadium	Zinc	Tributyltin (as Sn)	Benzene	Toluene	Ethylbenzene	Xylene (o)
				mg/kg	%	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0		15.6														5													
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2		19.4														29		0.1											
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5		15.4	<1		0.06	9760	<0.50	<1.00		<0.1	6.9		<0.5	<1.0	1360	4.6	<10	<0.01		1.3	0.1	<0.1	6.3	2.1	<0.0005	<0.2	<0.2	<0.2	<0.2
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6		20.4														9													
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8		18.8	<1		0.12	14600	<0.50	<1.00		<0.1	11.9		<0.5	<1.0	1230	24.5	<10	0.01		2	<0.1	<0.1	4.7	4.2		<0.2	<0.2	<0.2	<0.2
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2		28.6														55		0.8											
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5		28.4														5													
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7		28.4	<1	150	0.53	6760	<0.50	8.73		<0.1	12.2		1.4	3.2	17800	7	28	0.03		4.3	0.4	0.4	13.6	14		<0.2	<0.2	<0.2	<0.2
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0		29														9													
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2		27.7														6													
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5		24.2	<1		0.34	4790	<0.50	2.2		<0.1	6		<0.5	4.5	4290	10.6	<10	0.12		<1.0	<0.1	0.2	13.5	14.4	0.0069	<0.2	<0.2	<0.2	<0.2
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4		19.3														<5													
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6		19.6														<5													
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9		16.6														<5													
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1	<1	19.9	<1	80	0.13			<5	<1	<1		<0.5				42		<0.1	<2	4	<5	<2				<0.2	<0.5	<0.5	<0.5
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1	<1	32.2	<1	180	1.45			13	<1	<1		<0.5				154		2.2	<2	7	<5	<2				<0.2	<0.5	<0.5	<0.5
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5		30														84													
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4		30.5														18		0.3											
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6		15.4														6													
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0		15														9													
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8		14.8														16													
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1		13.6														7													
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1		35.7														57		0.7											
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5		38														14													
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4		34														20													
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0		31.7														6													
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8		26.1														<5		<0.1											
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1	<1	24.9	<1	70	0.29			9	<1	<1		<0.5				<5		<0.1	<2	3	<5	<2				<0.2	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4		17.9														8													
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6		30.8														6													

Statistics

Number of Results				8	90	25	12	22	17	17	25	8	25	17	8	17	17	17	90	17	40	8	25	25	25	17	17	8	25	25	25	25
Number of Detects				0	90	0	11	22	17	0	15	0	1	17	0	6	5	17	77	5	24	0	21	11	11	17	15	3	0	0	0	0
Minimum Concentration				<1	1.5	<1	<40	0.04	2820	<0.5	<1.0	<1	<0.1	2.5	<0.5	<0.5	<1.0	1020	1.1	<10	<0.01	<2	<1.0	<0.1	<0.1	2.5	<1.0	<0.0005	<0.2	<0.2	<0.2	<0.2
Maximum Concentration				<1	64.3	<1	180	2.82	14800	<0.5	18	<1	<1	42	<0.5	4.2	189	34900	318	88	4.25	<2	10.4	0.6	3	32.6	445	0.0204	<0.2	<0.5	<0.5	<0.5

Wastle Classification - solid waste guidelines analytical results

							TRH - NEPM 2013							TRH - NEPM 2013 - SG Cleanup				TRH - NEPM 1999					TRH - NEPM 1999 - SG Cleanup									
				Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	>C10-C16 SG Cleanup	>C16-C34 SG Cleanup	>C34-C40 SG Cleanup	>C10-C40 (sum) SG Cleanup	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	C10-C14 SG Cleanup	C15-C28 SG Cleanup	C29-C36 SG Cleanup	C10-C36 (sum) SG Cleanup	Sum of polycyclic aromatic hydrocarbons	Benzo(e)pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.2	0.3	0.2	3	3	3	3	3	5	3	50	100	100	50	3	3	3	5	3	50	100	100	50	0.5	0.004	0.004	0.004	0.004	0.004
NSW EPA (2014) General Solid Waste CT1 (No Leaching)					1,000													650				10,000				10,000						
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)					4,000													2,600				40,000				40,000						
Location Code	**Date**	**Field ID**	**Depth**																													
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7	<0.5				<10						<50	320	<100	320	<10					<50	220	140	360	30.9		<0.5	0.5	0.6	2.4
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45	<0.5				<10						<50	850	170	1020	<10					<50	560	400	960	9.1		<0.5	<0.5	<0.5	0.8
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95	<0.5				<10						<50	<100	<100	<50	<10					<50	<100	<100	<50	<0.5		<0.5	<0.5	<0.5	<0.5
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																								13		<0.5	<0.5	<0.5	1.2
VC01	30/10/2019	VC01_0.4-0.6	0.4 - 0.6																								<0.5		<0.5	<0.5	<0.5	<0.5
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.2	<0.5	<0.2	<3.0	<3	<3	<3	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1	<0.2	<0.5	<0.2	<3.0	<3	<3	<3	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																								17.7		<0.5	<0.5	<0.5	1.5
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	<0.2	<0.5	<0.2	<3.0	<3	4	4	78	28	110					<3	<3	48	46	94						0.631	0.044	0.297	0.286	1.13
VC02	31/10/2019	VC02_0.5-0.6	0.5 - 0.6																								1		<0.5	<0.5	<0.5	1.5
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																								<0.5		<0.5	<0.5	<0.5	<0.5
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																								<0.5		<0.5	<0.5	<0.5	<0.5
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																								<0.5		<0.5	<0.5	<0.5	<0.5
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6	<0.2	<0.5	<0.2	<3.0	<3	<3	<3	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	0.005
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																								<0.5		<0.5	<0.5	<0.5	<0.5
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<0.2	<0.5	<0.2	<3.0	<3	<3	<3	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4	<0.2	<0.5	<0.2	<3.0	<3	<3	<3	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																								<0.5		<0.5	<0.5	<0.5	<0.5
VC03	30/10/2019	VC03_0.5-1.0	0.4 - 1.0																								<0.5		<0.5	<0.5	<0.5	<0.5
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																								<0.5		<0.5	<0.5	<0.5	<0.5
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																								<0.5		<0.5	<0.5	<0.5	<0.5
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																								<0.5		<0.5	<0.5	<0.5	<0.5
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4	<0.2	<0.5	<0.2	<3.0	<3	<3	<3	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																								<0.5		<0.5	<0.5	<0.5	<0.5
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.2	<0.5	<0.2	<3.0	<3	<3	<3	4	<5	4					<3	<3	5	<5	5						<0.005	<0.005	<0.005	<0.005	<0.005
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																								<0.5		<0.5	<0.5	<0.5	<0.5
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																								<0.5		<0.5	<0.5	<0.5	<0.5
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																								1.5		<0.5	<0.5	<0.5	<0.5
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																								<0.5		<0.5	<0.5	<0.5	<0.5
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																								<0.5		<0.5	<0.5	<0.5	<0.5
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9	<0.2	<0.5	<0.2	<3.0	<3	<3	<3	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1	<0.5				<10						<50	610	190	800	<10					<50	350	370	720	14		<0.5	<0.5	<0.5	1
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																								<0.5		<0.5	<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																								<0.5		<0.5	<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																								<0.5		<0.5	<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																								<0.5		<0.5	<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																								<0.5		<0.5	<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																								<0.5		<0.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2	<0.2	<0.5	<0.2	<3.0	<3	4	4	122	49	175					<3	<3	68	79	147						0.307	<0.025	0.132	0.103	0.417
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.2	<0.5	<0.2	<3.0	<3	7	7	176	69	252					<3	<3	101	111	212						0.373	<0.025	0.202	0.116	0.542
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																								3.6		<0.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																								<0.5		<0.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																								<0.5		<0.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.8																								<0.5		<0.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																								<0.5		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1	<0.5				<10						<50	190	<100	190	<10					<50	110	110	220	5.9		<0.5	<0.5	<0.5	0.6
VC08	31/10/2019	VC08_0.0-0.5	0.0 - 0.5																								2.8		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																								26.4		<0.5	<0.5	0.8	2
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																								<0.5		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																								<0.5		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																								<0.5		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																								<0.5		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.2	<0.5	<0.2	<3.0	<3	<3	<3	66	48	114					<3	<3	18	70	88						<0.004	<0.004	<0.004	<0.004	0.006
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																								<0.5		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																								<0.5		<0.5	<0.5	<0.5	<0.5
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																								<0.5		<0.5	<0.5	<0.5	<0.5
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																								<0.5		<0.5	<0.5	<0.5	<0.5
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																								<0.5		<0.5	<0.5	<0.5	<0.5
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																								<0.5		<0.5	<0.5	<0.5	<0.5

							TRH - NEPM 2013							TRH - NEPM 2013 - SG Cleanup				TRH - NEPM 1999					TRH - NEPM 1999 - SG Cleanup									
				Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	>C10-C16 SG Cleanup	>C16-C34 SG Cleanup	>C34-C40 SG Cleanup	>C10-C40 (sum) SG Cleanup	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	C10-C14 SG Cleanup	C15-C28 SG Cleanup	C29-C36 SG Cleanup	C10-C36 (sum) SG Cleanup	Sum of polycyclic aromatic hydrocarbons	Benzo(e)pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																								<0.5		<0.5	<0.5	<0.5	<0.5
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																								<0.5		<0.5	<0.5	<0.5	<0.5
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<0.2	<0.5	<0.2	<3.0	<3	<3	<3	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																								<0.5		<0.5	<0.5	<0.5	<0.5
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8	<0.2	<0.5	<0.2	<3.0	<3	<3	<3	<3	<5	<3					<3	<3	<3	<5	<3						0.006	<0.004	<0.004	<0.004	0.012
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																								<0.5		<0.5	<0.5	<0.5	<0.5
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																								<0.5		<0.5	<0.5	<0.5	<0.5
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7	<0.2	<0.5	<0.2	<3.0	<3	<3	<3	6	<5	6					<3	<3	4	<5	4						<0.004	<0.004	<0.004	<0.004	<0.004
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																								<0.5		<0.5	<0.5	<0.5	<0.5
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																								<0.5		<0.5	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.2	<0.5	<0.2	<3.0	<3	<12	<12	185	72	257					<3	<6	109	112	221						0.117	<0.004	0.06	0.037	0.147
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																								<0.5		<0.5	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																								<0.5		<0.5	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																								<0.5		<0.5	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1	<0.5				<10						<50	<100	<100	<50	<10					<50	<100	<100	<50	<0.5		<0.5	<0.5	<0.5	<0.5
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1	<0.5				<10						<50	160	<100	160	<10					<50	<100	100	100	6.9		<0.5	<0.5	<0.5	0.7
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																								10.2		<0.5	<0.5	<0.5	1
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																								4.4		<0.5	<0.5	<0.5	0.5
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																								<0.5		<0.5	<0.5	<0.5	<0.5
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																								<0.5		<0.5	<0.5	<0.5	<0.5
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																								<0.5		<0.5	<0.5	<0.5	<0.5
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																								<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																								<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																								<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																								<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																								<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																								<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1	<0.5				<10						<50	<100	<100	<50	<10					<50	<100	<100	<50	<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																								<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																								<0.5		<0.5	<0.5	<0.5	<0.5

Statistics

Number of Results		25	17	17	17	25	17	17	17	17	17	8	8	8	8	25	17	17	17	17	8	8	8	8	73	17	90	90	90	90
Number of Detects		0	0	0	0	0	3	3	7	5	7	0	5	2	5	0	0	7	5	7	0	4	5	5	14	5	1	5	6	18
Minimum Concentration		<0.2	<0.5	<0.2	<3.0	<3	<3	<3	<3	<5	<3	<50	<100	<100	<50	<3	<3	<3	<3	<3	<50	<100	<100	<50	<0.5	<0.004	<0.004	<0.004	<0.004	<0.004
Maximum Concentration		<0.5	<0.5	<0.2	<3.0	<10	<12	<12	185	72	257	<50	850	190	1020	<10	<6	109	112	221	<50	560	400	960	30.9	0.631	0.044	0.5	0.8	2.4

Location Code	Date	Field ID	Depth	PAHs: Benzo(b+j+k)fluoranthene	Benzo(a) pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Naphthalene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	PAHs (Sum of total) - Lab calc	Total 8 PAHs (as BaP TEQ)(zero LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(half LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(full LOR) - Lab Calc	Phenols: 3,4-Methylphenol (m,p-cresol)	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2,6-dichlorophenol	2-chlorophenol	2-methylnaphthalene	2-methylphenol	2-nitrophenol
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				1	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.004	0.004	0.004	0.004	0.004	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.005	0.2	0.5
NSW EPA (2014) General Solid Waste CT1 (No Leaching)					0.8												200					8,000	40						4,000	
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)					3.2												800					32,000	160						16,000	
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7		4	4.2	1.7	1.8	2.2	<0.5	4.9	<0.5	<0.5	1.5	1.4	5.7		5	5.3	5.5	<1	<0.5	<0.5						<0.5	
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45		1.1	1.4	0.7	0.8	0.7	<0.5	1.4	<0.5	<0.5	0.6	<0.5	1.6		1.5	1.7	2	<1	<0.5	<0.5						<0.5	
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2	<1	<0.5	<0.5						<0.5	
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2		1.4	1.9	0.8	1.1	1.1	<0.5	1.9	<0.5	<0.5	0.8	0.7	2.1		1.9	2.1	2.4										
VC01	30/10/2019	VC01_0.4-0.6	0.4 - 0.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<1	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004				<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2		1.9	2.7	0.9	1.6	1.5	<0.5	2.6	<0.5	<0.5	1.2	0.9	2.9		2.6	2.8	3.1										
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5		1.57	1.49	0.661	1	0.997	0.219	1.89	<0.2	0.095	0.963	0.885	1.78	14.8				<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.044	<0.5	<0.5
VC02	31/10/2019	VC02_0.5-0.6	0.5 - 0.6		1.9	0.8	1.1	1.1	<0..5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	0.5		<0.5	0.6	1.2										
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6		0.004	<0.004	<0.004	<0.004	0.005	<0.004	0.011	<0.005	<0.004	<0.004	0.004	0.01	0.039				<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004				<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004				<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC03	30/10/2019	VC03_0.5-1.0	0.4 - 1.0		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004				<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.5	0.7	1.4	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.005	<0.6	<0.6
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	0.8		<0.5	0.6	1.2										
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004				<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1		1.8	1.8	0.8	1.1	1	<0.5	2.3	<0.5	<0.5	0.9	0.7	2.6		2.3	2.5	2.8	<1	<0.5	<0.5						<0.5	
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2		0.627	0.606	0.304	0.483	0.378	0.089	0.595	<0.2	<0.025	0.375	0.226	0.639	5.72				<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.025	<0.5	<0.5
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	1	0.872	0.799	0.375	0.663	0.7	0.127	1.5	0.06	0.041	0.517	0.7	1.5	7.5	1	1.3	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.025	<0.5	<0.5
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4		0.7	0.7	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	1.2		0.8	1.1	1.4										
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.8		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1		0.9	1	<0.5	<0.5	0.6	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	1.5		1.1	1.4	1.7	<1	<0.5	<0.5						<0.5	
VC08	31/10/2019	VC08_0.0-0.5	0.0 - 0.5		0.6	0.7	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	0.8		0.7	1	1.3										
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4		3	3	1.3	1.1	2	<0.5	4.6	<0.5	<0.5	0.9	2.7	5		3.8	4	4.2										
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<1	0.01	0.009	<0.004	0.006	0.005	<0.004	0.01	<0.005	<0.004	0.006	0.016	0.011	0.079	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004				<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										

				PAHs																	Phenols									
				Benzo(b+j+k)fluoranthene	Benzo(a) pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Naphthalene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	PAHs (Sum of total) - Lab calc	Total 8 PAHs (as BaP TEQ)(zero LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(half LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(full LOR) - Lab Calc	3,4-Methylphenol (m,p-cresol)	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2,6-dichlorophenol	2-chlorophenol	2-methylnaphthalene	2-methylphenol	2-nitrophenol
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004				<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8		0.013	0.01	0.007	0.008	0.008	<0.004	0.016	<0.005	<0.004	0.008	0.008	0.017	0.113				<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004				<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<1	0.255	0.226	0.116	0.197	0.122	0.04	0.201	0.01	0.008	0.155	0.096	0.217	2.18	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2	<1	<0.5	<0.5						<0.5	
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1		1	1.1	<0.5	0.6	0.6	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	1.5		1.2	1.5	1.8	<1	<0.5	<0.5						<0.5	
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5		1	1.2	0.5	0.7	0.9	<0.5	2	<0.5	<0.5	<0.5	0.8	2.1		1.3	1.6	1.8										
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4		0.7	0.8	<0.5	0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	1		0.8	1.1	1.4										
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2	<1	<0.5	<0.5						<0.5	
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2										
Statistics																														
Number of Results				5	90	90	90	90	90	90	90	90	90	90	90	90	17	78	78	78	25	25	25	17	17	17	17	17	25	17
Number of Detects				1	20	19	13	16	16	5	20	2	3	12	13	21	7	13	78	78	0	0	0	0	0	0	0	1	0	0
Minimum Concentration				<1	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5
Maximum Concentration				1	4	4.2	1.7	1.8	2.2	1.9	4.9	0.06	0.095	1.5	2.7	5.7	14.8	5	5.3	5.5	<1	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	0.044	<0.5	<0.6

									VOCs																								
				3-methylcholanthrene	4-chloro-3-methylphenol	Acetophenone	Pentachlorophenol	Phenol	1,1-dichloroethane	1,2,3-trichlorobenzene	1,2,3-trichloropropane	1,2-dibromoethane	1,3-dichlorobenzene	2-butanone (MEK)	2-hexanone (MBK)	4-methyl-2-pentanone (MIBK)	Bromodichloromethane	Bromoform	Carbon disulfide	Chlorodibromomethane	Chloroethane	cis-1,3-dichloropropene	cis-1,4-Dichloro-2-butene	Dibromomethane	Iodomethane	n-butylbenzene	n-propylbenzene	Pentachloroethane	p-isopropyltoluene	sec-butylbenzene	Trichloroethene	tert-butylbenzene	Tetrachloroethene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	1	0.5	0.5	0.5	0.5	0.5	0.5	5	5	5	0.5	0.5	0.5	0.5	5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
NSW EPA (2014) General Solid Waste CT1 (No Leaching)														4,000																	10		14
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)														16,000																	40		56
Location Code	**Date**	**Field ID**	**Depth**																														
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7		<0.5		<2	<0.5						<5																	<0.5		<0.5
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45		<0.5		<2	<0.5						<5																	<0.5		<0.5
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95		<0.5		<2	<0.5						<5																	<0.5		<0.5
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																														
VC01	30/10/2019	VC01_0.4-0.6	0.4 - 0.6																														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.5	<0.5	<0.5	<1	<0.5					<0.5																				
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1		<0.5		<2	<0.5																									
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																														
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5		<0.5		<2	<0.5																									
VC02	31/10/2019	VC02_0.5-0.6	0.5 - 0.6																														
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																														
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																														
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																														
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6		<0.5		<2	<0.5																									
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																														
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5		<0.5		<2	<0.5																									
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4		<0.5		<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																														
VC03	30/10/2019	VC03_0.5-1.0	0.4 - 1.0																														
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																														
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																														
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																														
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4		<0.5		<2	<0.5																									
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																														
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.6	<0.6	<0.6	<1	<0.6					<0.6																				
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																														
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																														
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																														
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																														
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																														
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9		<0.5		<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1		<0.5		<2	<0.5						<5																	<0.5		<0.5
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																														
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																														
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																														
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																														
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																														
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																														
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2		<0.5		<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.5	<0.5	<0.5	<1	<0.5					<0.5																				
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																														
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																														
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																														
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.8																														
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																														
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1		<0.5		<2	<0.5						<5																	<0.5		<0.5
VC08	31/10/2019	VC08_0.0-0.5	0.0 - 0.5																														
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																														
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																														
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																														
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																														
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																														
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.5	<0.5	<0.5	<1	<0.5					<0.5																				
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																														
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																														
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2		<0.5		<2	<0.5																									
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																														
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																														
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																														
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																														

									VOCs																								
				3-methylcholanthrene	4-chloro-3-methylphenol	Acetophenone	Pentachlorophenol	Phenol	1,1-dichloroethane	1,2,3-trichlorobenzene	1,2,3-trichloropropane	1,2-dibromoethane	1,3-dichlorobenzene	2-butanone (MEK)	2-hexanone (MBK)	4-methyl-2-pentanone (MIBK)	Bromodichloromethane	Bromoform	Carbon disulfide	Chlorodibromomethane	Chloroethane	cis-1,3-dichloropropene	cis-1,4-Dichloro-2-butene	Dibromomethane	Iodomethane	n-butylbenzene	n-propylbenzene	Pentachloroethane	p-isopropyltoluene	sec-butylbenzene	Trichloroethene	tert-butylbenzene	Tetrachloroethene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																														
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																														
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5		<0.5		<2	<0.5																									
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																														
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8		<0.5		<2	<0.5																									
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																														
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																														
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7		<0.5		<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																														
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																														
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.5	<0.5	<0.5	<1	<0.5					<0.5																				
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																														
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																														
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																														
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1		<0.5		<2	<0.5						<5																	<0.5		<0.5
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1		<0.5		<2	<0.5						<5																	<0.5		<0.5
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																														
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																														
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																														
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																														
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																														
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																														
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																														
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																														
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																														
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																														
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																														
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1		<0.5		<2	<0.5						<5																	<0.5		<0.5
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																														
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																														

Statistics

Number of Results				5	25	5	25	25	4	4	4	4	9	12	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	12	4	12
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Maximum Concentration				<0.6	<0.6	<0.6	<2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.6	<5	<5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

									SVOCs																							
				trans-1,3-dichloropropene	trans-1,2-dichloroethene	trans-1,4-Dichloro-2-butene	Trichlorofluoromethane	Vinyl acetate	1-naphthylamine	2-(acetylamino) fluorene	2-nitroaniline	3,3-Dichlorobenzidine	3-nitroaniline	4-(dimethylamino) azobenzene	4-bromophenyl phenyl ether	4-chloroaniline	4-chlorophenyl phenyl ether	4-nitroaniline	4-Nitroquinoline-N-oxide	5-nitro-o-toluidine	7,12-dimethylbenz(a)anthracene	Aniline	Azobenzene	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl)ether	Carbazole	Chlorobenzilate	Coronene	Hexachlorocyclopentadiene	Hexachloroethane	Hexachloropropene	Isophorone
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	5	5	0.5	0.5	1	0.5	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5	0.5	0.5	0.5	0.005	2.5	0.5	0.5	0.5
NSW EPA (2014) General Solid Waste CT1 (No Leaching)																																
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)																																
Location Code	**Date**	**Field ID**	**Depth**																													
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7																													
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45																													
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95																													
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																													
VC01	30/10/2019	VC01_0.4-0.6	0.4 - 0.6																													
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0						<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.005	<2.5	<0.5	<0.5	<0.5
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1																									<0.005				
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																													
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5																									0.375				
VC02	31/10/2019	VC02_0.5-0.6	0.5 - 0.6																													
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																													
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																													
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																													
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6																									<0.005				
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																													
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5																									<0.005				
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4	<0.5	<0.5	<0.5	<5	<5																				<0.005				
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																													
VC03	30/10/2019	VC03_0.5-1.0	0.4 - 1.0																													
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																													
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																													
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																													
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4																									<0.005				
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																													
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0						<0.6	<0.6	<1.0	<0.6	<1.0	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<1	<0.6	<0.6	<0.6	<0.6	<0.005	<2.5	<0.6	<0.6	<0.6
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																													
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																													
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																													
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																													
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																													
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9	<0.5	<0.5	<0.5	<5	<5																				<0.005				
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1																													
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																													
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																													
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																													
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																													
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																													
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																													
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2	<0.5	<0.5	<0.5	<5	<5																				0.256				
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5						<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	0.25	<2.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																													
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																													
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																													
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.8																													
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																													
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1																													
VC08	31/10/2019	VC08_0.0-0.5	0.0 - 0.5																													
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																													
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																													
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																													
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																													
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																													
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5						<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.005	<2.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																													
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																													
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2																									<0.005				
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																													
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																													
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																													
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																													

									SVOCs																							
				trans-1,3-dichloropropene	trans-1,2-dichloroethene	trans-1,4-Dichloro-2-butene	Trichlorofluoromethane	Vinyl acetate	1-naphthylamine	2-(acetylamino) fluorene	2-nitroaniline	3,3-Dichlorobenzidine	3-nitroaniline	4-(dimethylamino) azobenzene	4-bromophenyl phenyl ether	4-chloroaniline	4-chlorophenyl phenyl ether	4-nitroaniline	4-Nitroquinoline-N-oxide	5-nitro-o-toluidine	7,12-dimethylbenz(a)anthracene	Aniline	Azobenzene	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl)ether	Carbazole	Chlorobenzilate	Coronene	Hexachlorocyclopentadiene	Hexachloroethane	Hexachloropropene	Isophorone
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																													
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																													
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5																									<0.005				
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																													
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8																									<0.005				
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																													
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																													
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7	<0.5	<0.5	<0.5	<5	<5																				<0.005				
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																													
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																													
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5						<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	0.126	<2.5	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																													
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																													
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																													
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1																													
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1																													
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																													
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																													
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																													
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																													
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																													
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																													
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																													
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																													
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																													
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																													
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																													
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1																													
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																													
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																													

Statistics

Number of Results				4	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	17	5	5	5	5
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
Minimum Concentration				<0.5	<0.5	<0.5	<5	<5	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.005	<2.5	<0.5	<0.5	<0.5
Maximum Concentration				<0.5	<0.5	<0.5	<5	<5	<0.6	<0.6	<1.0	<0.6	<1.0	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<1	<0.6	<0.6	<0.6	<0.6	0.375	<2.5	<0.6	<0.6	<0.6

Location Code	Date	Field ID	Depth	Methapyrilene	N-nitrosodiethylamine	N-nitrosodi-n-butylamine	N-nitrosodi-n-propylamine	N-Nitrosomethylethylamine	N-nitrosomorpholine	N-nitrosopiperidine	N-nitrosopyrrolidine	Pentachlorobenzene	Perylene	Phenacetin	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	4,4'-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)	Chlordane (trans)	d-BHC	4,4 DDD	4,4 DDT	DDT+DDE+DDD - Lab Calc
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5	0.004	0.5	0.1	0.1	0.0005	0.0005	0.0005	0.05	0.0005	0.00025	0.00025	0.00025	0.0005	0.0005	0.0005	0.0005
NSW EPA (2014) General Solid Waste CT1 (No Leaching)																												
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)																												
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																									
VC01	30/10/2019	VC01_0.4-0.6	0.4 - 0.6																									
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.004	<0.5			<0.00050	<0.00050	<0.00050	<0.5	<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																									
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5										0.329				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC02	31/10/2019	VC02_0.5-0.6	0.5 - 0.6																									
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																									
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																									
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																									
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																									
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																									
VC03	30/10/2019	VC03_0.5-1.0	0.4 - 1.0																									
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																									
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																									
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																									
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																									
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<1.0	<0.6	<0.005	<0.6			<0.00050	<0.00050	<0.00050	<0.5	<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																									
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																									
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																									
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																									
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																									
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																									
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																									
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																									
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																									
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																									
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																									
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2										0.136				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	0.174	<0.5			<0.00050	<0.00050	<0.00050	<0.5	<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																									
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																									
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																									
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.8																									
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																									
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	
VC08	31/10/2019	VC08_0.0-0.5	0.0 - 0.5																									
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																									
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																									
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																									
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																									
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																									
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.004	<0.5			<0.00050	<0.00050	<0.00050	<0.5	<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																									
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																									
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																									
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																									
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																									
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																									

				Methapyrilene	N-nitrosodiethylamine	N-nitrosodi-n-butylamine	N-nitrosodi-n-propylamine	N-Nitrosomethylethylamine	N-nitrosomorpholine	N-nitrosopiperidine	N-nitrosopyrrolidine	Pentachlorobenzene	Perylene	Phenacetin	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	4,4'-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)	Chlordane (trans)	d-BHC	4,4 DDD	4,4 DDT	DDT+DDE+DDD - Lab Calc
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																									
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																									
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																									
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																									
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																									
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																									
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																									
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	0.055	<0.5			<0.00050	<0.00050	<0.00050	<0.5	<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																									
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																									
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																									
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																									
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																									
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																									
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																									
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																									
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																									
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																									
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																									
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																									
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																									
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																									
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																									
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																									

Statistics

Number of Results	5	5	5	5	5	5	5	5	5	17	5	0	0	25	25	25	5	25	25	25	25	25	25	25	17
Number of Detects	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.004	<0.5			<0.0005	<0.0005	<0.0005	<0.5	<0.0005	<0.00025	<0.00025	<0.00025	<0.0005	<0.0005	<0.0005	<0.0005
Maximum Concentration	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<1.0	<0.6	0.329	<0.6			<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.0005

				OC Pesticides																							
				Dieldrin	Endosulfan	Endosulfan I (alpha)	Endosulfan II (beta)	Endosulfan Sulfate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	Oxychlordane	Toxaphene	Tokuthion	Azinphos methyl	Bolstar (Sulprofos)	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos	Chlorfenvinphos E	Chlorpyrifos	Chlorpyrifos-methyl
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00025	0.0005	0.0005	0.0005	0.0005	0.0005	1	0.2	0.01	0.2	0.01	0.01	0.2	0.01	0.01	0.01
NSW EPA (2014) General Solid Waste CT1 (No Leaching)					60																					4	
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)					240																					16	
Location Code	**Date**	**Field ID**	**Depth**																								
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05											<0.05	
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05											<0.05	
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05											<0.05	
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																								
VC01	30/10/2019	VC01_0.4-0.6	0.4 - 0.6																								
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5	<0.0100	<0.01	<0.01
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																								
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01
VC02	31/10/2019	VC02_0.5-0.6	0.5 - 0.6																								
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																								
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																								
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																								
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																								
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																								
VC03	30/10/2019	VC03_0.5-1.0	0.4 - 1.0																								
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																								
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																								
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																								
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																								
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.6	<0.0100	<0.01	<0.01
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																								
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																								
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																								
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																								
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																								
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05											<0.05	
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																								
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																								
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																								
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																								
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																								
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																								
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5	<0.0100	<0.01	<0.01
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																								
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																								
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																								
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.8																								
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																								
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05											<0.05	
VC08	31/10/2019	VC08_0.0-0.5	0.0 - 0.5																								
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																								
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																								
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																								
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																								
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																								
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5	<0.0100	<0.01	<0.01
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																								
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																								
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																								
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																								
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																								
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																								

				OC Pesticides																							
				Dieldrin	Endosulfan	Endosulfan I (alpha)	Endosulfan II (beta)	Endosulfan Sulfate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	Oxychlordane	Toxaphene	Tokuthion	Azinphos methyl	Bolstar (Sulprofos)	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos	Chlorfenvinphos E	Chlorpyrifos	Chlorpyrifos-methyl
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																								
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																								
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																								
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																								
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																								
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																								
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																								
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5	<0.0100	<0.01	<0.01
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																								
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																								
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																								
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05											<0.05	
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05											<0.05	
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																								
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																								
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																								
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																								
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																								
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																								
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																								
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																								
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																								
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																								
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																								
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05											<0.05	
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																								
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																								

Statistics

Statistics	Dieldrin	Endosulfan	Endosulfan I (alpha)	Endosulfan II (beta)	Endosulfan Sulfate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	Oxychlordane	Toxaphene	Tokuthion	Azinphos methyl	Bolstar (Sulprofos)	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos	Chlorfenvinphos E	Chlorpyrifos	Chlorpyrifos-methyl
Number of Results	25	17	25	25	25	25	25	17	25	25	25	25	17	17	0	0	17	0	17	17	5	17	25	17
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			<0.01		<0.01	<0.01	<0.5	<0.0100	<0.01	<0.01
Maximum Concentration	<0.05	<0.0005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.0005	<0.05	<0.05	<0.05	<0.05	<0.0005	<0.0005			<0.01		<0.01	<0.01	<0.6	<0.0100	<0.05	<0.01

OP Pesticides

Location Code	Date	Field ID	Depth	Coumaphos	Demeton-O	Demeton-S	Demeton-S-methyl	Diazinon	cis-Chlorfenvinphos	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop	Fenamiphos	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Parathion	Phorate	Pirimphos-ethyl	Pirimiphos-methyl	Prothiofos	Pyrazophos	Ronnel
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				2	0.2	0.2	0.01	0.01	0.01	0.01	0.01	0.2	0.2	0.01	0.2	0.01	0.2	0.2	0.01	0.01	0.2	0.01	0.2	0.01	0.2	2	0.01	0.2	0.01	0.2	0.01	0.2	0.2
NSW EPA (2014) General Solid Waste CT1 (No Leaching)																																	
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)																																	
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7																														
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45																														
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95																														
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																														
VC01	30/10/2019	VC01_0.4-0.6	0.4 - 0.6																														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																														
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC02	31/10/2019	VC02_0.5-0.6	0.5 - 0.6																														
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																														
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																														
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																														
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																														
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																														
VC03	30/10/2019	VC03_0.5-1.0	0.4 - 1.0																														
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																														
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																														
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																														
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																														
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																														
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																														
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																														
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																														
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																														
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1																														
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																														
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																														
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																														
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																														
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																														
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																														
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																														
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																														
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																														
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.8																														
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																														
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1																														
VC08	31/10/2019	VC08_0.0-0.5	0.0 - 0.5																														
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																														
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																														
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																														
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																														
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																														
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																														
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																														
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																														
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																														
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																														
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																														

				OP Pesticides																													
				Coumaphos	Demeton-O	Demeton-S	Demeton-S-methyl	Diazinon	cis-Chlorfenvinphos	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop	Fenamiphos	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Parathion	Phorate	Pirimphos-ethyl	Pirimiphos-methyl	Prothiofos	Pyrazophos	Ronnel
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																														
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																														
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																														
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																														
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																														
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																														
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																														
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																														
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																														
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																														
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1																														
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1																														
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																														
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																														
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																														
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																														
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																														
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																														
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																														
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																														
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																														
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																														
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																														
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1																														
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																														
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																														

Statistics

	Coumaphos	Demeton-O	Demeton-S	Demeton-S-methyl	Diazinon	cis-Chlorfenvinphos	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop	Fenamiphos	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Parathion	Phorate	Pirimphos-ethyl	Pirimiphos-methyl	Prothiofos	Pyrazophos	Ronnel
Number of Results	0	0	0	17	17	17	17	17	0	0	17	0	17	0	0	17	17	0	17	0	17	0	0	17	0	17	0	17	0	0
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		
Maximum Concentration				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01		

							MAH				Halogenated Hydrocarbons		PCBs								Herbicides									
Location Code	Date	Field ID	Depth	Terbufos	Trichloronate	Tetrachlorvinphos	1,2,4-trimethylbenzene	Styrene	1,3,5-trimethylbenzene	Isopropylbenzene	Bromomethane	Dichlorodifluoromethane	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Total)	Pronamide	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,4-trichlorobenzene	1,2-dibromo-3-chloropropane	1,2-dichlorobenzene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.2	0.2	0.2	0.5	0.5	0.5	0.5	5	5	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
NSW EPA (2014) General Solid Waste CT1 (No Leaching)								60												50		200	600	26	24	14				86
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)								240												50		800	2,400	104	96	56				344
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7					<0.5												<0.1		<0.5	<0.5	<0.5	<0.5	<0.5				
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45					<0.5												<0.1		<0.5	<0.5	<0.5	<0.5	<0.5				
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95					<0.5												<0.1		<0.5	<0.5	<0.5	<0.5	<0.5				
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																											
VC01	30/10/2019	VC01_0.4-0.6	0.4 - 0.6																											
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0										<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.5							<0.5		<0.5
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1										<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050										
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																											
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5										<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050										
VC02	31/10/2019	VC02_0.5-0.6	0.5 - 0.6																											
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																											
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																											
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																											
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6										<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050										
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																											
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5										<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050										
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4				<0.5	<0.5	<0.5	<0.5	<5	<5	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																											
VC03	30/10/2019	VC03_0.5-1.0	0.4 - 1.0																											
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																											
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																											
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																											
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4										<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050										
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																											
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0										<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.6							<0.6		<0.6
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																											
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																											
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																	<0.1										
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																											
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																											
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9				<0.5	<0.5	<0.5	<0.5	<5	<5	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1					<0.5												<0.1		<0.5	<0.5	<0.5	<0.5	<0.5				
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																											
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																											
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																											
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																											
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																											
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																											
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2				<0.5	<0.5	<0.5	<0.5	<5	<5	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5										<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0677	<0.0050	0.0677	<0.5							<0.5		<0.5
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																											
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																											
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																	<0.1										
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.8																											
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																											
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1					<0.5												<0.1		<0.5	<0.5	<0.5	<0.5	<0.5				
VC08	31/10/2019	VC08_0.0-0.5	0.0 - 0.5																											
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																	<0.1										
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																											
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																											
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																											
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																											
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5										<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.5							<0.5		<0.5
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																											
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																											
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2										<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050										
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																											
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																	<0.1										
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																											
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																											

							MAH				Halogenated Hydrocarbons		PCBs								Herbicides									
				Terbufos	Trichloronate	Tetrachlorvinphos	1,2,4-trimethylbenzene	Styrene	1,3,5-trimethylbenzene	Isopropylbenzene	Bromomethane	Dichlorodifluoromethane	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Total)	Pronamide	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,4-trichlorobenzene	1,2-dibromo-3-chloropropane	1,2-dichlorobenzene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																											
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																											
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5										<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050										
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																											
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8										<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050										
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																											
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																											
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7				<0.5	<0.5	<0.5	<0.5	<5	<5	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																											
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																											
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5										<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0346	<0.0050	0.0346	<0.5							<0.5		<0.5
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																	<0.1										
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																											
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																											
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1					<0.5												<0.1		<0.5	<0.5	<0.5	<0.5	<0.5				
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1					<0.5												<0.1		<0.5	<0.5	<0.5	<0.5	<0.5				
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																											
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																											
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																											
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																											
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																											
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																											
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																											
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																											
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																											
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																											
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																											
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1					<0.5												<0.1		<0.5	<0.5	<0.5	<0.5	<0.5				
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																											
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																											

Statistics

Number of Results	0	0	0	4	12	4	4	4	4	17	17	17	17	17	17	17	30	5	12	12	12	12	12	4	9	4	9
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<0.5	<0.5	<0.5	<0.5	<5	<5	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.0050	<0.0050	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Maximum Concentration				<0.5	<0.5	<0.5	<0.5	<5	<5	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	0.0677	<0.0062	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.6	<0.5	<0.6

Wastle Classification - solid waste guidelines analytical results

				Chlorinated Hydrocarbons																	Explosives				Nitroaromatics			Nitrosoamines	Phthalates			
				1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	1,4-dichlorobenzene	2,2-dichloropropane	2-chloronaphthalene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Carbon tetrachloride	Chlorobenzene	Chloroform	Chloromethane	cis-1,2-dichloroethene	Methylene chloride	Hexachlorobutadiene	Vinyl chloride	1,3,5-Trinitrobenzene	2,4-Dinitrotoluene	2,6-dinitrotoluene	Nitrobenzene	2-Picoline	4-aminobiphenyl	Pentachloronitrobenzene	N-Nitrosodiphenyl & Diphenylamine	Bis(2-ethylhexyl) phthalate	Butyl benzyl phthalate	Diethylphthalate	Dimethyl phthalate
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	0.5	0.5	0.5	4	0.5	1	1	0.5	0.5	0.5	0.5	1	5	0.5	0.5	0.5
NSW EPA (2014) General Solid Waste CT1 (No Leaching)				10			150						10	2,000	120			172		4		2.6		40								
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)				40			600						40	8,000	480			688		16		10.4		160								
Location Code	**Date**	**Field ID**	**Depth**																													
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7	<0.5									<0.5	<0.5	<0.5			<0.5		<4												
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45	<0.5									<0.5	<0.5	<0.5			<0.5		<4												
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95	<0.5									<0.5	<0.5	<0.5			<0.5		<4												
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																													
VC01	30/10/2019	VC01_0.4-0.6	0.4 - 0.6																													
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0				<0.5		<0.5										<0.5		<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0	<5.0	<0.5	<0.5	<0.5
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1																													
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																													
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5																													
VC02	31/10/2019	VC02_0.5-0.6	0.5 - 0.6																													
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																													
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																													
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																													
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6																													
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																													
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5																													
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5		<0.5	<5												
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																													
VC03	30/10/2019	VC03_0.5-1.0	0.4 - 1.0																													
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																													
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																													
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																													
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4																													
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																													
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0				<0.6		<0.6										<0.6		<0.6	<1.0	<1.0	<0.6	<0.6	<0.6	<0.6	<1.2	<5.0	<0.6	<0.6	<0.6
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																													
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																													
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																													
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																													
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																													
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5		<0.5	<5												
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1	<0.5									<0.5	<0.5	<0.5			<0.5		<4												
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																													
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																													
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																													
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																													
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																													
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																													
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5		<0.5	<5												
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5				<0.5		<0.5										<0.5		<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0	<5.0	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																													
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																													
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																													
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.8																													
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																													
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1	<0.5									<0.5	<0.5	<0.5			<0.5		<4												
VC08	31/10/2019	VC08_0.0-0.5	0.0 - 0.5																													
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																													
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																													
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																													
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																													
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																													
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5				<0.5		<0.5										<0.5		<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0	<5.0	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																													
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																													
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2																													
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																													
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																													
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																													
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																													

				Chlorinated Hydrocarbons																	Explosives				Nitroaromatics			Nitrosoamines	Phthalates			
				1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	1,4-dichlorobenzene	2,2-dichloropropane	2-chloronaphthalene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Carbon tetrachloride	Chlorobenzene	Chloroform	Chloromethane	cis-1,2-dichloroethene	Methylene chloride	Hexachlorobutadiene	Vinyl chloride	1,3,5-Trinitrobenzene	2,4-Dinitrotoluene	2,6-dinitrotoluene	Nitrobenzene	2-Picoline	4-aminobiphenyl	Pentachloronitrobenzene	N-Nitrosodiphenyl & Diphenylamine	Bis(2-ethylhexyl) phthalate	Butyl benzyl phthalate	Diethylphthalate	Dimethyl phthalate
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																													
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																													
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5																													
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																													
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8																													
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																													
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																													
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5		<0.5	<5												
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																													
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																													
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5				<0.5		<0.5										<0.5		<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0	<5.0	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																													
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																													
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																													
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1	<0.5									<0.5	<0.5	<0.5			<0.5		<4												
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1	<0.5									<0.5	<0.5	<0.5			<0.5		<4												
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																													
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																													
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																													
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																													
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																													
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																													
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																													
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																													
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																													
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																													
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																													
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1	<0.5									<0.5	<0.5	<0.5			<0.5		<4												
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																													
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																													
Statistics																																
Number of Results				12	4	4	9	4	5	4	4	4	12	12	12	4	4	8	9	12	5	5	5	5	5	5	5	5	5	5	5	5
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<4	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5
Maximum Concentration				<0.5	<0.5	<0.5	<0.6	<0.5	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<5	<0.6	<1.0	<1.0	<0.6	<0.6	<0.6	<0.6	<1.2	<0.6	<0.6	<0.6	<0.6

	Di-n-butyl phthalate	Di-n-octyl phthalate
	mg/kg	mg/kg
EQL	0.5	0.5
NSW EPA (2014) General Solid Waste CT1 (No Leaching)		
NSW EPA (2014) Restricted Solid Waste CT2 (No Leaching)		

Location Code	Date	Field ID	Depth	Di-n-butyl phthalate	Di-n-octyl phthalate
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7		
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45		
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95		
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2		
VC01	30/10/2019	VC01_0.4-0.6	0.4 - 0.6		
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.5	<0.5
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1		
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2		
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5		
VC02	31/10/2019	VC02_0.5-0.6	0.5 - 0.6		
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0		
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2		
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5		
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6		
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2		
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5		
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4		
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6		
VC03	30/10/2019	VC03_0.5-1.0	0.4 - 1.0		
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7		
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2		
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1		
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4		
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6		
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.6	<0.6
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8		
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0		
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1		
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7		
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9		
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9		
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1		
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5		
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4		
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6		
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0		
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8		
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9		
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2		
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4		
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6		
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0		
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.8		
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2		
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1		
VC08	31/10/2019	VC08_0.0-0.5	0.0 - 0.5		
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4		
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6		
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0		
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8		
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1		
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.5	<0.5
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4		
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6		
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2		
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5		
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6		
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0		
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8		

				Di-n-butyl phthalate	Di-n-octyl phthalate
				mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0		
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2		
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5		
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6		
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8		
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2		
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5		
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7		
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0		
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2		
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.5	<0.5
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4		
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6		
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9		
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1		
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1		
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5		
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4		
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6		
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0		
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8		
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1		
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1		
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5		
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4		
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0		
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8		
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1		
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4		
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6		

Statistics

Number of Results	5	5
Number of Detects	0	0
Minimum Concentration	<0.5	<0.5
Maximum Concentration	<0.6	<0.6

Location Code	Date	Field ID	Depth	Inorganics		Metals															
				Moisture (%)	Cyanide (Total)	Aluminium	Antimony	Arsenic	Cadmium	Chromium (III+VI)	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Vanadium	Zinc
				%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.1	1	50	0.5	1	0.1	1	0.5	1	50	1	10	0.01	1	0.1	0.1	2	1
NAGD 2009 - SQG-High Values							**25**	**70**	**10**	**370**		**270**		**220**		**1**	**52**		**3.7**		**410**
NAGD 2009 - Screening Level							2	20	1.5	80		65		50		0.15	21		1		200
ANZG 2018 GV -High							**25**	**70**	**10**	**370**		**270**		**220**		**1**	**52**		**4**		**410**
ANZG 2018 DGV							2	20	1.5	80		65		50		0.15	21		1		200
Location Code	**Date**	**Field ID**	**Depth**																		
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	13.5	<1	3,870	<0.50	<1.00	<0.1	3	<0.5	<1.0	1,470	1.4	<10	<0.01	<1.0	<0.1	<0.1	3.8	<1.0
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	49.1	<1	12,200	<0.50	16.1	0.5	42	4.2	120	34,900	**318**	88	**4.25**	10.4	0.6	3.0	32.6	**445**
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	13.1	<1	11,300	<0.50	<1.00	<0.1	10.7	0.5	<1.0	1,290	33.6	<10	0.05	2.0	0.1	<0.1	5.5	16.7
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	64.3	<1	14,600	<0.50	<1.00	<0.1	12	<0.5	<1.0	3,080	4.9	<10	<0.01	1.6	0.1	0.3	8.9	2.3
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	31.3	<1	5,550	<0.50	9.04	<0.1	16.6	2.4	189	15,600	110	37	**1.61**	4.4	0.3	1.5	16.2	158
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	17.5	<1	7,220	<0.50	3.11	<0.1	10.8	<0.5	<1.0	3,460	14.6	<10	0.05	1.2	0.3	0.2	21.3	3.2
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	15.4	<1	9,760	<0.50	<1.00	<0.1	6.9	<0.5	<1.0	1,360	4.6	<10	<0.01	1.3	0.1	<0.1	6.3	2.1
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	24.2	<1	4,790	<0.50	2.2	<0.1	6	<0.5	4.5	4,290	10.6	<10	0.12	<1.0	<0.1	0.2	13.5	14.4
Statistics																					
Number of Results				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects				8	0	8	0	4	1	8	3	3	8	8	2	5	6	6	5	8	7
Minimum Concentration				13.1	<1	3,870	<0.5	<1	<0.1	3.0	<0.5	<1.0	1,290	1.4	<10	0.01	<0.1	<0.1	<0.1	2.5	<1
Maximum Concentration				64.3	<1	14,600	<0.5	16	0.5	42	4	189	34,900	318	88	4.25	10.4	0.6	3	32.6	445

				TOC		Organo Metals		BTEXN					
				Total Organic Carbon	Total Organic Carbon (used for normalisation)	Tributyltin (as Sn)	Normalised Tributyltin (as Sn)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total
				%	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.02		0.0005	0.0005	0.1	0.1	0.1	0.1	0.2	0.3
NAGD 2009 - SQG-High Values						**0.07**	**0.07**						
NAGD 2009 - Screening Level						0.009	0.009						
ANZAST 2018 GV-High						**0.07**	**0.07**						
ANZAST 2018 DGV						0.009	0.009						
ANZECC 2000 - ISQG - High[a]													
ANECC 2000 - ISQG - Low[a]													
Location Code	**Date**	**Field ID**	**Depth**										
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	0.06	1	<0.0005	<0.0005	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	2.82	2.82	0.0028	0.0010	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	0.15	1	<0.0005	<0.0005	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	0.05	1	<0.0005	<0.0005	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	1.05	1.05	0.0204	0.0194	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	0.15	1	<0.0005	<0.0005	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	0.06	1	<0.0005	<0.0005	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	0.34	0.34	0.0069	0.0203	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5
Statistics													
Number of Results				8	8	8	8	8	8	8	8	8	8
Number of Detects				8	8	3	3	0	0	0	0	0	0
Minimum Concentration				0.04	1.00	<0.0005	<0.0005	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5
Maximum Concentration				2.82	2.82	0.0204	0.0194	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

					TRH - NEPM 2013							TRH - NEPM 1999			
				BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.2	3	3	3	3	3	5	3	3	3	3	5
NAGD 2009 - SQG-High Values															
NAGD 2009 - Screening Level															
ANZAST 2018 GV-High															
ANZAST 2018 DGV															
ANZECC 2000 - ISQG - High[a]															
ANECC 2000 - ISQG - Low[a]															
Location Code	**Date**	**Field ID**	**Depth**												
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.2	<3.0	<3	<3	<3	<3	<5	<3	<3	<3	<3	<5
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	<0.2	<3.0	<3	4	4	78	28	110	<3	<3	48	46
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<0.2	<3.0	<3	<3	<3	<3	<5	<3	<3	<3	<3	<5
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.2	<3.0	<3	<3	<3	4	<5	4	<3	<3	5	<5
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.2	<3.0	<3	7	7	176	69	252	<3	<3	101	111
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.2	<3.0	<3	<3	<3	66	48	114	<3	<3	18	70
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<0.2	<3.0	<3	<3	<3	<3	<5	<3	<3	<3	<3	<5
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.2	<3.0	<3	<12	<12	185	72	257	<3	<6	109	112
Statistics															
Number of Results				8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects				0	0	0	2	2	5	5	5	0	0	7	5
Minimum Concentration				<0.2	<3	<3	<3	<3	<3	<5	<3	<3	<3	<3	<5
Maximum Concentration				<0.2	<3	<3	<12	<12	185	72	252	<3	<20	109	112

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

Location Code	Date	Field ID	Depth	C10-C36 (Sum of Total)	Normalised C10-C36 (Sum of Total)	Benzo(e)pyrene	Acenaphthene	Normalised Acenaphthene	Acenaphthylene	Normalised Acenaphthylene	Anthracene	Normalised Anthracene	Benz(a)anthracene	Normalised Benz(a)anthracene	Benzo(b+j+k)fluoranthene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					3	0.004	0.004		0.004		0.004		0.004		1
NAGD 2009 - SQG-High Values															
NAGD 2009 - Screening Level				550	550										
ANZAST 2018 GV-High															
ANZAST 2018 DGV															
ANZECC 2000 - ISQG - High[a]							**0.5**	**0.5**	**0.64**	**0.64**	**1.1**	**1.1**	**1.6**		
ANECC 2000 - ISQG - Low[a]							0.016	0.016	0.04	0.04	0.09	0.085	0.26		
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<3	<3	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<1
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	94	33.33	0.631	0.044	0.016	0.297	0.105	0.286	0.101	1.13	0.401	
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<3	<3	<0.004	<0.004	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	5	5	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<1
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	212	201.90	0.373	<0.025	<0.024	0.202	0.192	0.116	0.110	0.8	0.762	1
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	88	88	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.006	0.006	<1
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<3	<3	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	221	650	0.117	<0.004	<0.012	0.06	0.176	0.037	0.109	0.147	0.432	<1
Statistics															
Number of Results				8	8	8	8	8	8	8	8	8	8	8	5
Number of Detects				5	5	3	1	1	3	3	3	3	4	4	1
Minimum Concentration				<3	<3	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<1
Maximum Concentration				221	221	0.631	0.044	<0.024	0.297	0.192	0.8	0.110	1.13	0.8	1

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				PAHs											
				Benzo(a) pyrene	Normalised Benzo(a) pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Normalised Chrysene	Dibenz(a,h)anthracene	Normalised Dibenz(a,h)anthracene	Fluoranthene	Normalised Fluoranthene	Naphthalene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.004		0.004	0.004	0.004	0.004		0.004		0.004		0.005
NAGD 2009 - SQG-High Values															
NAGD 2009 - Screening Level															
ANZAST 2018 GV-High															
ANZAST 2018 DGV															
ANZECC 2000 - ISQG - High[a]				**1.6**					**2.8**		**0.26**		**5.1**		**2.1**
ANECC 2000 - ISQG - Low[a]				0.43					0.384		0.063		0.6		0.16
Location Code	**Date**	**Field ID**	**Depth**												
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.004	<0.004	0.004	<0.005
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	1.57	0.55673759	1.49	0.661	1	0.997	0.354	0.219	0.078	1.89	0.670	<0.2
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	0.872	0.83047619	0.799	0.375	0.663	0.7	0.667	0.127	0.121	1.5	1.429	0.06
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	0.01	0.01	0.009	<0.004	0.006	0.005	0.005	<0.004	0.004	0.01	0.01	<0.005
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<0.004	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	0.255	0.75	0.226	0.116	0.197	0.122	0.359	0.04	0.118	0.201	0.591	0.01

Statistics												
Number of Results	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects	4	5	19	12	16	17	4	4	4	21	5	4
Minimum Concentration	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005
Maximum Concentration	1.57	0.830	4.2	1.7	1.8	2.2	0.666	<0.5	0.121	1.89	1.4	<1

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

Location Code	Date	Field ID	Depth	Normalised Naphthalene	Fluorene	Normalised Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Normalised Phenanthrene	Pyrene	Normalised Pyrene	PAHs (Sum of total) - Lab calc	Normalised PAHs (Sum of total) - Lab calc	Total 8 PAHs (as BaP TEQ)(zero LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(half LOR) - Lab Calc
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					0.004		0.004	0.004		0.004		0.004		0.5	0.5
NAGD 2009 - SQG-High Values															
NAGD 2009 - Screening Level															
ANZAST 2018 GV-High												**50**	**50**		
ANZAST 2018 DGV												10	10		
ANZECC 2000 - ISQG - High[a]					**0.54**			**1.5**		**2.6**					
ANECC 2000 - ISQG - Low[a]					0.019			0.24		0.665					
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.5	0.6
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	0.07092199	0.095	0.034	0.963	0.885	0.314	1.78	0.631	14.8	5.248		
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004		
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.5	0.7
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	0.05714286	0.041	0.039	0.517	0.7	0.667	1.5	1.429	7.5	7.143	1.0	1.3
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.005	<0.004	<0.004	0.006	0.016	0.016	0.011	0.011	0.079	0.079	<0.5	0.6
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004		
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	0.029	0.008	0.024	0.155	0.096	0.282	0.217	0.638	2.18	6.412	<0.5	0.6

Statistics	Normalised Naphthalene	Fluorene	Normalised Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Normalised Phenanthrene	Pyrene	Normalised Pyrene	PAHs (Sum of total) - Lab calc	Normalised PAHs (Sum of total) - Lab calc	Total 8 PAHs (as BaP TEQ)(zero LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(half LOR) - Lab Calc
Number of Results	8	8	8	8	8	8	8	8	8	8	5	5
Number of Detects	3	3	3	4	4	4	4	4	4	4	1	5
Minimum Concentration	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.5	0.6
Maximum Concentration	0.071	0.095	0.039	0.963	0.885	0.667	1.78	1.429	14.8	7.142	1	1.3

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

					PCBs									Herbicides	
				Total 8 PAHs (as BaP TEQ)(full LOR) - Lab Calc	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Total)	Normalised PCBs (Total)	Pronamide	1,2,4-trichlorobenzene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005		0.5	0.5
NAGD 2009 - SQG-High Values															
NAGD 2009 - Screening Level															
ANZAST 2018 GV-High												**0.28**	**0.28**		
ANZAST 2018 DGV												0.034	0.034		
ANZECC 2000 - ISQG - High[a]															
ANECC 2000 - ISQG - Low[a]															
Location Code	**Date**	**Field ID**	**Depth**												
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	1.2	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.005	<0.5	<0.5
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.002		
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.005		
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	1.4	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	0.006	<0.6	<0.6
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	1.5	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0677	<0.0050	0.0677	0.064	<0.5	<0.5
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	1.2	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.005	<0.5	<0.5
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.005		
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	1.2	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0346	<0.0050	0.0346	0.102	<0.5	<0.5
Statistics															
Number of Results				5	8	8	8	8	8	8	8	8	8	5	5
Number of Detects				5	0	0	0	0	0	2	0	2	2	0	0
Minimum Concentration				1.2	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0062	<0.005	<0.0018	<0.5	<0.5
Maximum Concentration				1.5	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	0.0677	<0.1	0.0677	0.0645	<0.6	<0.6

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				Chlorinated Hydrocarbons				Explosives				Nitroaromatics			Nitrosoamines
				1,2-dichlorobenzene	1,4-dichlorobenzene	2-chloronaphthalene	Hexachlorobutadiene	1,3,5-Trinitrobenzene	2,4-Dinitrotoluene	2,6-dinitrotoluene	Nitrobenzene	2-Picoline	4-aminobiphenyl	Pentachloronitrobenzene	N-Nitrosodiphenyl & Diphenylamine
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	0.5	0.5	1	1	0.5	0.5	0.5	0.5	1
NAGD 2009 - SQG-High Values															
NAGD 2009 - Screening Level															
ANZAST 2018 GV-High															
ANZAST 2018 DGV															
ANZECC 2000 - ISQG - High[a]															
ANECC 2000 - ISQG - Low[a]															
Location Code	**Date**	**Field ID**	**Depth**												
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5												
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5												
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.6	<0.6	<0.6	<0.6	<0.6	<1.0	<1.0	<0.6	<0.6	<0.6	<0.6	<1.2
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5												
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0
Statistics															
Number of Results				5	5	5	5	5	5	5	5	5	5	5	5
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<0.5	<1
Maximum Concentration				<0.6	<0.6	<0.6	<0.6	<0.6	<1	<1	<0.6	<0.6	<0.6	<0.6	<1.2

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				Phthalates												
				Bis(2-ethylhexyl) phthalate	Butyl benzyl phthalate	Diethylphthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	4,4'-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				5	0.5	0.5	0.5	0.5	0.5	0.1	0.1	0.0005	0.0005	0.0005	0.05	0.0005
NAGD 2009 - SQG-High Values												**0.027**				
NAGD 2009 - Screening Level												0.0022				
ANZAST 2018 GV-High												**0.007**				
ANZAST 2018 DGV												0.0014				
ANZECC 2000 - ISQG - High[a]																
ANECC 2000 - ISQG - Low[a]																
Location Code	**Date**	**Field ID**	**Depth**													
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<5.0	<0.5	<0.5	<0.5	<0.5	<0.5			<0.00050	<0.00050	<0.00050	<0.5	<0.00050
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5									<0.00050	<0.00050	<0.00050		<0.00050
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5									<0.00050	<0.00050	<0.00050		<0.00050
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<5.0	<0.6	<0.6	<0.6	<0.6	<0.6			<0.00050	<0.00050	<0.00050	<0.5	<0.00050
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<5.0	<0.5	<0.5	<0.5	<0.5	<0.5			<0.00050	<0.00050	<0.00050	<0.5	<0.00050
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<5.0	<0.5	<0.5	<0.5	<0.5	<0.5			<0.00050	<0.00050	<0.00050	<0.5	<0.00050
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5									<0.00050	<0.00050	<0.00050		<0.00050
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<5.0	<0.5	<0.5	<0.5	<0.5	<0.5			<0.00050	<0.00050	<0.00050	<0.5	<0.00050
Statistics																
Number of Results				5	5	5	5	5	5			8	8	8	5	8
Number of Detects				0	0	0	0	0	0			0	0	0	0	0
Minimum Concentration				<5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.00050	<0.00050	<0.00050	<0.5	<0.00050
Maximum Concentration				<5	<0.6	<0.6	<0.6	<0.6	<0.6			<0.00050	<0.00050	<0.00050	<0.5	<0.00050

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				OC Pesticides													
				Chlordane	Chlordane (cis)	Chlordane (trans)	d-BHC	4,4 DDD	4,4 DDT	DDT+DDE+DDD - Lab Calc	Dieldrin	Endosulfan	Endosulfan I (alpha)	Endosulfan II (beta)	Endosulfan Sulfate	Endrin	Endrin aldehyde
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.00025	0.00025	0.00025	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
NAGD 2009 - SQG-High Values				**0.006**				**0.02**	**0.046**		**0.62**					**0.22**	
NAGD 2009 - Screening Level				0.0005				0.002	0.0016		0.28					0.01	
ANZAST 2018 GV-High				**0.009**				**0.02**	**0.046**	**0.005**	**0.07**					**0.06**	
ANZAST 2018 DGV				0.0045				0.002	0.0016	0.0012	0.0028					0.0027	
ANZECC 2000 - ISQG - High[a]																	
ANECC 2000 - ISQG - Low[a]																	
Location Code	**Date**	**Field ID**	**Depth**														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Statistics																	
Number of Results				8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Maximum Concentration				<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	Oxychlordane	Toxaphene	Tokuthion	Azinphos methyl	Bolstar (Sulprofos)	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.0005	0.00025	0.0005	0.0005	0.0005	0.0005	0.0005	1	0.2	0.01	0.2	0.01	0.01	0.2
NAGD 2009 - SQG-High Values					**0.001**												
NAGD 2009 - Screening Level					0.00032												
ANZAST 2018 GV-High					**0.0014**												
ANZAST 2018 DGV					0.0009												
ANZECC 2000 - ISQG - High[a]																	
ANECC 2000 - ISQG - Low[a]																	
Location Code	**Date**	**Field ID**	**Depth**														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.6
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5
Statistics																	
Number of Results				8	8	8	8	8	8	8			8		8	8	5
Number of Detects				0	0	0	0	0	0	0			0		0	0	0
Minimum Concentration				<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5
Maximum Concentration				<0.00050	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				Chlorfenvinphos E	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Demeton-S-methyl	Diazinon	cis-Chlorfenvinphos	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.01	0.01	0.01	2	0.2	0.2	0.01	0.01	0.01	0.01	0.01	0.2	0.2	0.01
NAGD 2009 - SQG-High Values																	
NAGD 2009 - Screening Level																	
ANZAST 2018 GV-High																	
ANZAST 2018 DGV																	
ANZECC 2000 - ISQG - High[a]																	
ANECC 2000 - ISQG - Low[a]																	
Location Code	**Date**	**Field ID**	**Depth**														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01
Statistics																	
Number of Results				8	8	8				8	8	8	8	8			8
Number of Detects				0	0	0				0	0	0	0	0			0
Minimum Concentration				<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01
Maximum Concentration				<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				OP Pesticides													
				Ethoprop	Fenamiphos	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Parathion	Phorate
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.2	0.01	0.2	0.2	0.01	0.01	0.2	0.01	0.2	0.01	0.2	2	0.01	0.2
NAGD 2009 - SQG-High Values																	
NAGD 2009 - Screening Level																	
ANZAST 2018 GV-High																	
ANZAST 2018 DGV																	
ANZECC 2000 - ISQG - High[a]																	
ANECC 2000 - ISQG - Low[a]																	
Location Code	**Date**	**Field ID**	**Depth**														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01	
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01	
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01	
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01	
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01	
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01	
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01	
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01	
Statistics																	
Number of Results				8	8			8	8		8		8			8	
Number of Detects				0	0			0	0		0		0			0	
Minimum Concentration				<0.01	<0.01			<0.01	<0.01		<0.01		<0.01			<0.01	
Maximum Concentration				<0.01	<0.01			<0.01	<0.01		<0.01		<0.01			<0.01	

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				Pirimphos-ethyl	Pirimiphos-methyl	Prothiofos	Pyrazophos	Ronnel	Terbufos	Trichloronate	Tetrachlorvinphos	3,4-Methylphenol (m,p-cresol)	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2,6-dichlorophenol
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.01	0.2	0.01	0.2	0.2	0.2	0.2	0.2	0.4	0.5	0.5	0.5	0.5	0.5
NAGD 2009 - SQG-High Values																	
NAGD 2009 - Screening Level																	
ANZAST 2018 GV-High																	
ANZAST 2018 DGV																	
ANZECC 2000 - ISQG - High[a]																	
ANECC 2000 - ISQG - Low[a]																	
Location Code	**Date**	**Field ID**	**Depth**														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.01		<0.01						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	<0.01		<0.01						<1	<0.5	<0.5	<0.5	<0.5	<0.5
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<0.01		<0.01						<1	<0.5	<0.5	<0.5	<0.5	<0.5
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.01		<0.01						<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.01		<0.01						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.01		<0.01						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<0.01		<0.01						<1	<0.5	<0.5	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.01		<0.01						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Statistics																	
Number of Results				8		8						8	8	8	8	8	8
Number of Detects				0		0						0	0	0	0	0	0
Minimum Concentration				<0.01		<0.01						<0.05	<0.5	<0.5	<0.5	<0.5	<0.5
Maximum Concentration				<0.01		<0.01						<0.1	<0.6	<0.6	<0.6	<0.6	<0.6

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				Phenols													
				2-chlorophenol	2-methylnaphthalene	2-methylphenol	2-nitrophenol	3-methylcholanthrene	4-chloro-3-methylphenol	Acetophenone	Pentachlorophenol	Phenol	1,1-dichloroethane	1,2,3-trichlorobenzene	1,2,3-trichloropropane	1,2-dibromoethane	1,3-dichlorobenzene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.005	0.2	0.5	0.5	0.5	0.5	1	0.5	0.5	0.5	0.5	0.5	0.5
NAGD 2009 - SQG-High Values																	
NAGD 2009 - Screening Level																	
ANZAST 2018 GV-High																	
ANZAST 2018 DGV																	
ANZECC 2000 - ISQG - High[a]																	
ANECC 2000 - ISQG - Low[a]																	
Location Code	**Date**	**Field ID**	**Depth**														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.5	<0.005	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5					<0.5
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	<0.5	0.044	<0.5	<0.5		<0.5		<2	<0.5					
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<0.5	<0.005	<0.5	<0.5		<0.5		<2	<0.5					
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.6	<0.005	<0.6	<0.6	<0.6	<0.6	<0.6	<1	<0.6					<0.6
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.5	<0.025	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5					<0.5
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.5	<0.005	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5					<0.5
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<0.5	<0.005	<0.5	<0.5		<0.5		<2	<0.5					
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.5	<0.005	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5					<0.5
Statistics																	
Number of Results				8	8	8	8	5	8	5	8	8					8
Number of Detects				0	0	0	0	0	0	0	0	0					0
Minimum Concentration				<0.5	<0.005	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5					<0.5
Maximum Concentration				<0.6	0.044	<0.6	<0.6	<0.6	<0.6	<0.6	<2	<0.6					<0.6

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				VOCs													
				2-butanone (MEK)	2-hexanone (MBK)	4-methyl-2-pentanone (MIBK)	Bromodichloromethane	Bromoform	Carbon disulfide	Chlorodibromomethane	Chloroethane	cis-1,3-dichloropropene	cis-1,4-Dichloro-2-butene	Dibromomethane	Iodomethane	n-butylbenzene	n-propylbenzene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				5	5	5	0.5	0.5	0.5	0.5	5	0.5	0.5	0.5	0.5	0.5	0.5
NAGD 2009 - SQG-High Values																	
NAGD 2009 - Screening Level																	
ANZAST 2018 GV-High																	
ANZAST 2018 DGV																	
ANZECC 2000 - ISQG - High[a]																	
ANECC 2000 - ISQG - Low[a]																	
Location Code	**Date**	**Field ID**	**Depth**														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0														
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5														
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5														
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0														
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5														
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5														
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5														
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5														
Statistics																	
Number of Results																	
Number of Detects																	
Minimum Concentration																	
Maximum Concentration																	

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				Pentachloroethane	p-isopropyltoluene	sec-butylbenzene	Trichloroethene	tert-butylbenzene	Tetrachloroethene	trans-1,3-dichloropropene	trans-1,2-dichloroethene	trans-1,4-Dichloro-2-butene	Trichlorofluoromethane	Vinyl acetate	1-naphthylamine	2-(acetylamino) fluorene	2-nitroaniline
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	5	0.5	0.5	1
NAGD 2009 - SQG-High Values																	
NAGD 2009 - Screening Level																	
ANZAST 2018 GV-High																	
ANZAST 2018 DGV																	
ANZECC 2000 - ISQG - High[a]																	
ANECC 2000 - ISQG - Low[a]																	
Location Code	**Date**	**Field ID**	**Depth**														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0												<0.5	<0.5	<1.0
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5														
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5														
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0												<0.6	<0.6	<1.0
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5												<0.5	<0.5	<1.0
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5												<0.5	<0.5	<1.0
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5														
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5												<0.5	<0.5	<1.0
Statistics																	
Number of Results															5	5	5
Number of Detects															0	0	0
Minimum Concentration															<0.5	<0.5	<1
Maximum Concentration															<0.6	<0.6	<1

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				3,3-Dichlorobenzidine	3-nitroaniline	4-(dimethylamino) azobenzene	4-bromophenyl phenyl ether	4-chloroaniline	4-chlorophenyl phenyl ether	4-nitroaniline	4-Nitroquinoline-N-oxide	5-nitro-o-toluidine	7,12-dimethylbenz(a)anthracene	Aniline	Azobenzene	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl)ether
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5	0.5
NAGD 2009 - SQG-High Values																	
NAGD 2009 - Screening Level																	
ANZAST 2018 GV-High																	
ANZAST 2018 DGV																	
ANZECC 2000 - ISQG - High[a]																	
ANECC 2000 - ISQG - Low[a]																	
Location Code	**Date**	**Field ID**	**Depth**														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5														
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5														
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.6	<1.0	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<1	<0.6	<0.6
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5														
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5
Statistics																	
Number of Results				5	5	5	5	5	5	5	5	5	5	5	5	5	5
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5
Maximum Concentration				<0.6	<1	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<1	<0.6	<0.6

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				SVOCs													
				Carbazole	Chlorobenzilate	Coronene	Hexachlorocyclopentadiene	Hexachloroethane	Hexachloropropene	Isophorone	Methapyrilene	N-nitrosodiethylamine	N-nitrosodi-n-butylamine	N-nitrosodi-n-propylamine	N-Nitrosomethylethylamine	N-nitrosomorpholine	N-nitrosopiperidine
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.005	2.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
NAGD 2009 - SQG-High Values																	
NAGD 2009 - Screening Level																	
ANZAST 2018 GV-High																	
ANZAST 2018 DGV																	
ANZECC 2000 - ISQG - High[a]																	
ANECC 2000 - ISQG - Low[a]																	
Location Code	**Date**	**Field ID**	**Depth**														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.5	<0.5	<0.005	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5			0.375											
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5			<0.005											
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.6	<0.6	<0.005	<2.5	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.5	<0.5	0.25	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.5	<0.5	<0.005	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5			<0.005											
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.5	<0.5	0.126	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Statistics																	
Number of Results				5	5	8	5	5	5	5	5	5	5	5	5	5	5
Number of Detects				0	0	3	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<0.5	<0.5	<0.005	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Maximum Concentration				<0.6	<0.6	0.375	<2.5	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

				N-nitrosopyrrolidine	Pentachlorobenzene	Perylene	Phenacetin
				mg/kg	mg/kg	mg/kg	mg/kg
EQL				1	0.5	0.004	0.5
NAGD 2009 - SQG-High Values							
NAGD 2009 - Screening Level							
ANZAST 2018 GV-High							
ANZAST 2018 DGV							
ANZECC 2000 - ISQG - High[a]							
ANECC 2000 - ISQG - Low[a]							
Location Code	**Date**	**Field ID**	**Depth**				
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<1.0	<0.5	<0.004	<0.5
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5			0.329	
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5			<0.004	
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<1.0	<0.6	<0.005	<0.6
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<1.0	<0.5	0.174	<0.5
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<1.0	<0.5	<0.004	<0.5
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5			<0.004	
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<1.0	<0.5	0.055	<0.5

Statistics				
Number of Results	5	5	8	5
Number of Detects	0	0	3	0
Minimum Concentration	<1.0	<0.5	<0.004	<0.5
Maximum Concentration	<1.0	<0.6	0.329	<0.6

[a] Criteria are only listed from the ANZECC (2000) where no updated criterion in the ANZAST (2018) is provided.

Appendix C
Table C7
Analytical results NAGD phase III analysis

Location Code	Date	Field ID	Depth	PAH Compounds in Water																		Simultaneously Extractable Metals (SEM)		Total Mercury by FIMS - Low Level	Total Metals in Saline Water Suite A by ORC-	
				Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Naphthalene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	PAHs (Sum of total) - Lab calc	Total 8 PAHs (as BaP TEQ)(zero LOR) - Lab Calc	Copper	Silver	Mercury	Copper	Silver
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mmol/kg	mmol/kg	mg/L	mg/L	mg/L
EQL				0.02	0.02	0.02	0.02	0.005	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.005	0.005			0.00004	0.001	0.0001
ANZG 2018 MW 95%															70									0.0004	0.0013	
	30/10/2019	SALTWATER		<0.02	<0.02	<0.02	<0.02	<0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.005	<0.005			<0.00004	<0.001	<0.0001
VC02	30/10/2019	VC02_0.0-0.5	0.0 - 0.5	<0.02	<0.02	<0.02	<0.02	<0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.005	<0.005			<0.00004	<0.001	<0.0001
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6																			0.11	<0.01			
VC07	30/10/2019	VC07_0.0-0.1	0.0 - 0.1																			0.76	<0.01			
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.02	<0.02	<0.02	<0.02	<0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.005	<0.005			<0.00004	<0.001	<0.0001
VC12	31/10/2019	VC12_0.0-0.1	0.0 - 0.1																			0.50	<0.01			
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.02	<0.02	<0.02	<0.02	<0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.005	<0.005			<0.00004	<0.001	<0.0001

Statistics

Statistics	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Naphthalene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	PAHs (Sum of total) - Lab calc	Total 8 PAHs (as BaP TEQ)(zero LOR) - Lab Calc	Copper (SEM)	Silver (SEM)	Mercury	Copper	Silver
Number of Results	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	4	4	4
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Minimum Concentration	<0.02	<0.02	<0.02	<0.02	<0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.005	<0.005	0.11	<0.01	<0.00004	<0.001	<0.0001
Maximum Concentration	<0.02	<0.02	<0.02	<0.02	<0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.005	<0.005	0.76	<0.01	<0.00004	<0.001	<0.0001

Dioxins I-TEQ 0.5xLOR

Location Code	Date	Field ID	Depth	1234678-HpCDD I-TEQ2 (0.5 LOR)	1234678-HpCDF I-TEQ2 (0.5 LOR)	1234789-HpCDF I-TEQ2 (0.5 LOR)	123478-HxCDD I-TEQ2 (0.5 LOR)	123478-HxCDF I-TEQ2 (0.5 LOR)	123678-HxCDD I-TEQ2 (0.5 LOR)	123678-HxCDF I-TEQ2 (0.5 LOR)	123789-HxCDD I-TEQ2 (0.5 LOR)	123789-HxCDF I-TEQ2 (0.5 LOR)	12378-PeCDD I-TEQ2 (0.5 LOR)	12378-PeCDF I-TEQ2 (0.5 LOR)	234678-HxCDF I-TEQ2 (0.5 LOR)	23478-PeCDF I-TEQ2 (0.5 LOR)	2378-TCDD I-TEQ2 (0.5 LOR)	2378-TCDF I-TEQ2 (0.5 LOR)	OCDD I-TEQ2 (0.5 LOR)	OCDF I-TEQ2 (0.5 LOR)	Total TEQ I-TEQ2 (0.5 LOR)
				pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
EQL				1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	0.25	0.25	5	2.5	0
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1	0.67	0.01	0.01	0.12	0.12	0.12	0.12	0.12	0.12	0.62	0.06	0.12	0.62	0.25	0.02	23.30	0.00	26.46
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1	24.00	4.40	0.37	3.51	3.68	12.80	1.79	9.30	0.13	16.55	0.67	0.13	10.25	18.40	1.67	48.00	1.30	156.94
VC03	30/10/2019	VC03_0.0-0.5	0 - 0.5	1.92	0.01	0.01	0.12	0.12	0.12	0.12	0.61	0.12	0.61	0.06	0.12	0.61	0.94	0.02	63.60	0.00	69.14
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1	1.11	0.01	0.01	0.12	0.12	0.12	0.12	0.53	0.12	0.62	0.06	0.12	0.62	0.25	0.02	34.60	0.00	38.61
VC07	30/10/2019	VC07_0.0-0.5	0 - 0.5	7.08	1.23	0.09	0.88	1.12	3.10	0.56	2.97	0.12	3.92	0.22	0.81	2.86	6.49	0.46	19.20	0.36	51.46
VC08	31/10/2019	VC08_1.0-1.5	1 - 1.5	1.70	0.01	0.01	0.38	0.12	0.60	0.12	1.13	0.12	1.52	0.06	0.12	0.62	0.25	0.02	19.10	0.00	25.92
VC10	31/10/2019	VC10_0.0-0.5	0 - 0.5	2.83	0.01	0.01	0.12	0.12	0.12	0.12	0.58	0.12	0.62	0.06	0.12	0.62	0.25	0.02	73.50	0.00	79.27
VC12	31/10/2019	VC12_0.0-0.5	0 - 0.5	3.01	0.48	0.03	0.44	0.39	1.31	0.13	1.34	0.13	1.71	0.06	0.13	0.63	1.78	0.19	15.30	0.14	27.16
Statistics																					
Number of Results				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Minimum Concentration				0.67	0.01	0.01	0.12	0.12	0.12	0.12	0.12	0.12	0.61	0.06	0.12	0.61	0.25	0.02	15.3	0	25.92
Maximum Concentration				24	4.4	0.37	3.51	3.68	12.8	1.79	9.3	0.13	16.55	0.67	0.81	10.25	18.4	1.67	73.5	1.3	156.94
Average Concentration *				5.3	0.77	0.068	0.71	0.72	2.3	0.39	2.1	0.12	3.3	0.16	0.21	2.1	3.6	0.3	37	0.23	59

Dioxins I-TEQ 0xLOR

Location Code	Date	Field ID	Depth	1234678-HpCDD I-TEQ1 (zero)	1234678-HpCDF I-TEQ1 (zero)	1234789-HpCDF I-TEQ1 (zero)	123478-HxCDD I-TEQ1 (zero)	123478-HxCDF I-TEQ1 (zero)	123678-HxCDD I-TEQ1 (zero)	123678-HxCDF I-TEQ1 (zero)	123789-HxCDD I-TEQ1 (zero)	123789-HxCDF I-TEQ1 (zero)	12378-PeCDD I-TEQ1 (zero)	12378-PeCDF I-TEQ1 (zero)	234678-HxCDF I-TEQ1 (zero)	23478-PeCDF I-TEQ1 (zero)	2378-TCDD I-TEQ1 (zero)
				pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
EQL				1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	0.25
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1	24.00	4.40	0.37	3.51	3.68	12.80	1.79	9.30	0.00	16.55	0.67	0.00	10.25	18.40
VC03	30/10/2019	VC03_0.0-0.5	0 - 0.5	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.00	0.00	0.00	0.00	0.00	0.94
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.00	0.00
VC07	30/10/2019	VC07_0.0-0.5	0 - 0.5	7.08	1.23	0.09	0.88	1.12	3.10	0.56	2.97	0.00	3.92	0.22	0.81	2.86	6.49
VC08	31/10/2019	VC08_1.0-1.5	1 - 1.5	1.70	0.00	0.00	0.38	0.00	0.60	0.00	1.13	0.00	1.52	0.00	0.00	0.00	0.00
VC10	31/10/2019	VC10_0.0-0.5	0 - 0.5	2.83	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00
VC12	31/10/2019	VC12_0.0-0.5	0 - 0.5	3.01	0.48	0.03	0.44	0.39	1.31	0.00	1.34	0.00	1.71	0.00	0.00	0.00	1.78
Statistics																	
Number of Results				8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects				8	8	8	8	8	8	8	8	8	8	8	8	8	8
Minimum Concentration				0.67	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum Concentration				24	4.4	0.37	3.51	3.68	12.8	1.79	9.3	0	16.55	0.67	0.81	10.25	18.4
Average Concentration *				5.3	0.76	0.061	0.65	0.65	2.2	0.29	2.1	0	3	0.11	0.1	1.6	3.5

* A Non Detect Multiplier of 0.5 has been applied.

								Dioxins I-TEQ 1xLOR	Dioxins Total	Dioxins Total LOR	Dioxins Total Peaks		Dioxins WHO-TEQ 0.5xLOR																	
				2378-TCDF I-TEQ1 (zero)	OCDD I-TEQ1 (zero)	OCDF I-TEQ1 (zero)	Total TEQ I-TEQ1 (zero)	Total TEQ I-TEQ3 (LOR)	Octa-Furan	Hepta-Dioxins LOR	Hepta-Dioxins No. of Peaks	Octa-Furan No. of Peaks	1234678-HpCDD WHO-TEQ2 (0.5 LOR)	1234678-HpCDF WHO-TEQ2 (0.5 LOR)	1234789-HpCDF WHO-TEQ2 (0.5 LOR)	123478-HxCDD WHO-TEQ2 (0.5 LOR)	123478-HxCDF WHO-TEQ2 (0.5 LOR)	123678-HxCDD WHO-TEQ2 (0.5 LOR)	123678-HxCDF WHO-TEQ2 (0.5 LOR)	123789-HxCDD WHO-TEQ2 (0.5 LOR)	123789-HxCDF WHO-TEQ2 (0.5 LOR)	12378-PeCDD WHO-TEQ2 (0.5 LOR)	12378-PeCDF WHO-TEQ2 (0.5 LOR)	234678-HxCDF WHO-TEQ2 (0.5 LOR)	23478-PeCDF WHO-TEQ2 (0.5 LOR)	2378-TCDD WHO-TEQ2 (0.5 LOR)	2378-TCDF WHO-TEQ2 (0.5 LOR)	OCDD WHO-TEQ2 (0.5 LOR)	OCDF WHO-TEQ2 (0.5 LOR)	Total TEQ WHO-TEQ2 (0.5 LOR)
				pg/g	pg/g	pg/g	pg/g	pg/g	ng/kg	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
EQL				0.25	5	2.5	0	0	2.5	1.25	1.25	2.5	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	0.25	0.25	5	2.5	0
Location Code	**Date**	**Field ID**	**Depth**																											
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1	0.00	23.30	0.00	23.97	28.95	<5.0	5.0	2	1	0.67	0.01	0.01	0.12	0.12	0.12	0.12	0.12	0.12	1.25	0.04	0.12	0.37	0.25	0.02	6.99	0.00	10.50
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1	1.67	48.00	1.30	156.69	157.19	1,300.0	5.0	2	1	24.00	4.40	0.37	3.51	3.68	12.80	1.79	9.30	0.13	33.10	0.40	0.13	6.15	18.40	1.67	14.40	0.39	134.61
VC03	30/10/2019	VC03_0.0-0.5	0 - 0.5	0.00	63.60	0.00	67.07	71.22	<4.9	4.9	2	1	1.92	0.01	0.01	0.12	0.12	0.12	0.12	0.61	0.12	1.23	0.04	0.12	0.37	0.94	0.02	19.08	0.00	24.96
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1	0.00	34.60	0.00	36.24	40.97	<5.0	5.0	2	1	1.11	0.01	0.01	0.12	0.12	0.12	0.12	0.53	0.12	1.25	0.04	0.12	0.37	0.25	0.02	10.38	0.00	14.73
VC07	30/10/2019	VC07_0.0-0.5	0 - 0.5	0.46	19.20	0.36	51.33	51.58	363.0	5.0	2	1	7.08	1.23	0.09	0.88	1.12	3.10	0.56	2.97	0.12	7.83	0.13	0.81	1.71	6.49	0.46	5.76	0.11	40.45
VC08	31/10/2019	VC08_1.0-1.5	1 - 1.5	0.00	19.10	0.00	24.43	27.41	<5.0	5.0	2	1	1.70	0.01	0.01	0.38	0.12	0.60	0.12	1.13	0.12	3.04	0.04	0.12	0.37	0.25	0.02	5.73	0.00	13.79
VC10	31/10/2019	VC10_0.0-0.5	0 - 0.5	0.00	73.50	0.00	76.91	81.62	<5.0	5.0	2	1	2.83	0.01	0.01	0.12	0.12	0.12	0.12	0.58	0.12	1.25	0.04	0.12	0.37	0.25	0.02	22.05	0.00	28.16
VC12	31/10/2019	VC12_0.0-0.5	0 - 0.5	0.19	15.30	0.14	26.10	28.23	137.0	5.0	2	1	3.01	0.48	0.03	0.44	0.39	1.31	0.13	1.34	0.13	3.42	0.04	0.13	0.38	1.78	0.19	4.59	0.04	17.79
Statistics																														
Number of Results				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects				8	8	8	8	8	3	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Minimum Concentration				0	15.3	0	23.97	27.41	<4.9	4.9	2	1	0.67	0.01	0.01	0.12	0.12	0.12	0.12	0.12	0.12	1.23	0.04	0.12	0.37	0.25	0.02	4.59	0	10.5
Maximum Concentration				1.67	73.5	1.3	156.69	157.19	1,300	5	2	1	24	4.4	0.37	3.51	3.68	12.8	1.79	9.3	0.13	33.1	0.4	0.81	6.15	18.4	1.67	22.05	0.39	134.61
Average Concentration *				0.29	37	0.23	58	61	227	5	2	1	5.3	0.77	0.068	0.71	0.72	2.3	0.39	2.1	0.12	6.5	0.096	0.21	1.3	3.6	0.3	11	0.068	36

* A Non Detect Multiplier of 0.5 has been applied.

				Dioxins WHO-TEQ 0xLOR																	
				1234678-HpCDD WHO-TEQ1 (zero)	1234678-HpCDF WHO-TEQ1 (zero)	1234789-HpCDF WHO-TEQ1 (zero)	123478-HxCDD WHO-TEQ1 (zero)	123478-HxCDF WHO-TEQ1 (zero)	123678-HxCDD WHO-TEQ1 (zero)	123678-HxCDF WHO-TEQ1 (zero)	123789-HxCDD WHO-TEQ1 (zero)	123789-HxCDF WHO-TEQ1 (zero)	12378-PeCDD WHO-TEQ1 (zero)	12378-PeCDF WHO-TEQ1 (zero)	234678-HxCDF WHO-TEQ1 (zero)	23478-PeCDF WHO-TEQ1 (zero)	2378-TCDD WHO-TEQ1 (zero)	2378-TCDF WHO-TEQ1 (zero)	OCDD WHO-TEQ1 (zero)	OCDF WHO-TEQ1 (zero)	Total TEQ WHO-TEQ1 (zero)
				pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
EQL				1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	0.25	0.25	5	2.5	0
Location Code	**Date**	**Field ID**	**Depth**																		
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.99	0.00	7.66
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1	24.00	4.40	0.37	3.51	3.68	12.80	1.79	9.30	0.00	33.10	0.40	0.00	6.15	18.40	1.67	14.40	0.39	134.36
VC03	30/10/2019	VC03_0.0-0.5	0 - 0.5	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.00	0.00	0.00	0.00	0.00	0.94	0.00	19.08	0.00	22.55
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.38	0.00	12.02
VC07	30/10/2019	VC07_0.0-0.5	0 - 0.5	7.08	1.23	0.09	0.88	1.12	3.10	0.56	2.97	0.00	7.83	0.13	0.81	1.71	6.49	0.46	5.76	0.11	40.32
VC08	31/10/2019	VC08_1.0-1.5	1 - 1.5	1.70	0.00	0.00	0.38	0.00	0.60	0.00	1.13	0.00	3.04	0.00	0.00	0.00	0.00	0.00	5.73	0.00	12.58
VC10	31/10/2019	VC10_0.0-0.5	0 - 0.5	2.83	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.05	0.00	25.46
VC12	31/10/2019	VC12_0.0-0.5	0 - 0.5	3.01	0.48	0.03	0.44	0.39	1.31	0.00	1.34	0.00	3.42	0.00	0.00	0.00	1.78	0.19	4.59	0.04	17.01
Statistics																					
Number of Results				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Minimum Concentration				0.67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.59	0	7.66
Maximum Concentration				24	4.4	0.37	3.51	3.68	12.8	1.79	9.3	0	33.1	0.4	0.81	6.15	18.4	1.67	22.05	0.39	134.36
Average Concentration *				5.3	0.76	0.061	0.65	0.65	2.2	0.29	2.1	0	5.9	0.066	0.1	0.98	3.5	0.29	11	0.068	34

				Dioxins WHO-TEQ 1xLOR													
				1234678-HpCDD WHO-TEQ3 (LOR)	1234678-HpCDF WHO-TEQ3 (LOR)	1234789-HpCDF WHO-TEQ3 (LOR)	123478-HxCDD WHO-TEQ3 (LOR)	123478-HxCDF WHO-TEQ3 (LOR)	123678-HxCDD WHO-TEQ3 (LOR)	123678-HxCDF WHO-TEQ3 (LOR)	123789-HxCDD WHO-TEQ3 (LOR)	123789-HxCDF WHO-TEQ3 (LOR)	12378-PeCDD WHO-TEQ3 (LOR)	12378-PeCDF WHO-TEQ3 (LOR)	234678-HxCDF WHO-TEQ3 (LOR)	23478-PeCDF WHO-TEQ3 (LOR)	2378-TCDD WHO-TEQ3 (LOR)
				pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
EQL				1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	0.25
Location Code	**Date**	**Field ID**	**Depth**														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1	0.67	0.02	0.02	0.25	0.25	0.25	0.25	0.25	0.25	2.50	0.07	0.25	0.75	0.50
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1	24.00	4.40	0.37	3.51	3.68	12.80	1.79	9.30	0.25	33.10	0.40	0.25	6.15	18.40
VC03	30/10/2019	VC03_0.0-0.5	0 - 0.5	1.92	0.02	0.02	0.25	0.25	0.25	0.25	0.61	0.25	2.45	0.07	0.25	0.74	0.94
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1	1.11	0.02	0.02	0.25	0.25	0.25	0.25	0.53	0.25	2.50	0.07	0.25	0.75	0.50
VC07	30/10/2019	VC07_0.0-0.5	0 - 0.5	7.08	1.23	0.09	0.88	1.12	3.10	0.56	2.97	0.25	7.83	0.13	0.81	1.71	6.49
VC08	31/10/2019	VC08_1.0-1.5	1 - 1.5	1.70	0.02	0.02	0.38	0.25	0.60	0.25	1.13	0.25	3.04	0.07	0.25	0.75	0.50
VC10	31/10/2019	VC10_0.0-0.5	0 - 0.5	2.83	0.02	0.02	0.25	0.25	0.25	0.25	0.58	0.25	2.49	0.07	0.25	0.75	0.50
VC12	31/10/2019	VC12_0.0-0.5	0 - 0.5	3.01	0.48	0.03	0.44	0.39	1.31	0.25	1.34	0.25	3.42	0.08	0.25	0.75	1.78
Statistics																	
Number of Results				8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects				8	8	8	8	8	8	8	8	8	8	8	8	8	8
Minimum Concentration				0.67	0.02	0.02	0.25	0.25	0.25	0.25	0.25	0.25	2.45	0.07	0.25	0.74	0.5
Maximum Concentration				24	4.4	0.37	3.51	3.68	12.8	1.79	9.3	0.25	33.1	0.4	0.81	6.15	18.4
Average Concentration *				5.3	0.78	0.074	0.78	0.8	2.4	0.48	2.1	0.25	7.2	0.12	0.32	1.5	3.7

* A Non Detect Multiplier of 0.5 has been applied.

Location Code	Date	Field ID	Depth	2378-TCDF WHO-TEQ3 (LOR)	OCDD WHO-TEQ3 (LOR)	OCDF WHO-TEQ3 (LOR)	Total TEQ WHO-TEQ3 (LOR)	Dioxins & Furans: Hepta-Dioxins	Tetra-Dioxins	Hepta-Furans	Hepta-Furans LOR4 pg/g	Hepta-Furans No. of Peaks	Hexa-Dioxins LOR4 pg/g	Hexa-Dioxins No. of Peaks	Hexa-Furans LOR4 pg/g	Hexa-Furans No. of Peaks	Octa-Dioxin LOR4 pg/g	Octa-Dioxin No. of Peaks
				pg/g	pg/g	pg/g	pg/g	ng/kg	ng/kg	ng/kg	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
EQL				0.25	5	2.5	0	1.25	0.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	5	5
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1	0.05	6.99	0.00	13.33	144.0	<6.5	<2.5	2.5	1	7.5	3	2.5	1	10.0	1
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1	1.67	14.40	0.39	134.86	7,140.0	343.0	1,350.0	10.0	4	17.5	7	25.0	10	10.0	1
VC03	30/10/2019	VC03_0.0-0.5	0 - 0.5	0.05	19.08	0.00	27.38	525.0	71.0	<2.5	2.5	1	12.3	5	2.5	1	9.8	1
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1	0.05	10.38	0.00	17.44	252.0	27.4	<2.5	2.5	1	15.0	6	2.5	1	10.0	1
VC07	30/10/2019	VC07_0.0-0.5	0 - 0.5	0.46	5.76	0.11	40.57	2,230.0	118.0	344.0	10.0	4	17.5	7	27.5	11	10.0	1
VC08	31/10/2019	VC08_1.0-1.5	1 - 1.5	0.05	5.73	0.00	15.01	1,160.0	474.0	<7.5	7.5	3	17.5	7	2.5	1	10.0	1
VC10	31/10/2019	VC10_0.0-0.5	0 - 0.5	0.05	22.05	0.00	30.87	1,090.0	269.0	<2.5	2.5	1	17.4	7	2.5	1	10.0	1
VC12	31/10/2019	VC12_0.0-0.5	0 - 0.5	0.19	4.59	0.04	18.58	894.0	95.8	128.0	10.0	4	17.5	7	27.5	11	10.0	1
Statistics																		
Number of Results				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects				8	8	8	8	8	7	3	8	8	8	8	8	8	8	8
Minimum Concentration				0.05	4.59	0	13.33	144	<6.5	<2.5	2.5	1	7.5	3	2.5	1	9.8	1
Maximum Concentration				1.67	22.05	0.39	134.86	7,140	474	1,350	10	4	17.5	7	27.5	11	10	1
Average Concentration *				0.32	11	0.068	37	1,679	175	229	5.9	2.4	15	6.1	12	4.6	10	1

Location Code	Date	Field ID	Depth	Penta-Dioxins LOR4 pg/g	Penta-Dioxins No. of Peaks	Penta-Furans LOR4 pg/g	Penta-Furans No. of Peaks	Tetra-Dioxins LOR4 pg/g	Tetra-Dioxins No. of Peaks	Tetra-Furans LOR4 pg/g	Tetra-Furans No. of Peaks	1234678-HpCDD	1234678-HpCDF	1234789-HpCDF	123478-HxCDD	123478-HxCDF	123678-HxCDD	123678-HxCDF	123789-HxCDD
				pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	ng/kg	ng/kg	ng/kg	ng/kg	ng/kg	ng/kg	ng/kg	ng/kg
EQL				1.25	1.25	1.25	1.25	0.25	0.25	0.25	0.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1	15.0	6	2.5	1	6.5	13	0.5	1	67.0	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1	25.0	10	30.0	12	5.5	11	9.0	18	2,400.0	440.0	37.0	35.1	36.8	128.0	17.9	93.0
VC03	30/10/2019	VC03_0.0-0.5	0 - 0.5	14.7	6	2.5	1	2.0	4	0.5	1	192.0	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	6.1
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1	17.5	7	2.5	1	3.0	6	0.5	1	111.0	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	5.3
VC07	30/10/2019	VC07_0.0-0.5	0 - 0.5	20.0	8	27.5	11	6.5	13	9.0	18	708.0	123.0	8.8	8.8	11.2	31.0	5.6	29.7
VC08	31/10/2019	VC08_1.0-1.5	1 - 1.5	15.0	6	2.5	1	1.5	3	0.5	1	170.0	<2.5	<2.5	3.8	<2.5	6.0	<2.5	11.3
VC10	31/10/2019	VC10_0.0-0.5	0 - 0.5	12.5	5	2.5	1	1.5	3	0.5	1	283.0	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	5.8
VC12	31/10/2019	VC12_0.0-0.5	0 - 0.5	20.0	8	25.0	10	6.5	13	9.0	18	301.0	47.5	2.8	4.4	3.9	13.1	<2.5	13.4
Statistics																			
Number of Results				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects				8	8	8	8	8	8	8	8	8	3	3	4	3	4	2	7
Minimum Concentration				12.5	5	2.5	1	1.5	3	0.5	1	67	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Maximum Concentration				25	10	30	12	6.5	13	9	18	2,400	440	37	35.1	36.8	128	17.9	93
Average Concentration *				17	7	12	4.8	4.1	8.2	3.7	7.4	529	77	6.9	7.1	7.3	23	3.9	21

* A Non Detect Multiplier of 0.5 has been applied.

Location Code	Date	Field ID	Depth	123789-HxCDF	2378-TCDD	12378-PeCDD	12378-PeCDF	234678-HxCDF	23478-PeCDF	2378-TCDF	Hexa-Dioxins	Hexa-Furans	Octa-Dioxin	Octa-Furan LOR4 pg/g	Penta-Dioxins	Penta-Furans	OCDD	OCDF	Total TEQ	Tetra-Furans
				ng/kg	ng/kg	ng/kg	ng/kg	ng/kg	ng/kg	ng/kg	ng/kg	ng/kg	ng/kg	pg/g	ng/kg	ng/kg	ng/kg	ng/kg	-	ng/kg
EQL				1.25	0.25	1.25	1.25	1.25	1.25	0.25	1.25	1.25	5	2.5	1.25	1.25	5	2.5		0.25
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1	<2.5	<0.5	<2.5	<2.5	<2.5	<2.5	<0.5	19.7	<2.5	23,300.0	5.0	<15.0	<2.5	23,300.0	<5.0	1	<0.5
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1	<2.5	18.4	33.1	13.4	<2.5	20.5	16.7	3,030.0	509.0	48,000.0	5.0	627.0	258.0	48,000.0	1,300.0	1	234.0
VC03	30/10/2019	VC03_0.0-0.5	0 - 0.5	<2.5	0.9	<2.5	<2.5	<2.5	<2.5	<0.5	388.0	<2.5	63,600.0	4.9	67.7	<2.5	63,600.0	<4.9	1	<0.5
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1	<2.5	<0.5	<2.5	<2.5	<2.5	<2.5	<0.5	115.0	<2.5	34,600.0	5.0	<17.5	<2.5	34,600.0	<5.0	1	<0.5
VC07	30/10/2019	VC07_0.0-0.5	0 - 0.5	<2.5	6.5	7.8	4.4	8.1	5.7	4.6	1,240.0	151.0	19,200.0	5.0	208.0	75.9	19,200.0	363.0	1	68.5
VC08	31/10/2019	VC08_1.0-1.5	1 - 1.5	<2.5	<0.5	3.0	<2.5	<2.5	<2.5	<0.5	708.0	<2.5	19,100.0	5.0	129.0	<2.5	19,100.0	<5.0	1	<0.5
VC10	31/10/2019	VC10_0.0-0.5	0 - 0.5	<2.5	<0.5	<2.5	<2.5	<2.5	<2.5	<0.5	518.0	<2.5	73,500.0	5.0	85.1	<2.5	73,500.0	<5.0	1	<0.5
VC12	31/10/2019	VC12_0.0-0.5	0 - 0.5	<2.5	1.8	3.4	<2.5	<2.5	<2.5	1.9	459.0	54.1	15,300.0	5.0	96.5	<25.0	15,300.0	137.0	1	18.7

Location Code	Date	Field ID	Depth	Dioxins & Furans (LOR) 1234678-HpCDD LOR pg/g	1234678-HpCDF LOR pg/g	1234789-HpCDF LOR pg/g	123478-HxCDD LOR pg/g	123478-HxCDF LOR pg/g	123678-HxCDD LOR pg/g	123678-HxCDF LOR pg/g	123789-HxCDD LOR pg/g	123789-HxCDF LOR pg/g	12378-PeCDD LOR pg/g	12378-PeCDF LOR pg/g	234678-HxCDF LOR pg/g	23478-PeCDF LOR pg/g	2378-TCDD LOR pg/g
				pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
EQL				1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	0.25
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.5
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.5
VC03	30/10/2019	VC03_0.0-0.5	0 - 0.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.5
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.5
VC07	30/10/2019	VC07_0.0-0.5	0 - 0.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.5
VC08	31/10/2019	VC08_1.0-1.5	1 - 1.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.5
VC10	31/10/2019	VC10_0.0-0.5	0 - 0.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.5
VC12	31/10/2019	VC12_0.0-0.5	0 - 0.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.5

Statistics

Statistic	123789-HxCDF	2378-TCDD	12378-PeCDD	12378-PeCDF	234678-HxCDF	23478-PeCDF	2378-TCDF	Hexa-Dioxins	Hexa-Furans	Octa-Dioxin	Octa-Furan LOR4 pg/g	Penta-Dioxins	Penta-Furans	OCDD	OCDF	Total TEQ	Tetra-Furans
Number of Results	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects	0	4	4	2	1	2	3	8	3	8	8	6	2	8	3	8	3
Minimum Concentration	<2.5	<0.5	<2.5	<2.5	<2.5	<2.5	<0.5	19.7	<2.5	15,300	4.9	<15	<2.5	15,300	<4.9	1	<0.5
Maximum Concentration	<2.5	18.4	33.1	13.4	8.1	20.5	16.7	3,030	509	73,500	5	627	258	73,500	1,300	1	234
Average Concentration *	1.2	3.6	6.5	3.2	2.1	4.2	3.1	810	90	37,075	5	154	44	37,075	227	1	40

Statistic	1234678-HpCDD LOR pg/g	1234678-HpCDF LOR pg/g	1234789-HpCDF LOR pg/g	123478-HxCDD LOR pg/g	123478-HxCDF LOR pg/g	123678-HxCDD LOR pg/g	123678-HxCDF LOR pg/g	123789-HxCDD LOR pg/g	123789-HxCDF LOR pg/g	12378-PeCDD LOR pg/g	12378-PeCDF LOR pg/g	234678-HxCDF LOR pg/g	23478-PeCDF LOR pg/g	2378-TCDD LOR pg/g
Number of Results	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Minimum Concentration	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.5
Maximum Concentration	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.5
Average Concentration *	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.5

* A Non Detect Multiplier of 0.5 has been applied.

Location Code	Date	Field ID	Depth	2378-TCDF LOR pg/g	OCDD LOR pg/g	OCDF LOR pg/g	Dioxins & Furans I TEQ3 (LOR) 1234678-HpCDD I-TEQ3 (LOR)	1234678-HpCDF I-TEQ3 (LOR)	1234789-HpCDF I-TEQ3 (LOR)	123478-HxCDD I-TEQ3 (LOR)	123478-HxCDF I-TEQ3 (LOR)	123678-HxCDD I-TEQ3 (LOR)	123678-HxCDF I-TEQ3 (LOR)	123789-HxCDD I-TEQ3 (LOR)	123789-HxCDF I-TEQ3 (LOR)	12378-PeCDD I-TEQ3 (LOR)	12378-PeCDF I-TEQ3 (LOR)	234678-HxCDF I-TEQ3 (LOR)	23478-PeCDF I-TEQ3 (LOR)	2378-TCDD I-TEQ3 (LOR)	2378-TCDF I-TEQ3 (LOR)	OCDD I-TEQ3 (LOR)	OCDF I-TEQ3 (LOR)	1234678-HpCDD I-TEF	1234678-HpCDD WHO-TEF	1234678-HpCDF I-TEF	1234678-HpCDF WHO-TEF	1234789-HpCDF I-TEF	1234789-HpCDF WHO-TEF	123478-HxCDD I-TEF	123478-HxCDD WHO-TEF	123478-HxCDF I-TEF	123478-HxCDF WHO-TEF	123678-HxCDD I-TEF	123678-HxCDD WHO-TEF	123678-HxCDF I-TEF
				pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
EQL				0.25	5	2.5	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	0.25	0.25	5	2.5	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1	0.5	10.0	5.0	0.67	0.02	0.02	0.25	0.25	0.25	0.25	0.25	0.25	1.25	0.12	0.25	1.25	0.50	0.05	23.30	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	0.1
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1	0.5	10.0	5.0	24.00	4.40	0.37	3.51	3.68	12.80	1.79	9.30	0.25	16.55	0.67	0.25	10.25	18.40	1.67	48.00	1.30	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	0.1
VC03	30/10/2019	VC03_0.0-0.5	0 - 0.5	0.5	9.8	4.9	1.92	0.02	0.02	0.25	0.25	0.25	0.25	0.61	0.25	1.23	0.12	0.25	1.23	0.94	0.05	63.60	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	0.1
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1	0.5	10.0	5.0	1.11	0.02	0.02	0.25	0.25	0.25	0.25	0.53	0.25	1.25	0.12	0.25	1.25	0.50	0.05	34.60	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	0.1
VC07	30/10/2019	VC07_0.0-0.5	0 - 0.5	0.5	10.0	5.0	7.08	1.23	0.09	0.88	1.12	3.10	0.56	2.97	0.25	3.92	0.22	0.81	2.86	6.49	0.46	19.20	0.36	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	0.1
VC08	31/10/2019	VC08_1.0-1.5	1 - 1.5	0.5	10.0	5.0	1.70	0.02	0.02	0.38	0.25	0.60	0.25	1.13	0.25	1.52	0.12	0.25	1.25	0.50	0.05	19.10	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	0.1
VC10	31/10/2019	VC10_0.0-0.5	0 - 0.5	0.5	10.0	5.0	2.83	0.02	0.02	0.25	0.25	0.25	0.25	0.58	0.25	1.25	0.12	0.25	1.25	0.50	0.05	73.50	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	0.1
VC12	31/10/2019	VC12_0.0-0.5	0 - 0.5	0.5	10.0	5.0	3.01	0.48	0.03	0.44	0.39	1.31	0.25	1.34	0.25	1.71	0.13	0.25	1.25	1.78	0.19	15.30	0.14	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Statistics																																				
Number of Results				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Minimum Concentration				0.5	9.8	4.9	0.67	0.02	0.02	0.25	0.25	0.25	0.25	0.25	0.25	1.23	0.12	0.25	1.23	0.5	0.05	15.3	0	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Maximum Concentration				0.5	10	5	24	4.4	0.37	3.51	3.68	12.8	1.79	9.3	0.25	16.55	0.67	0.81	10.25	18.4	1.67	73.5	1.3	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Average Concentration *				0.5	10	5	5.3	0.78	0.074	0.78	0.8	2.4	0.48	2.1	0.25	3.6	0.2	0.32	2.6	3.7	0.32	37	0.23	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	0.1

* A Non Detect Multiplier of 0.5 has been applied.

				Dioxins & Furans TEF																				
				123678-HxCDF WHO-TEF	123789-HxCDD I-TEF	123789-HxCDD WHO-TEF	123789-HxCDF I-TEF	123789-HxCDF WHO-TEF	12378-PeCDD I-TEF	12378-PeCDD WHO-TEF	12378-PeCDF I-TEF	12378-PeCDF WHO-TEF	234678-HxCDF I-TEF	234678-HxCDF WHO-TEF	23478-PeCDF I-TEF	23478-PeCDF WHO-TEF	2378-TCDD I-TEF	2378-TCDD WHO-TEF	2378-TCDF I-TEF	2378-TCDF WHO-TEF	OCDD I-TEF	OCDD WHO-TEF	OCDF I-TEF	OCDF WHO-TEF
				pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
EQL				1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	0.25	0.25	0.25	0.25	5	5	2.5	2.5
Location Code	**Date**	**Field ID**	**Depth**																					
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1	0.1	0.1	0.1	0.1	0.1	0.5	1	0.05	0.03	0.1	0.1	0.5	0.3	1	1	0.1	0.1	0.001	0.0003	0.001	0.0003
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1	0.1	0.1	0.1	0.1	0.1	0.5	1	0.05	0.03	0.1	0.1	0.5	0.3	1	1	0.1	0.1	0.001	0.0003	0.001	0.0003
VC03	30/10/2019	VC03_0.0-0.5	0 - 0.5	0.1	0.1	0.1	0.1	0.1	0.5	1	0.05	0.03	0.1	0.1	0.5	0.3	1	1	0.1	0.1	0.001	0.0003	0.001	0.0003
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1	0.1	0.1	0.1	0.1	0.1	0.5	1	0.05	0.03	0.1	0.1	0.5	0.3	1	1	0.1	0.1	0.001	0.0003	0.001	0.0003
VC07	30/10/2019	VC07_0.0-0.5	0 - 0.5	0.1	0.1	0.1	0.1	0.1	0.5	1	0.05	0.03	0.1	0.1	0.5	0.3	1	1	0.1	0.1	0.001	0.0003	0.001	0.0003
VC08	31/10/2019	VC08_1.0-1.5	1 - 1.5	0.1	0.1	0.1	0.1	0.1	0.5	1	0.05	0.03	0.1	0.1	0.5	0.3	1	1	0.1	0.1	0.001	0.0003	0.001	0.0003
VC10	31/10/2019	VC10_0.0-0.5	0 - 0.5	0.1	0.1	0.1	0.1	0.1	0.5	1	0.05	0.03	0.1	0.1	0.5	0.3	1	1	0.1	0.1	0.001	0.0003	0.001	0.0003
VC12	31/10/2019	VC12_0.0-0.5	0 - 0.5	0.1	0.1	0.1	0.1	0.1	0.5	1	0.05	0.03	0.1	0.1	0.5	0.3	1	1	0.1	0.1	0.001	0.0003	0.001	0.0003
Statistics																								
Number of Results				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Number of Detects				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Minimum Concentration				0.1	0.1	0.1	0.1	0.1	0.5	1	0.05	0.03	0.1	0.1	0.5	0.3	1	1	0.1	0.1	0.001	0.0003	0.001	0.0003
Maximum Concentration				0.1	0.1	0.1	0.1	0.1	0.5	1	0.05	0.03	0.1	0.1	0.5	0.3	1	1	0.1	0.1	0.001	0.0003	0.001	0.0003
Average Concentration *				0.1	0.1	0.1	0.1	0.1	0.5	1	0.05	0.03	0.1	0.1	0.5	0.3	1	1	0.1	0.1	0.001	0.0003	0.001	0.0003

* A Non Detect Multiplier of 0.5 has been applied.

Date	Field ID	Lab Report Number	Smple Type	Inorganics			TOC	Metals															
				Moisture (%)	Moisture Content (%)	Cyanide (Total)	Total Organic Carbon	Aluminium	Antimony	Arsenic	Cadmium	Chromium (III+VI)	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Silver	Vanadium	Zinc
				%	%	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				1	1	1	0.02	50	0.5	1	0.1	1	0.5	1	50	1	10	0.01	1	0.1	0.1	2	1
30/10/2019	VC09_0.0-0.2	ES1936029 (ALS)	Parent	34.5		<1	0.08	8,120	<0.50	1.74	<0.1	10.3	0.8	<1.0	4,720	10.7	20	0.02	1.8	0.2	0.1	15.4	2.9
30/10/2019	FD02	685895 (Eurofins)	Inter-Lab Duplicate		15	<5	<0.1																
RPD						0	0																
30/10/2019	VC11_0.5-0.7	ES1936029 (ALS)	Parent	28.4		<1	0.53	6,760	<0.50	8.73	<0.1	12.2	1.4	3.2	17,800	7.0	28	0.03	4.3	0.4	0.4	13.6	14.0
30/10/2019	FD01	ES1936029 (ALS)	Intra-Lab Duplicate	28.8		<1	0.39	6,720	<0.50	7.74	<0.1	11.4	1.3	2.1	17,000	5.7	27	0.02	3.8	0.3	0.5	14.2	11.8
RPD				1		0	30	1	0	12	0	7	7	42	5	20	4	40	12	29	22	4	17
31/10/2019	VC10_0.0-0.5	ES1936029 (ALS)	Parent	15.4		<1	0.06	9,760	<0.50	<1.00	<0.1	6.9	<0.5	<1.0	1,360	4.6	<10	<0.01	1.3	0.1	<0.1	6.3	2.1
31/10/2019	FD05	ES1936029 (ALS)	Intra-Lab Duplicate	15.1		<1	0.09	10,700	<0.50	<1.00	<0.1	7.6	<0.5	<1.0	2,060	3.0	<10	<0.01	1.9	0.1	0.2	13.4	2.9
RPD				2		0	40	9	0	0	0	10	0	0	41	42	0	0	37	0	67	72	32

Date	Field ID	Lab Report Number	Smple Type	BTEXN									
				Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Naphthalene (BTEXN)	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.1	0.1	0.1	0.1	0.2	0.3	0.5	0.2	3	3
30/10/2019	VC09_0.0-0.2	ES1936029 (ALS)	Parent	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5		<0.2	<3.0	<3
30/10/2019	FD02	685895 (Eurofins)	Inter-Lab Duplicate	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5		<20	<20
RPD				0	0	0	0	0	0			0	0
30/10/2019	VC11_0.5-0.7	ES1936029 (ALS)	Parent	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5		<0.2	<3.0	<3
30/10/2019	FD01	ES1936029 (ALS)	Intra-Lab Duplicate	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5		<0.2	<3.0	<3
RPD				0	0	0	0	0	0		0	0	0
31/10/2019	VC10_0.0-0.5	ES1936029 (ALS)	Parent	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5		<0.2	<3.0	<3
31/10/2019	FD05	ES1936029 (ALS)	Intra-Lab Duplicate	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5		<0.2	<3.0	<3
RPD				0	0	0	0	0	0		0	0	0

***RPDs have only been considered where a concentration is greater than 10 times the EQL.**

****Elevated RPDs are highlighted. Acceptable RPDs are: No limit (1 - 10 x EQL); 50 (organics); 30 (inorganics)**

*****Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory**

				TRH - NEPM 2013					TRH - NEPM 1999					PAHs																	
				F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Benzo(e)pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Naphthalene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene-PAH	Phenanthrene	Pyrene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				3	3	3	5	3	3	3	3	5	3	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.004	0.004	0.5	0.004	0.004
Date	**Field ID**	**Lab Report Number**	**Smple Type**																												
30/10/2019	VC09_0.0-0.2	ES1936029 (ALS)	Parent	<3	<3	<3	<5	<3	<3	<3	<3	<5	<3	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004		<0.004	<0.004
30/10/2019	FD02	685895 (Eurofins)	Inter-Lab Duplicate	<50	<50	<100	<100	<100	<20	<20	<50	<50	<50		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5
RPD				0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0		0	0		0	0
30/10/2019	VC11_0.5-0.7	ES1936029 (ALS)	Parent	<3	<3	6	<5	6	<3	<3	4	<5	4	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004		<0.004	<0.004
30/10/2019	FD01	ES1936029 (ALS)	Intra-Lab Duplicate	<3	<3	<3	<5	<3	<3	<3	<3	<5	<3	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004		<0.004	<0.004
RPD				0	0	67	0	67	0	0	29	0	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
31/10/2019	VC10_0.0-0.5	ES1936029 (ALS)	Parent	<3	<3	<3	<5	<3	<3	<3	<3	<5	<3	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004		<0.004	<0.004
31/10/2019	FD05	ES1936029 (ALS)	Intra-Lab Duplicate	<3	<3	<3	<5	<3	<3	<3	<3	<5	<3	<0.004	<0.004	<0.004	<0.004	<0.004	0.005	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004		<0.004	0.004
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0		0	0

***RPDs have only been considered where a concentration is greater than 10 times the EQL.**

****Elevated RPDs are highlighted. Acceptable RPDs are: No limit (1 - 10 x EQL); 50 (organics); 30 (inorganics)**

*****Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any me**

									Phenols																					SVOCs			
				PAHs (Sum of total) - Lab calc	Total 8 PAHs (as BaP TEQ)(zero LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(half LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(full LOR) - Lab Calc	3,4-Methylphenol (m,p-cresol)	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2,4-dinitrophenol	2,6-dichlorophenol	2-chlorophenol	2-methylnaphthalene	2-methylphenol	2-nitrophenol	4,6-Dinitro-2-methylphenol	4,6-Dinitro-o-cyclohexyl phenol	4-chloro-3-methylphenol	4-nitrophenol	Pentachlorophenol	Phenol	tetrachlorophenols	Phenols (Total Halogenated)	Phenols (Total Non Halogenated)	Coronene	Perylene	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.004	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	5	0.5	0.5	0.005	0.2	0.5	5	20	0.5	5	1	0.5	10	1	20	0.005	0.004	0.1	0.1
Date	**Field ID**	**Lab Report Number**	**Smple Type**																												
30/10/2019	VC09_0.0-0.2	ES1936029 (ALS)	Parent	<0.004				<1	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.005	<0.5	<0.5			<0.5		<2	<0.5				<0.005	<0.004		
30/10/2019	FD02	685895 (Eurofins)	Inter-Lab Duplicate	<0.5	<0.5	0.6	1.2	<0.4	<1	<1	<0.5	<0.5	<5	<0.5	<0.5		<0.2	<1	<5	<20	<1	<5	<1	<0.5	<10	<1	<20			<0.1	<0.1
RPD				0				0	0	0	0	0		0	0		0	0			0		0	0							
30/10/2019	VC11_0.5-0.7	ES1936029 (ALS)	Parent	<0.004				<1	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.005	<0.5	<0.5			<0.5		<2	<0.5				<0.005	<0.004		
30/10/2019	FD01	ES1936029 (ALS)	Intra-Lab Duplicate	<0.004				<1	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.005	<0.5	<0.5			<0.5		<2	<0.5				<0.005	<0.004		
RPD				0				0	0	0	0	0		0	0	0	0	0			0		0	0				0	0		
31/10/2019	VC10_0.0-0.5	ES1936029 (ALS)	Parent	<0.004				<1	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.005	<0.5	<0.5			<0.5		<2	<0.5				<0.005	<0.004		
31/10/2019	FD05	ES1936029 (ALS)	Intra-Lab Duplicate	0.009				<1	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.005	<0.5	<0.5			<0.5		<2	<0.5				<0.005	<0.004		
RPD				77				0	0	0	0	0		0	0	0	0	0			0		0	0				0	0		

***RPDs have only been considered where a concentration is greater than 10 times the EQL.**
****Elevated RPDs are highlighted. Acceptable RPDs are: No limit (1 - 10 x EQL); 50 (organics); 30 (inorganics)**
*****Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any me**

Appendix C
Table C9
Relative Percentage Differences

				4,4'-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)	Chlordane (trans)	d-BHC	4,4 DDD	4,4 DDT	DDT+DDE+DDD - Lab Calc	Dieldrin	Endosulfan	Endosulfan I (alpha)	Endosulfan II (beta)	Endosulfan Sulfate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)
				OC Pesticides																				
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.0005	0.0005	0.0005	0.05	0.0005	0.00025	0.00025	0.00025	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00025
Date	**Field ID**	**Lab Report Number**	**Smple Type**																					
30/10/2019	VC09_0.0-0.2	ES1936029 (ALS)	Parent	<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025
30/10/2019	FD02	685895 (Eurofins)	Inter-Lab Duplicate	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1			<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
RPD				0	0	0		0	0			0	0	0	0	0		0	0	0	0	0	0	0
30/10/2019	VC11_0.5-0.7	ES1936029 (ALS)	Parent	<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025
30/10/2019	FD01	ES1936029 (ALS)	Intra-Lab Duplicate	<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025
RPD				0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31/10/2019	VC10_0.0-0.5	ES1936029 (ALS)	Parent	<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025
31/10/2019	FD05	ES1936029 (ALS)	Intra-Lab Duplicate	<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025
RPD				0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

***RPDs have only been considered where a concentration is greater than 10 times the EQL.**
****Elevated RPDs are highlighted. Acceptable RPDs are: No limit (1 - 10 x EQL); 50 (organics); 30 (inorganics)**
*****Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any me**

Appendix C
Table C9
Relative Percentage Differences

										OP Pes																				
				Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	Oxychlordane	Toxaphene	Tokuthion	Azinphos methyl	Bolstar (Sulprofos)	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos	Chlorfenvinphos E	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Demeton-S-methyl	Diazinon	cis-Chlorfenvinphos	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.0005	0.0005	0.0005	0.0005	0.0005	1	0.2	0.01	0.2	0.01	0.01	0.2	0.01	0.01	0.01	2	0.2	0.2	0.01	0.01	0.01	0.01	0.01	0.2	0.2	0.01	0.2
Date	**Field ID**	**Lab Report Number**	**Smple Type**																											
30/10/2019	VC09_0.0-0.2	ES1936029 (ALS)	Parent	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	
30/10/2019	FD02	685895 (Eurofins)	Inter-Lab Duplicate	<0.05	<0.05	<0.05	<0.05		<1	<0.2	<0.2	<0.2			<0.2		<0.2	<0.2	<2	<0.2	<0.2		<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
RPD				0	0	0	0				0						0	0					0		0	0			0	
30/10/2019	VC11_0.5-0.7	ES1936029 (ALS)	Parent	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	
30/10/2019	FD01	ES1936029 (ALS)	Intra-Lab Duplicate	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	
RPD				0	0	0	0	0			0		0	0		0	0	0				0	0	0	0	0			0	
31/10/2019	VC10_0.0-0.5	ES1936029 (ALS)	Parent	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	
31/10/2019	FD05	ES1936029 (ALS)	Intra-Lab Duplicate	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	
RPD				0	0	0	0	0			0		0	0		0	0	0				0	0	0	0	0			0	

***RPDs have only been considered where a concentration is greater than 10 times the EQL.**
****Elevated RPDs are highlighted. Acceptable RPDs are: No limit (1 - 10 x EQL); 50 (organics); 30 (inorganics)**
*****Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any me**

				icides																					Halogenated		PCBs				
				Fenamiphos	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Parathion	Phorate	Pirimphos-ethyl	Pirimiphos-methyl	Prothiofos	Pyrazophos	Ronnel	Terbufos	Trichloronate	Tetrachlorvinphos	Bromomethane	Dichlorodifluoromethane	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.01	0.2	0.2	0.01	0.01	0.2	0.01	0.2	0.01	0.2	2	0.01	0.2	0.01	0.2	0.01	0.2	0.2	0.2	0.2	0.2	5	5	0.005	0.005	0.005	0.005	0.005
Date	**Field ID**	**Lab Report Number**	**Smple Type**																												
30/10/2019	VC09_0.0-0.2	ES1936029 (ALS)	Parent	<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01								<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
30/10/2019	FD02	685895 (Eurofins)	Inter-Lab Duplicate		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2		<0.2		<0.2	<0.2	<0.2	<0.2	<0.2			<0.1	<0.1	<0.1	<0.1	<0.1
RPD							0	0		0		0			0												0	0	0	0	0
30/10/2019	VC11_0.5-0.7	ES1936029 (ALS)	Parent	<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01						<5	<5	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
30/10/2019	FD01	ES1936029 (ALS)	Intra-Lab Duplicate	<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01								<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
RPD				0			0	0		0		0			0		0		0								0	0	0	0	0
31/10/2019	VC10_0.0-0.5	ES1936029 (ALS)	Parent	<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01								<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
31/10/2019	FD05	ES1936029 (ALS)	Intra-Lab Duplicate	<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01								<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
RPD				0			0	0		0		0			0		0		0								0	0	0	0	0

***RPDs have only been considered where a concentration is greater than 10 times the EQL.**
****Elevated RPDs are highlighted. Acceptable RPDs are: No limit (1 - 10 x EQL); 50 (organics); 30 (inorganics)**
*****Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any me**

							Herbicides
				Arochlor 1254	Arochlor 1260	PCBs (Total)	Dinoseb
				mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.005	0.005	0.005	20
Date	**Field ID**	**Lab Report Number**	**Smple Type**				
30/10/2019	VC09_0.0-0.2	ES1936029 (ALS)	Parent	<0.0050	<0.0050	<0.0050	
30/10/2019	FD02	685895 (Eurofins)	Inter-Lab Duplicate	<0.1	<0.1	<0.1	<20
RPD				0	0	0	
30/10/2019	VC11_0.5-0.7	ES1936029 (ALS)	Parent	<0.0050	<0.0050	<0.0050	
30/10/2019	FD01	ES1936029 (ALS)	Intra-Lab Duplicate	<0.0050	<0.0050	<0.0050	
RPD				0	0	0	
31/10/2019	VC10_0.0-0.5	ES1936029 (ALS)	Parent	<0.0050	<0.0050	<0.0050	
31/10/2019	FD05	ES1936029 (ALS)	Intra-Lab Duplicate	<0.0050	<0.0050	<0.0050	
RPD				0	0	0	

***RPDs have only been considered where a concentration is greater than 10 times the EQL.**
****Elevated RPDs are highlighted. Acceptable RPDs are: No limit (1 - 10 x EQL); 50 (organics); 30 (inorganics)**
*****Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any me**

Appendix C
Table C10
Trip Blanks and Rinsate Blanks

				BTEXN							TRH - NEPM 2013		TRH - NEPM 1999	PAHs
				Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	C6-C9 Fraction	Naphthalene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.2	0.5	0.5	0.5	0.5	0.5	0.2	10	10	10	1
Date	**Field ID**	**Sample Type**	**Matrix Type**											
30/10/2019	TB1	Trip Blank	**soil**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<10	<1
31/10/2019	TB2	Trip Blank	soil	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<10	<1
7/11/2019	Trip blank	Trip Blank	soil	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<10	<1

				Metals								BTEXN							TRH - NEPM 2013							TRH - NEPM 1999					PAHs											
				Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Sum of polycyclic aromatic hydrocarbons	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.001	0.0001	0.001	0.001	0.001	0.0001	0.001	0.005	1	2	2	2	2	2	1	20	20	100	100	100	100	100	20	50	100	50	50	0.0005	1	1	1	1	0.5	1	1	1	1	1	1
Date	**Field ID**	**Sample Type**	**Matrix Type**																																							
30/10/2019	RIN_01	Rinsate Blank	water	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<0.0005	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
31/10/2019	RIN_02	Rinsate Blank	water	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<0.0005	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
7/11/2019	RB	Rinsate Blank	water	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005																				<0.0005	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
7/11/2019	RIN_03	Rinsate Blank	water																												<0.0005	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

				Naphthalene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	Total 8 PAHs (as BaP TEQ)(zero LOR) - Lab Calc
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				1	1	1	1	1	0.5
Date	**Field ID**	**Sample Type**	**Matrix Type**						
30/10/2019	RIN_01	Rinsate Blank	water	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5
31/10/2019	RIN_02	Rinsate Blank	water	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5
7/11/2019	RB	Rinsate Blank	water	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5
7/11/2019	RIN_03	Rinsate Blank	water	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5

Appendix C
Table C4
Analytical results - Waste classification TCLP

				Cyanides	Inorganics		Leachate				Major Ions	TOC	Metals											
				Cyanide (WAD)	Moisture (%)	Cyanide (Total)	pH (Initial)	pH (after HCL)	pH (Final)	TCLP Fluid	Fluoride	Total Organic Carbon	Aluminium	Antimony	Arsenic	Beryllium	Cadmium	Chromium (III+VI)	Chromium (hexavalent)	Cobalt	Copper	Iron	Lead	Lead (filtered)
				mg/kg	%	mg/kg	pH Units	pH Units	pH Units	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L
EQL				1	0.1	1	0.1	0.1	0.1	1	40	0.02	50	0.5	1	1	0.1	1	0.5	0.5	1	50	1	0.1
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)						5,900					10,000				500	100	100	1,900	1,900				1,500	
NSW EPA (2014) General Solid Waste TCLP1																								5
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)						23,600					40,000				2,000	400	400	7,600	7,600				6,000	
NSW EPA (2014) Restricted Solid Waste TCLP2																								20
Location Code	**Date**	**Field ID**	**Depth**																					
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7	<1	47	<1	9.2	5.4	6.3	2	160				10	<1	<1		<0.5				127	<0.1
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45	<1	23.7	<1	9.2	5.2	5.8	2	170				6	<1	<1		<0.5				68	
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95	<1	18.2	<1	5.4	1.4	5.1	1	40				<5	<1	<1		<0.5				<5	
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6		13.8																		<5	
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2		29		9	4.1	6.4	1													156	<0.1
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0		13.5	<1						0.06	3870	<0.50	<1.00		<0.1	3		<0.5	<1.0	1470	1.4	
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1		14.5	<1						0.04	2820	<0.50	<1.00		<0.1	2.5		<0.5	<1.0	1020	1.1	
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2		43.8		8.8	5.5	5.7	2													223	0.2
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6		22.4		8.1	1.4	5.1	1													66	
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0		21.4																		6	
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2		20.7		8.6	1.4	4.9	1													13	<0.1
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5		17.6																		8	
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6		13	<1						0.07	8610	<0.50	1.22		<0.1	8.9		<0.5	<1.0	5400	3.1	
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5		49.1	<1	9.1	5.2	4.8	2		2.82	12200	<0.50	16.1		0.5	42		4.2	120	34900	318	
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2		20.4		8.8	1.6	5	1													14	0.7
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5		13.1	<1						0.15	11300	<0.50	<1.00		<0.1	10.7		0.5	<1.0	1290	33.6	
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4		12.1	<1					40	0.16	11800	<0.50	<1.00		<0.1	12.5		<0.5	<1.0	1240	13.5	
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6		20.2																		29	
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0		18.5																		<5	
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7		19.3																		5	
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2		17.3																		<5	
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1		24		6.7	1.4	5	1													16	<0.1
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4		17.1	<1						0.1	14800	<0.50	<1.00		<0.1	13.2		<0.5	<1.0	2510	28	
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0		64.3	<1						0.05	14600	<0.50	<1.00		<0.1	12		<0.5	<1.0	3080	4.9	
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6		15.9																		7	
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8		19.2		6.7	1.3	4.9	1													<5	<0.1
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0		20.1																		<5	
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1		23.5		9.2	2	6.5	1													56	<0.1
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7		17.8																		<5	
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9		14.7																		5	
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9		4.3	<1					<40	0.11	4150	<0.50	3.22		<0.1	4.3		<0.5	<1.0	3840	1.6	
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1	<1	48.2	<1	9.1	5.4	5.2	2	90	2.05			18	<1	<1		<0.5				224	0.8
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5		20																		11	
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4		18.1		8	1.4	5.1	1													8	
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6		18.9																		11	
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0		21.4																		30	
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8		22.1																		36	
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9		21.6																		18	
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2		1.5	<1					80	1.28	3930	<0.50	6.28		<0.1	12.5		1.4	38.2	11800	67.7	
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5		31.3	<1	8.9	5.2	6	2		1.05	5550	<0.50	9.04		<0.1	16.6		2.4	189	15600	110	0.1
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4		32.7		9.2	5.2	6.1	2													89	
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6		19		8.7	1.4	5.1	1													10	
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0		22.3																		7	
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7		20.6																		6	
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2		17.4		8.5	1.4	5.1	1													198	
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1	<1	31.1	<1					120	1.2			14	<1	<1		<0.5				117	<0.1
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4		46		9.2	5.2	6.1	2													216	
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5		36.7																		111	
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6		31.3																		19	
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0		27.3																		7	
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8		27.1																		6	
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1		18.6																		6	
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5		17.5	<1						0.15	7220	<0.50	3.11		<0.1	10.8		<0.5	<1.0	3460	14.6	
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4		18.7																		9	
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6		15.4																		11	
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2		34.5	<1						0.08	8120	<0.50	1.74		<0.1	10.3		0.8	<1.0	4720	10.7	
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5		14.5																		<5	
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6		16.3																		17	
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0		17.8																		22	
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8		17.2		8.2	1.7	5	1													10	<0.1

				Cyanides	Inorganics		Leachate				Major Ions	TOC	Metals											
				Cyanide (WAD)	Moisture (%)	Cyanide (Total)	pH (Initial)	pH (after HCL)	pH (Final)	TCLP Fluid	Fluoride	Total Organic Carbon	Aluminium	Antimony	Arsenic	Beryllium	Cadmium	Chromium (III+VI)	Chromium (hexavalent)	Cobalt	Copper	Iron	Lead	Lead (filtered)
				mg/kg	%	mg/kg	pH Units	pH Units	pH Units	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0		15.6																		5	
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8		18.8	<1						0.12	14600	<0.50	<1.00		<0.1	11.9		<0.5	<1.0	1230	24.5	
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2		19.4		9	1.7	5.1	1													29	<0.1
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5		15.4	<1						0.06	9760	<0.50	<1.00		<0.1	6.9		<0.5	<1.0	1360	4.6	
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6		20.4																		9	
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2		28.6		9.2	5.3	6.1	2													55	<0.1
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5		28.4																		5	
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7		28.4	<1					150	0.53	6760	<0.50	8.73		<0.1	12.2		1.4	3.2	17800	7	
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0		29																		9	
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2		27.7																		6	
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5		24.2	<1						0.34	4790	<0.50	2.2		<0.1	6		<0.5	4.5	4290	10.6	
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4		19.3																		<5	
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6		19.6																		<5	
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9		16.6		8.2	1.6	4.9	1													<5	<0.1
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1	<1	19.9	<1					80	0.13			<5	<1	<1		<0.5				42	
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1	<1	32.2	<1	9	5.4	6	2	180	1.45			13	<1	<1		<0.5				154	<0.1
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5		30																		84	
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4		30.5		9.3	5.1	5.8	2													18	
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6		15.4																		6	
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0		15																		9	
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8		14.8																		16	
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1		13.6																		7	
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1		35.7		9.3	5.2	6	2													57	<0.1
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5		38																		14	
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4		34																		20	
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0		31.7																		6	
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8		26.1		9.4	5.3	6	2													<5	<0.1
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1	<1	24.9	<1					70	0.29			9	<1	<1		<0.5				<5	
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4		17.9																		8	
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6		30.8																		6	
Statistics																								
Number of Results				8	90	25	27	27	27	27	12	22	17	17	25	8	25	17	8	17	17	17	90	18
Number of Detects				0	90	0	27	27	27	27	11	22	17	0	15	0	1	17	0	6	5	17	77	4
Minimum Concentration				<1	1.5	<1	5.4	1.3	4.8	1	<40	0.04	2820	<0.50	<1	<1	<0.1	2.5	<0.5	<0.5	<1.0	1020	<5	<0.1
Maximum Concentration				<1	64.3	<1	9.4	5.5	6.5	2	180	2.82	14800	<0.50	18	<1	0.5	42	<0.5	4.2	189	34900	318	0.8

Appendix C
Table C4
Analytical results - Waste classification TCLP

Location Code	Date	Field ID	Depth	Manganese	Mercury	Mercury (filtered)	Molybdenum	Nickel	Selenium	Silver	Vanadium	Zinc	Organo Metals: Tributyltin (as Sn)	BTEXN: Benzene	BTEXN: Toluene	BTEXN: Ethylbenzene	BTEXN: Xylene (o)	BTEXN: Xylene (m & p)	BTEXN: Xylene Total	BTEXN: BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	TRH - NEPM: C6-C10 Fraction	TRH - NEPM: F2 (>C10-C16 minus Naphthalene)	TRH - NEPM: >C10-C16 Fraction
				mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				10	0.01	0.001	2	1	0.1	0.1	2	1	0.0005	0.1	0.1	0.1	0.1	0.2	0.3	0.2	3	3	3	3
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)					50		1,000	1,050	50	180				18	518	1,080			1,800					
NSW EPA (2014) General Solid Waste TCLP1						0.2																		
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)					200		4,000	4,200	200	720				72	2,073	4,320			7,200					
NSW EPA (2014) Restricted Solid Waste TCLP2						0.8																		
Location Code	**Date**	**Field ID**	**Depth**																					
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7		1.1		<2	5	<5	<2				<0.2	<0.5	<0.5	<0.5	<0.5				<10		
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45		0.2		<2	2	<5	<2				<0.2	<0.5	<0.5	<0.5	<0.5				<10		
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95		<0.1		<2	5	<5	<2				<0.2	<0.5	<0.5	<0.5	<0.5				<10		
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6																					
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2		1.9	<0.0010																		
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<10	<0.01			<1.0	<0.1	<0.1	3.8	<1.0	<0.0005	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1	<10	<0.01			<1.0	<0.1	<0.1	2.5	<1.0		<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																					
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6		0.9	<0.0010																		
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																					
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2		<0.1	<0.0010																		
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																					
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6	<10	<0.01			1	0.2	<0.1	14.8	1.9		<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	88	4.25	<0.0010		10.4	0.6	3	32.6	445	0.0028	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	4	4
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																					
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<10	0.05			2	0.1	<0.1	5.5	16.7	<0.0005	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4	<10	0.04			1.9	<0.1	0.1	5.1	6.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																					
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0																					
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																					
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																					
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1		<0.1	<0.0010																		
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4	<10	<0.01			2	0.2	0.1	10.4	3.4		<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<10	<0.01			1.6	0.1	0.3	8.9	2.3	<0.0005	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																					
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																					
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																					
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1		0.6	<0.0010																		
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																					
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																					
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9	<10	<0.01			<1.0	<0.1	0.1	15.6	1.5		<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1		3.4		<2	10	<5	<2				<0.2	<0.5	<0.5	<0.5	<0.5				<10		
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																					
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4		<0.1	<0.0010																		
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																					
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																					
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																					
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																					
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2	34	0.84			3	0.2	0.3	11.9	96.6		<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	4	4
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	37	1.61			4.4	0.3	1.5	16.2	158	0.0204	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	7	7
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4		1	<0.0010																		
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6		<0.1	<0.0010																		
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																					
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7																					
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2		<0.1	<0.0010																		
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1		1.8		<2	6	<5	<2				<0.2	<0.5	<0.5	<0.5	<0.5				<10		
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4		2.5	<0.0010																		
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5																					
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																					
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																					
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																					
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																					
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<10	0.05			1.2	0.3	0.2	21.3	3.2	<0.0005	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																					
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																					
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2	20	0.02			1.8	0.2	0.1	15.4	2.9		<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																					
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																					
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																					
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																					

Appendix C
Table C4
Analytical results - Waste classification TCLP

													Organo Metals	BTEXN							TRH - NEPM			
				Manganese	Mercury	Mercury (filtered)	Molybdenum	Nickel	Selenium	Silver	Vanadium	Zinc	Tributyltin (as Sn)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction
				mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																					
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8	<10	0.01			2	<0.1	<0.1	4.7	4.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2		0.1	<0.0010																		
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<10	<0.01			1.3	0.1	<0.1	6.3	2.1	<0.0005	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																					
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2		0.8	<0.0010																		
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																					
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7	28	0.03			4.3	0.4	0.4	13.6	14		<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<3	<3
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																					
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																					
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<10	0.12			<1.0	<0.1	0.2	13.5	14.4	0.0069	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3	<12	<12
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																					
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																					
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																					
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1		<0.1		<2	4	<5	<2				<0.2	<0.5	<0.5	<0.5	<0.5				<10		
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1		2.2		<2	7	<5	<2				<0.2	<0.5	<0.5	<0.5	<0.5				<10		
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																					
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4		0.3	<0.0010																		
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																					
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																					
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																					
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																					
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1		0.7	<0.0010																		
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																					
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																					
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																					
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8		<0.1	<0.0010																		
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1		<0.1		<2	3	<5	<2				<0.2	<0.5	<0.5	<0.5	<0.5				<10		
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																					
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																					

Statistics

	Manganese	Mercury	Mercury (filtered)	Molybdenum	Nickel	Selenium	Silver	Vanadium	Zinc	Tributyltin (as Sn)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction
Number of Results	17	40	16	8	25	25	25	17	17	8	25	25	25	25	25	17	17	17	25	17	17
Number of Detects	5	24	0	0	21	11	11	17	15	3	0	0	0	0	0	0	0	0	0	3	3
Minimum Concentration	<10	<0.01	<0.0010	<2	<1.0	<0.1	<0.1	2.5	<1.0	<0.0005	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<3.0	<3.0	<3.0	<3.0
Maximum Concentration	88	4.25	<0.0010	<2	10.4	0.6	3	32.6	445	0.0204	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<3.0	<10	7	7

				2013			TRH - NEPM 2013 - SG Cleanup				TRH - NEPM 1999					TRH - NEPM 1999 - SG Cleanup									
				F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	>C10-C16 SG Cleanup	>C16-C34 SG Cleanup	>C34-C40 SG Cleanup	>C10-C40 (sum) SG Cleanup	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	C10-C14 SG Cleanup	C15-C28 SG Cleanup	C29-C36 SG Cleanup	C10-C36 (sum) SG Cleanup	Sum of polycyclic aromatic hydrocarbons	Benzo(e)pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				3	5	3	50	100	100	50	3	3	3	5	3	50	100	100	50	0.5	0.004	0.004	0.004	0.004	0.004
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)											650				10,000				10,000						
NSW EPA (2014) General Solid Waste TCLP1																									
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)											2,600				40,000				40,000						
NSW EPA (2014) Restricted Solid Waste TCLP2																									
Location Code	**Date**	**Field ID**	**Depth**																						
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7				<50	320	<100	320	<10					<50	220	140	360	30.9		<0.5	0.5	0.6	2.4
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45				<50	850	170	1020	<10					<50	560	400	960	9.1		<0.5	<0.5	<0.5	0.8
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95				<50	<100	<100	<50	<10					<50	<100	<100	<50	<0.5		<0.5	<0.5	<0.5	<0.5
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6																	<0.5		<0.5	<0.5	<0.5	<0.5
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																	13		<0.5	<0.5	<0.5	1.2
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																	17.7		<0.5	<0.5	<0.5	1.5
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6																	1		<0.5	<0.5	<0.5	<0.5
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																	<0.5		<0.5	<0.5	<0.5	<0.5
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																	<0.5		<0.5	<0.5	<0.5	<0.5
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																	<0.5		<0.5	<0.5	<0.5	<0.5
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	0.005
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	78	28	110					<3	<3	48	46	94						0.631	0.044	0.297	0.286	1.13
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																	<0.5		<0.5	<0.5	<0.5	<0.5
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																	<0.5		<0.5	<0.5	<0.5	<0.5
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0																	<0.5		<0.5	<0.5	<0.5	<0.5
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																	<0.5		<0.5	<0.5	<0.5	<0.5
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																	<0.5		<0.5	<0.5	<0.5	<0.5
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																	<0.5		<0.5	<0.5	<0.5	<0.5
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	4	<5	4					<3	<3	5	<5	5						<0.005	<0.005	<0.005	<0.005	<0.005
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																	<0.5		<0.5	<0.5	<0.5	<0.5
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																	<0.5		<0.5	<0.5	<0.5	<0.5
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																	<0.5		<0.5	<0.5	<0.5	<0.5
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																	1.5		<0.5	<0.5	<0.5	<0.5
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																	<0.5		<0.5	<0.5	<0.5	<0.5
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																	<0.5		<0.5	<0.5	<0.5	<0.5
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1				<50	610	190	800	<10					<50	350	370	720	14		<0.5	<0.5	<0.5	1
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																	<0.5		<0.5	<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																	<0.5		<0.5	<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																	<0.5		<0.5	<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																	<0.5		<0.5	<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																	<0.5		<0.5	<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																	<0.5		<0.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2	122	49	175					<3	<3	68	79	147						0.307	<0.025	0.132	0.103	0.417
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	176	69	252					<3	<3	101	111	212						0.373	<0.025	<0.5	<0.5	0.8
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																	3.6		<0.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																	<0.5		<0.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																	<0.5		<0.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7																	<0.5		<0.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																	<0.5		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1				<50	190	<100	190	<10					<50	110	110	220	5.9		<0.5	<0.5	<0.5	0.6
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																	26.4		<0.5	<0.5	0.8	2
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5																	2.8		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																	<0.5		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																	<0.5		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																	<0.5		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																	<0.5		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	66	48	114					<3	<3	18	70	88						<0.004	<0.004	<0.004	<0.004	<0.5
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																	<0.5		<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																	<0.5		<0.5	<0.5	<0.5	<0.5
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																	<0.5		<0.5	<0.5	<0.5	<0.5
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																	<0.5		<0.5	<0.5	<0.5	<0.5
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																	<0.5		<0.5	<0.5	<0.5	<0.5
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																	<0.5		<0.5	<0.5	<0.5	<0.5

				2013			TRH - NEPM 2013 - SG Cleanup				TRH - NEPM 1999					TRH - NEPM 1999 - SG Cleanup									
				F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	>C10-C16 SG Cleanup	>C16-C34 SG Cleanup	>C34-C40 SG Cleanup	>C10-C40 (sum) SG Cleanup	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	C10-C14 SG Cleanup	C15-C28 SG Cleanup	C29-C36 SG Cleanup	C10-C36 (sum) SG Cleanup	Sum of polycyclic aromatic hydrocarbons	Benzo(e)pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																	<0.5		<0.5	<0.5	<0.5	<0.5
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8	<3	<5	<3					<3	<3	<3	<5	<3						0.006	<0.004	<0.004	<0.004	0.012
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																	<0.5		<0.5	<0.5	<0.5	<0.5
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<3	<5	<3					<3	<3	<3	<5	<3						<0.004	<0.004	<0.004	<0.004	<0.004
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																	<0.5		<0.5	<0.5	<0.5	<0.5
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																	<0.5		<0.5	<0.5	<0.5	<0.5
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																	<0.5		<0.5	<0.5	<0.5	<0.5
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7	6	<5	6					<3	<3	4	<5	4						<0.004	<0.004	<0.004	<0.004	<0.004
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																	<0.5		<0.5	<0.5	<0.5	<0.5
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																	<0.5		<0.5	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	185	72	257					<3	<6	109	112	221						0.117	<0.004	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																	<0.5		<0.5	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																	<0.5		<0.5	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																	<0.5		<0.5	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1				<50	<100	<100	<50	<10					<50	<100	<100	<50	<0.5		<0.5	<0.5	<0.5	<0.5
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1				<50	160	<100	160	<10					<50	<100	100	100	6.9		<0.5	<0.5	<0.5	0.7
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																	10.2		<0.5	<0.5	<0.5	1
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																	4.4		<0.5	<0.5	<0.5	0.5
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																	<0.5		<0.5	<0.5	<0.5	<0.5
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																	<0.5		<0.5	<0.5	<0.5	<0.5
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																	<0.5		<0.5	<0.5	<0.5	<0.5
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																	<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																	<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																	<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																	<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																	<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																	<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1				<50	<100	<100	<50	<10					<50	<100	<100	<50	<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																	<0.5		<0.5	<0.5	<0.5	<0.5
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																	<0.5		<0.5	<0.5	<0.5	<0.5

Statistics

Number of Results	17	17	17	8	8	8	8	25	17	17	17	17	8	8	8	8	73	17	90	90	90	90
Number of Detects	7	5	7	0	5	2	5	0	0	7	5	7	0	4	5	5	14	5	1	3	4	15
Minimum Concentration	<3.0	<5	<3	<50	<100	<100	<50	<3	<3	<3	<5	<3	<50	<100	<100	<50	<0.5	<0.005	<0.004	<0.004	<0.004	<0.004
Maximum Concentration	185	72	257	<50	850	190	1020	<10	<6	109	112	221	<50	560	400	960	30.9	0.631	<0.5	0.5	0.8	2.4

				PAHs																				
				Benzo(b+j+k)fluoranthene	Benzo(a) pyrene		Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Naphthalene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	PAHs (Sum of total) - Lab calc	Total 8 PAHs (as BaP TEQ)(zero LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(zero LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(half LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(full LOR) - Lab Calc	3,4-Methylphenol (m,p-cresol)	2,4,5-trichlorophenol
				mg/kg	mg/kg	µg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	mg/kg	mg/kg	mg/kg	mg/kg
EQL				1	0.004	0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.004	0.004	0.004	0.004	0.004	0.5	0.005	0.5	0.5	0.4	0.5
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)					10													200						14,400
NSW EPA (2014) General Solid Waste TCLP1						40																		
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)					23													800						57,600
NSW EPA (2014) Restricted Solid Waste TCLP2						160																		
Location Code	**Date**	**Field ID**	**Depth**																					
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7		4		4.2	1.7	1.8	2.2	<0.5	4.9	<0.5	<0.5	1.5	1.4	5.7		5		5.3	5.5	<1	<0.5
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45		1.1	<0.5	1.4	0.7	0.8	0.7	<0.5	1.4	<0.5	<0.5	0.6	<0.5	1.6		1.5		1.7	2	<1	<0.5
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2	<1	<0.5
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2		1.4	<0.5	1.9	0.8	1.1	1.1	<0.5	1.9	<0.5	<0.5	0.8	0.7	2.1		1.9		2.1	2.4		
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<1	<0.004		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	<0.5		0.6	1.2	<0.5	<0.5
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1		<0.004		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004					<1	<0.5
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2		1.9	<0.5	2.7	0.9	1.6	1.5	<0.5	2.6	<0.5	<0.5	1.2	0.9	2.9		2.6		2.8	3.1		
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6		<0.5		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5		<0.5		0.6	1.2		
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6		0.004		<0.004	<0.004	<0.004	0.005	<0.004	0.011	<0.005	<0.004	<0.004	0.004	0.01	0.039					<1	<0.5
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5		1.57	<0.5	1.49	0.661	1	0.997	0.219	1.89	<0.2	0.095	0.963	0.885	1.78	14.8					<1	<0.5
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5		<0.004		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004					<1	<0.5
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4		<0.004		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004					<1	<0.5
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4		<0.004		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004					<1	<0.5
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<1	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.5		0.7	1.4	<0.6	<0.6
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	0.8		<0.5		0.6	1.2		
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9		<0.004		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004					<1	<0.5
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1		1.8		1.8	0.8	1.1	1	<0.5	2.3	<0.5	<0.5	0.9	0.7	2.6		2.3		2.5	2.8	<1	<0.5
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2		0.627		0.606	0.304	0.483	0.378	0.089	0.595	<0.2	<0.025	0.375	0.226	0.639	5.72					<1	<0.5
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	1	0.8	<0.5	0.799	0.375	0.5	0.7	<0.5	1.5	<0.2	<0.5	<0.5	0.7	1.5	7.5	1		1.3	1.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4		0.7		0.7	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	1.2		0.8		1.1	1.4		
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1		0.9	<0.5	1	<0.5	<0.5	0.6	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	1.5		1.1		1.4	1.7	<1	<0.5
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4		3		3	1.3	1.1	2	<0.5	4.6	<0.5	<0.5	0.9	2.7	5		3.8		4	4.2		
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5		0.6	0.7	0.7	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	0.8		0.7		1	1.3		
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<1	<0.5		0.009	<0.004	<0.5	<0.5	<0.004	<0.5	<0.005	<0.004	<0.5	<0.5	<0.5	<0.5	<0.5		0.6	1.2	<0.5	<0.5
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2		<0.004		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004					<1	<0.5
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		

				PAHs																				
				Benzo(b+j+k)fluoranthene	Benzo(a) pyrene		Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Naphthalene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	PAHs (Sum of total) - Lab calc	Total 8 PAHs (as BaP TEQ)(zero LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(zero LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(half LOR) - Lab Calc	Total 8 PAHs (as BaP TEQ)(full LOR) - Lab Calc	3,4-Methylphenol (m,p-cresol)	2,4,5-trichlorophenol
				mg/kg	mg/kg	µg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8		0.013		0.01	0.007	0.008	0.008	<0.004	0.016	<0.005	<0.004	0.008	0.008	0.017	0.113					<1	<0.5
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5		<0.004		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004					<1	<0.5
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7		<0.004		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004					<1	<0.5
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<1	<0.5		0.226	0.116	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		0.6	1.2	<0.5	<0.5
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2	<1	<0.5
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1		1		1.1	<0.5	0.6	0.6	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	1.5		1.2		1.5	1.8	<1	<0.5
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5		1		1.2	0.5	0.7	0.9	<0.5	2	<0.5	<0.5	<0.5	0.8	2.1		1.3		1.6	1.8		
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4		0.7		0.8	<0.5	0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	1		0.8		1.1	1.4		
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2	<1	<0.5
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6		<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5		0.6	1.2		

Statistics

Number of Results	5	90	19	90	90	90	90	90	90	90	90	90	90	90	17	78	0	78	78	25	25
Number of Detects	1	17	1	19	12	13	14	2	18	0	1	9	11	19	5	13	0	78	78	0	0
Minimum Concentration	<1	<0.004	<0.5	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	<0.5		0.6	1.2	<0.5	<0.5
Maximum Concentration	1	4	<0.5	4.2	1.7	1.8	2.2	0.219	4.9	<0.5	<0.5	1.5	2.7	5.7	14.8	5		5.3	5.5	<1	<0.6

				Phenols																					
				2,4,6-trichlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2,6-dichlorophenol	2-chlorophenol	2-methylnaphthalene	2-methylphenol	2-nitrophenol	3-methylcholanthrene	4-chloro-3-methylphenol	Acetophenone	Pentachlorophenol	Phenol	1,1-dichloroethane	1,2,3-trichlorobenzene	1,2,3-trichloropropane	1,2-dibromoethane	1,3-dichlorobenzene	2-butanone (MEK)	2-hexanone (MBK)	4-methyl-2-pentanone (MIBK)	Bromodichloromethane
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	0.5	0.5	0.005	0.2	0.5	0.5	0.5	0.5	1	0.5	0.5	0.5	0.5	0.5	0.5	5	5	5	0.5
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)				72						7,200												7,200			
NSW EPA (2014) General Solid Waste TCLP1																									
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)				288						28,800												28,800			
NSW EPA (2014) Restricted Solid Waste TCLP2																									
Location Code	**Date**	**Field ID**	**Depth**																						
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7	<0.5						<0.5			<0.5		<2	<0.5						<5			
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45	<0.5						<0.5			<0.5		<2	<0.5						<5			
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95	<0.5						<0.5			<0.5		<2	<0.5						<5			
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6																						
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																						
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5					<0.5				
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5		<0.5		<2	<0.5									
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																						
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6																						
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																						
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																						
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																						
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5		<0.5		<2	<0.5									
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.044	<0.5	<0.5		<0.5		<2	<0.5									
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																						
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5		<0.5		<2	<0.5									
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5		<0.5		<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<5	<0.5
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																						
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0																						
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																						
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																						
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																						
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5		<0.5		<2	<0.5									
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.6	<0.6	<0.6	<0.6	<0.6	<0.005	<0.6	<0.6	<0.6	<0.6	<0.6	<1	<0.6					<0.6				
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																						
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																						
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																						
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																						
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																						
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																						
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5		<0.5		<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<5	<0.5
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1	<0.5						<0.5			<0.5		<2	<0.5						<5			
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																						
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																						
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																						
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																						
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																						
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																						
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.025	<0.5	<0.5		<0.5		<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<5	<0.5
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.025	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5					<0.5				
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																						
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																						
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																						
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7																						
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																						
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1	<0.5						<0.5			<0.5		<2	<0.5						<5			
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																						
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5																						
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																						
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																						
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																						
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																						
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5					<0.5				
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																						
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																						
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5		<0.5		<2	<0.5									
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																						
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																						
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																						
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																						

				Phenols																						
				2,4,6-trichlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2,6-dichlorophenol	2-chlorophenol	2-methylnaphthalene	2-methylphenol	2-nitrophenol	3-methylcholanthrene	4-chloro-3-methylphenol	Acetophenone	Pentachlorophenol	Phenol	1,1-dichloroethane	1,2,3-trichlorobenzene	1,2,3-trichloropropane	1,2-dibromoethane	1,3-dichlorobenzene	2-butanone (MEK)	2-hexanone (MBK)	4-methyl-2-pentanone (MIBK)	Bromodichloromethane
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																						
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5		<0.5		<2	<0.5									
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																						
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5		<0.5		<2	<0.5									
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																						
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																						
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																						
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5		<0.5		<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<5	<0.5
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																						
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																						
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5					<0.5				
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																						
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																						
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																						
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1	<0.5						<0.5			<0.5		<2	<0.5						<5			
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1	<0.5						<0.5			<0.5		<2	<0.5						<5			
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																						
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																						
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																						
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																						
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																						
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																						
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																						
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																						
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																						
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																						
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																						
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1	<0.5						<0.5			<0.5		<2	<0.5						<5			
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																						
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																						

Statistics

	2,4,6-trichlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2,6-dichlorophenol	2-chlorophenol	2-methylnaphthalene	2-methylphenol	2-nitrophenol	3-methylcholanthrene	4-chloro-3-methylphenol	Acetophenone	Pentachlorophenol	Phenol	1,1-dichloroethane	1,2,3-trichlorobenzene	1,2,3-trichloropropane	1,2-dibromoethane	1,3-dichlorobenzene	2-butanone (MEK)	2-hexanone (MBK)	4-methyl-2-pentanone (MIBK)	Bromodichloromethane
Number of Results	25	17	17	17	17	17	25	17	5	25	5	25	25	4	4	4	4	9	12	4	4	4
Number of Detects	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.5	<0.5	<0.5	<0.5	<0.5	<0.005	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<5	<0.5
Maximum Concentration	<0.6	<0.6	<0.6	<0.6	<0.6	0.044	<0.6	<0.6	<0.6	<0.6	<0.6	<2	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<5	<0.5

				VOCs																						
				Bromoform	Carbon disulfide	Chlorodibromomethane	Chloroethane	cis-1,3-dichloropropene	cis-1,4-Dichloro-2-butene	Dibromomethane	Iodomethane	n-butylbenzene	n-propylbenzene	Pentachloroethane	p-isopropyltoluene	sec-butylbenzene	Trichloroethene	tert-butylbenzene	Tetrachloroethene	trans-1,3-dichloropropene	trans-1,2-dichloroethene	trans-1,4-Dichloro-2-butene	Trichlorofluoromethane	Vinyl acetate	1-naphthylamine	2-(acetylamino)fluorene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	5	0.5	0.5
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)																	18		25.2							
NSW EPA (2014) General Solid Waste TCLP1																										
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)																	72		101							
NSW EPA (2014) Restricted Solid Waste TCLP2																										
Location Code	**Date**	**Field ID**	**Depth**																							
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7														<0.5		<0.5							
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45														<0.5		<0.5							
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95														<0.5		<0.5							
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6																							
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																							
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0																						<0.5	<0.5
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1																							
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																							
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6																							
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																							
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																							
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																							
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6																							
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5																							
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																							
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5																							
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5		
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																							
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0																							
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																							
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																							
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																							
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4																							
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0																						<0.6	<0.6
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																							
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																							
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																							
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																							
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																							
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																							
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5		
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1														<0.5		<0.5							
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																							
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																							
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																							
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																							
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																							
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																							
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5		
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5																						<0.5	<0.5
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																							
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																							
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																							
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7																							
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																							
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1														<0.5		<0.5							
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																							
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5																							
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																							
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																							
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																							
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																							
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5																						<0.5	<0.5
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																							
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																							
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2																							
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																							
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																							
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																							
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																							

				VOCs																						
				Bromoform	Carbon disulfide	Chlorodibromomethane	Chloroethane	cis-1,3-dichloropropene	cis-1,4-Dichloro-2-butene	Dibromomethane	Iodomethane	n-butylbenzene	n-propylbenzene	Pentachloroethane	p-isopropyltoluene	sec-butylbenzene	Trichloroethene	tert-butylbenzene	Tetrachloroethene	trans-1,3-dichloropropene	trans-1,2-dichloroethene	trans-1,4-Dichloro-2-butene	Trichlorofluoromethane	Vinyl acetate	1-naphthylamine	2-(acetylamino) fluorene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																							
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8																							
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																							
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5																							
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																							
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																							
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																							
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5		
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																							
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																							
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5																						<0.5	<0.5
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																							
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																							
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																							
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1														<0.5		<0.5							
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1														<0.5		<0.5							
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																							
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																							
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																							
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																							
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																							
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																							
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																							
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																							
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																							
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																							
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																							
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1														<0.5		<0.5							
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																							
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																							

Statistics

Statistics	Bromoform	Carbon disulfide	Chlorodibromomethane	Chloroethane	cis-1,3-dichloropropene	cis-1,4-Dichloro-2-butene	Dibromomethane	Iodomethane	n-butylbenzene	n-propylbenzene	Pentachloroethane	p-isopropyltoluene	sec-butylbenzene	Trichloroethene	tert-butylbenzene	Tetrachloroethene	trans-1,3-dichloropropene	trans-1,2-dichloroethene	trans-1,4-Dichloro-2-butene	Trichlorofluoromethane	Vinyl acetate	1-naphthylamine	2-(acetylamino) fluorene
Number of Results	4	4	4	4	4	4	4	4	4	4	4	4	4	12	4	12	4	4	4	4	4	5	5
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<0.5	<0.5
Maximum Concentration	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<5	<0.6	<0.6

Location Code	Date	Field ID	Depth	SVOCs 2-nitroaniline	3,3-Dichlorobenzidine	3-nitroaniline	4-(dimethylamino) azobenzene	4-bromophenyl phenyl ether	4-chloroaniline	4-chlorophenyl phenyl ether	4-nitroaniline	4-Nitroquinoline-N-oxide	5-nitro-o-toluidine	7,12-dimethylbenz(a)anthracene	Aniline	Azobenzene	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl)ether	Carbazole	Chlorobenzilate	Coronene	Hexachlorocyclopentadiene	Hexachloroethane	Hexachloropropene	Isophorone
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				1	0.5	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5	0.5	0.5	0.5	0.005	2.5	0.5	0.5	0.5
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)																									
NSW EPA (2014) General Solid Waste TCLP1																									
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)																									
NSW EPA (2014) Restricted Solid Waste TCLP2																									
Location Code	**Date**	**Field ID**	**Depth**																						
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7																						
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45																						
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95																						
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6																						
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																						
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.005	<2.5	<0.5	<0.5	<0.5
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1																		<0.005				
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																						
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6																						
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																						
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																						
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																						
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6																		<0.005				
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5																		0.375				
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																						
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5																		<0.005				
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4																		<0.005				
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																						
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0																						
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																						
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																						
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																						
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4																		<0.005				
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<1.0	<0.6	<1.0	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<1	<0.6	<0.6	<0.6	<0.6	<0.005	<2.5	<0.6	<0.6	<0.6
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																						
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																						
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																						
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																						
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																						
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																						
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9																		<0.005				
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1																						
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																						
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																						
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																						
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																						
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																						
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																						
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2																		0.256				
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	0.25	<2.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																						
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																						
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																						
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7																						
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																						
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1																						
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																						
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5																						
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																						
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																						
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																						
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																						
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.005	<2.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																						
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																						
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2																		<0.005				
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																						
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																						
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																						
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																						

				SVOCs																					
				2-nitroaniline	3,3-Dichlorobenzidine	3-nitroaniline	4-(dimethylamino) azobenzene	4-bromophenyl phenyl ether	4-chloroaniline	4-chlorophenyl phenyl ether	4-nitroaniline	4-Nitroquinoline-N-oxide	5-nitro-o-toluidine	7,12-dimethylbenz(a)anthracene	Aniline	Azobenzene	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl)ether	Carbazole	Chlorobenzilate	Coronene	Hexachlorocyclopentadiene	Hexachloroethane	Hexachloropropene	Isophorone
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																						
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8																		<0.005				
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																						
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5																		<0.005				
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																						
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																						
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																						
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7																		<0.005				
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																						
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																						
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	0.126	<2.5	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																						
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																						
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																						
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1																						
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1																						
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																						
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																						
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																						
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																						
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																						
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																						
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																						
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																						
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																						
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																						
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																						
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1																						
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																						
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																						

Statistics

Number of Results	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	17	5	5	5	5
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
Minimum Concentration	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.005	<2.5	<0.5	<0.5	<0.5
Maximum Concentration	<1.0	<0.6	<1.0	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<1	<0.6	<0.6	<0.6	<0.6	0.375	<2.5	<0.6	<0.6	<0.6

Location Code	Date	Field ID	Depth	Methapyrilene	N-nitrosodiethylamine	N-nitrosodi-n-butylamine	N-nitrosodi-n-propylamine	N-Nitrosomethylethylamine	N-nitrosomorpholine	N-nitrosopiperidine	N-nitrosopyrrolidine	Pentachlorobenzene	Perylene	Phenacetin	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	4,4'-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5	0.004	0.5	0.1	0.1	0.0005	0.0005	0.0005	0.05	0.0005	0.00025	0.00025
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)																							
NSW EPA (2014) General Solid Waste TCLP1																							
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)																							
NSW EPA (2014) Restricted Solid Waste TCLP2																							
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6																				
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																				
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.004	<0.5			<0.00050	<0.00050	<0.00050	<0.5	<0.00050	<0.00025	<0.00025
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																				
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6																				
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																				
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																				
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																				
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5										0.329				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																				
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																				
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0																				
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																				
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																				
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																				
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<1.0	<0.6	<0.005	<0.6			<0.00050	<0.00050	<0.00050	<0.5	<0.00050	<0.00025	<0.00025
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																				
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																				
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																				
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																				
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																				
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																				
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																				
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																				
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																				
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																				
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																				
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																				
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2										0.136				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	0.174	<0.5			<0.00050	<0.00050	<0.00050	<0.5	<0.00050	<0.00025	<0.00025
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																				
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																				
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																				
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7																				
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																				
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																				
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5																				
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																				
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																				
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																				
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																				
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.004	<0.5			<0.00050	<0.00050	<0.00050	<0.5	<0.00050	<0.00025	<0.00025
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																				
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																				
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																				
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																				
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																				
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																				

				Methapyrilene	N-nitrosodiethylamine	N-nitrosodi-n-butylamine	N-nitrosodi-n-propylamine	N-Nitrosomethylethylamine	N-nitrosomorpholine	N-nitrosopiperidine	N-nitrosopyrrolidine	Pentachlorobenzene	Perylene	Phenacetin	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	4,4'-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																				
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																				
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																				
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																				
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																				
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7										<0.004				<0.00050	<0.00050	<0.00050		<0.00050	<0.00025	<0.00025
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																				
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																				
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	0.055	<0.5			<0.00050	<0.00050	<0.00050	<0.5	<0.00050	<0.00025	<0.00025
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																				
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																				
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																				
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																				
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																				
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																				
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																				
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																				
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																				
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																				
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																				
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																				
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																				
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																				
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1														<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																				
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																				

Statistics

	Methapyrilene	N-nitrosodiethylamine	N-nitrosodi-n-butylamine	N-nitrosodi-n-propylamine	N-Nitrosomethylethylamine	N-nitrosomorpholine	N-nitrosopiperidine	N-nitrosopyrrolidine	Pentachlorobenzene	Perylene	Phenacetin	Organochlorine pesticides EPAVic	Other organochlorine pesticides EPAVic	4,4'-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)
Number of Results	5	5	5	5	5	5	5	5	5	17	5	0	0	25	25	25	5	25	25	25
Number of Detects	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<0.5	<0.004	<0.5			<0.0005	<0.0005	<0.0005	<0.5	<0.0005	<0.00025	<0.00025
Maximum Concentration	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<1.0	<0.6	0.329	<0.6			<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05

				Chlordane (trans)	d-BHC	4,4 DDD	4,4 DDT	DDT+DDE+DDD - Lab Calc	Dieldrin	Endosulfan	Endosulfan I (alpha)	Endosulfan II (beta)	Endosulfan Sulfate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide
				OC Pesticides															
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.00025	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.00025	0.0005	0.0005
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)										108									
NSW EPA (2014) General Solid Waste TCLP1																			
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)										432									
NSW EPA (2014) Restricted Solid Waste TCLP2																			
Location Code	**Date**	**Field ID**	**Depth**																
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7	<0.05	<0.05	<0.05	<0.2		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45	<0.05	<0.05	<0.05	<0.2		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95	<0.05	<0.05	<0.05	<0.2		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6																
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6																
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0																
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1	<0.05	<0.05	<0.05	<0.2		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7																
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1	<0.05	<0.05	<0.05	<0.2		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5																
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																

				OC Pesticides															
				Chlordane (trans)	d-BHC	4,4 DDD	4,4 DDT	DDT+DDE+DDD - Lab Calc	Dieldrin	Endosulfan	Endosulfan I (alpha)	Endosulfan II (beta)	Endosulfan Sulfate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.00025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00025	<0.00050	<0.00050
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1	<0.05	<0.05	<0.05	<0.2		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1	<0.05	<0.05	<0.05	<0.2		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1	<0.05	<0.05	<0.05	<0.2		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																

Statistics

Number of Results	25	25	25	25	17	25	17	25	25	25	25	25	17	25	25	25
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.00025	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00025	<0.0005	<0.0005
Maximum Concentration	<0.05	<0.05	<0.05	<0.2	<0.0005	<0.05	<0.0005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.0005	<0.05	<0.05	<0.05

Location Code	Date	Field ID	Depth	Hexachlorobenzene	Methoxychlor	Oxychlordane	Toxaphene	Tokuthion	Azinphos methyl	Bolstar (Sulprofos)	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos	Chlorfenvinphos E	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Demeton-S-methyl	Diazinon	cis-Chlorfenvinphos	Dichlorvos	Dimethoate
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.0005	0.0005	0.0005	1	0.2	0.01	0.2	0.01	0.01	0.2	0.01	0.01	0.01	2	0.2	0.2	0.01	0.01	0.01	0.01	0.01
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)															7.5									
NSW EPA (2014) General Solid Waste TCLP1																								
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)															30									
NSW EPA (2014) Restricted Solid Waste TCLP2																								
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7	<0.05											<0.05									
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45	<0.05											<0.05									
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95	<0.05											<0.05									
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6																					
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																					
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																					
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6																					
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																					
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																					
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																					
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																					
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																					
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0																					
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																					
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																					
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																					
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.6	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																					
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																					
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																					
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																					
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																					
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																					
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1	<0.05											<0.05									
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																					
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																					
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																					
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																					
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																					
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																					
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																					
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																					
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																					
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7																					
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																					
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1	<0.05											<0.05									
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																					
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5																					
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																					
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																					
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																					
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																					
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																					
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																					
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																					
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																					
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																					
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																					

				Hexachlorobenzene	Methoxychlor	Oxychlordane	Toxaphene	Tokuthion	Azinphos methyl	Bolstar (Sulprofos)	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos	Chlorfenvinphos E	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Demeton-S-methyl	Diazinon	cis-Chlorfenvinphos	Dichlorvos	Dimethoate
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																					
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																					
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																					
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																					
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																					
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01		<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																					
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																					
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.00050	<0.00050	<0.00050			<0.01		<0.01	<0.01	<0.5	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																					
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																					
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																					
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1	<0.05											<0.05									
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1	<0.05											<0.05									
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																					
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																					
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																					
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																					
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																					
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																					
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																					
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																					
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																					
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																					
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																					
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1	<0.05											<0.05									
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																					
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																					
Statistics																								
Number of Results				25	17	17	0	0	17	0	17	17	5	17	25	17	0	0	0	17	17	17	17	17
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<0.0005	<0.0005	<0.0005			<0.01		<0.01	<0.01	<0.5	<0.0100	<0.01	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01
Maximum Concentration				<0.05	<0.0005	<0.0005			<0.01		<0.01	<0.01	<0.5	<0.0100	<0.05	<0.01				<0.01	<0.01	<0.01	<0.01	<0.01

				OP Pesticides																						
				Disulfoton	EPN	Ethion	Ethoprop	Fenamiphos	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Parathion	Phorate	Pirimphos-ethyl	Pirimiphos-methyl	Prothiofos	Pyrazophos	Ronnel	Terbufos
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.2	0.2	0.01	0.2	0.01	0.2	0.2	0.01	0.01	0.2	0.01	0.2	0.01	0.2	2	0.01	0.2	0.01	0.2	0.01	0.2	0.2	0.2
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)																										
NSW EPA (2014) General Solid Waste TCLP1																										
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)																										
NSW EPA (2014) Restricted Solid Waste TCLP2																										
Location Code	**Date**	**Field ID**	**Depth**																							
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7																							
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45																							
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95																							
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6																							
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																							
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																							
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6																							
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																							
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																							
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																							
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																							
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																							
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0																							
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																							
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																							
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																							
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																							
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																							
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																							
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																							
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																							
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																							
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1																							
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																							
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																							
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																							
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																							
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																							
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																							
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																							
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																							
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																							
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7																							
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																							
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1																							
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																							
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5																							
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																							
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																							
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																							
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																							
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																							
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																							
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																							
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																							
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																							
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																							

Appendix C
Table C4
Analytical results - Waste classification TCLP

				OP Pesticides																						
				Disulfoton	EPN	Ethion	Ethoprop	Fenamiphos	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Parathion	Phorate	Pirimphos-ethyl	Pirimiphos-methyl	Prothiofos	Pyrazophos	Ronnel	Terbufos
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																							
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																							
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																							
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																							
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																							
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																							
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																							
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																							
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																							
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																							
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1																							
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1																							
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																							
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																							
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																							
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																							
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																							
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																							
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																							
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																							
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																							
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																							
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																							
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1																							
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																							
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																							

Statistics

Number of Results	0	0	17	0	17	0	0	17	17	0	17	0	17	0	0	17	0	17	0	17	0	0	0
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			
Maximum Concentration			<0.01		<0.01			<0.01	<0.01		<0.01		<0.01			<0.01		<0.01		<0.01			

						MAH				Halogenated		PCBs								Herbicides			
				Trichloronate	Tetrachlorvinphos	1,2,4-trimethylbenzene	Styrene	1,3,5-trimethylbenzene	Isopropylbenzene	Bromomethane	Dichlorodifluoromethane	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Total)	Pronamide	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.2	0.2	0.5	0.5	0.5	0.5	5	5	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.5	0.5	0.5	0.5
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)							108												50		360	1,080	46.8
NSW EPA (2014) General Solid Waste TCLP1																							
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)							432												50		1,440	4,320	187
NSW EPA (2014) Restricted Solid Waste TCLP2																							
Location Code	**Date**	**Field ID**	**Depth**																				
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7				<0.5												<0.1		<0.5	<0.5	<0.5
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45				<0.5												<0.1		<0.5	<0.5	<0.5
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95				<0.5												<0.1		<0.5	<0.5	<0.5
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6																				
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																				
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0									<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.5			
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1									<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050				
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																				
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6																				
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																				
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																				
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																				
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6									<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050				
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5									<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050				
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																				
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5									<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050				
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4			<0.5	<0.5	<0.5	<0.5	<5	<5	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.5	<0.5	<0.5
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																				
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0																				
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																				
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																				
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																				
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4									<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050				
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0									<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	<0.6			
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																				
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																				
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																				
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																<0.1				
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																				
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																				
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9			<0.5	<0.5	<0.5	<0.5	<5	<5	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1				<0.5												<0.1		<0.5	<0.5	<0.5
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																				
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																				
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																				
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																				
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																				
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																				
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2			<0.5	<0.5	<0.5	<0.5	<5	<5	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5									<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0677	<0.0050	0.0677	<0.5			
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																				
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																				
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																<0.1				
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7																				
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																				
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1				<0.5												<0.1		<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																<0.1				
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5																				
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																				
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																				
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																				
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																				
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5									<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.5			
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																				
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																				
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2									<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050				
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																				
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																<0.1				
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																				
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																				

						MAH				Halogenated		PCBs								Herbicides			
				Trichloronate	Tetrachlorvinphos	1,2,4-trimethylbenzene	Styrene	1,3,5-trimethylbenzene	Isopropylbenzene	Bromomethane	Dichlorodifluoromethane	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Total)	Pronamide	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																				
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8									<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050				
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																				
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5									<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050				
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																				
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																				
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																				
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7			<0.5	<0.5	<0.5	<0.5	<5	<5	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050		<0.5	<0.5	<0.5
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																				
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																				
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5									<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0346	<0.0050	0.0346	<0.5			
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																<0.1				
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																				
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																				
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1				<0.5												<0.1		<0.5	<0.5	<0.5
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1				<0.5												<0.1		<0.5	<0.5	<0.5
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																				
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																				
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																				
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																				
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																				
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																				
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																				
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																				
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																				
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																				
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																				
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1				<0.5												<0.1		<0.5	<0.5	<0.5
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																				
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																				

Statistics

Number of Results	0	0	4	12	4	4	4	4	17	17	17	17	17	17	17	30	5	12	12	12
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0
Minimum Concentration			<0.5	<0.5	<0.5	<0.5	<5	<5	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.5	<0.5	<0.5	<0.5
Maximum Concentration			<0.5	<0.5	<0.5	<0.5	<5	<5	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	0.0677	<0.0062	0.0677	<0.6	<0.5	<0.5	<0.5

				Chlorinated Hydrocarbons																						
				1,1,2-trichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,4-trichlorobenzene	1,2-dibromo-3-chloropropane	1,2-dichlorobenzene	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	1,4-dichlorobenzene	2,2-dichloropropane	2-chloronaphthalene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Carbon tetrachloride	Chlorobenzene	Chloroform	Chloromethane	cis-1,2-dichloroethene	Methylene chloride	Hexachlorobutadiene	Vinyl chloride
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	0.5	0.5	0.5	4
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)				43.2	25				155	18			270						18	3,600	216			310		7.2
NSW EPA (2014) General Solid Waste TCLP1																										
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)				173	100				620	72			1,080						72	14,400	864			1,240		28.8
NSW EPA (2014) Restricted Solid Waste TCLP2																										
Location Code	**Date**	**Field ID**	**Depth**																							
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7	<0.5	<0.5					<0.5									<0.5	<0.5	<0.5			<0.5		<4
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45	<0.5	<0.5					<0.5									<0.5	<0.5	<0.5			<0.5		<4
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95	<0.5	<0.5					<0.5									<0.5	<0.5	<0.5			<0.5		<4
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6																							
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2																							
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0				<0.5		<0.5				<0.5		<0.5										<0.5	
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1																							
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2																							
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6																							
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0																							
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2																							
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5																							
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6																							
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5																							
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2																							
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5																							
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5		<0.5	<5
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6																							
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0																							
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7																							
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2																							
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1																							
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4																							
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0				<0.6		<0.6				<0.6		<0.6										<0.6	
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6																							
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8																							
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0																							
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1																							
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7																							
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9																							
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5		<0.5	<5
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1	<0.5	<0.5					<0.5									<0.5	<0.5	<0.5			<0.5		<4
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5																							
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4																							
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6																							
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0																							
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8																							
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9																							
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5		<0.5	<5
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5				<0.5		<0.5				<0.5		<0.5										<0.5	
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4																							
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6																							
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0																							
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7																							
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2																							
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1	<0.5	<0.5					<0.5									<0.5	<0.5	<0.5			<0.5		<4
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4																							
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5																							
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6																							
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0																							
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8																							
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1																							
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5				<0.5		<0.5				<0.5		<0.5										<0.5	
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4																							
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6																							
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2																							
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5																							
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6																							
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0																							
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8																							

				Chlorinated Hydrocarbons																						
				1,1,2-trichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,4-trichlorobenzene	1,2-dibromo-3-chloropropane	1,2-dichlorobenzene	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	1,4-dichlorobenzene	2,2-dichloropropane	2-chloronaphthalene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Carbon tetrachloride	Chlorobenzene	Chloroform	Chloromethane	cis-1,2-dichloroethene	Methylene chloride	Hexachlorobutadiene	Vinyl chloride
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0																							
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8																							
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2																							
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5																							
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6																							
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2																							
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5																							
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5		<0.5	<5
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0																							
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2																							
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5				<0.5		<0.5				<0.5		<0.5										<0.5	
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4																							
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6																							
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9																							
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1	<0.5	<0.5					<0.5									<0.5	<0.5	<0.5			<0.5		<4
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1	<0.5	<0.5					<0.5									<0.5	<0.5	<0.5			<0.5		<4
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5																							
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4																							
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6																							
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0																							
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8																							
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1																							
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1																							
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5																							
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4																							
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0																							
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8																							
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1	<0.5	<0.5					<0.5									<0.5	<0.5	<0.5			<0.5		<4
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4																							
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6																							
Statistics																										
Number of Results				12	12	4	9	4	9	12	4	4	9	4	5	4	4	4	12	12	12	4	4	8	9	12
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<4
Maximum Concentration				<0.5	<0.5	<0.5	<0.6	<0.5	<0.6	<0.5	<0.5	<0.5	<0.6	<0.5	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.6	<5

				Explosives				Nitroaromatics			Nitrosoamines	Phthalates					
				1,3,5-Trinitrobenzene	2,4-Dinitrotoluene	2,6-dinitrotoluene	Nitrobenzene	2-Picoline	4-aminobiphenyl	Pentachloronitrobenzene	N-Nitrosodiphenyl & Diphenylamine	Bis(2-ethylhexyl) phthalate	Butyl benzyl phthalate	Diethylphthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	1	1	0.5	0.5	0.5	0.5	1	5	0.5	0.5	0.5	0.5	0.5
NSW EPA (2014) General Solid Waste SCC1 (with TCLP)					4.68		72										
NSW EPA (2014) General Solid Waste TCLP1																	
NSW EPA (2014) Restricted Solid Waste SCC2 (with TCLP)					18.7		288										
NSW EPA (2014) Restricted Solid Waste TCLP2																	
Location Code	**Date**	**Field ID**	**Depth**														
BH05	7/11/2019	BH05_4.6-4.7	4.6 - 4.7														
BH06	7/11/2019	BH06_1.2-1.45	1.2 - 1.45														
BH07	7/11/2019	BH07_2.5-2.95	2.5 - 2.95														
VC01	30/10/2019	vc01_0.4-0.6	0.4 - 0.6														
VC01	30/10/2019	VC01_0.0-0.2	0.0 - 0.2														
VC01	30/10/2019	VC01_0.5-1.0	0.5 - 1.0	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0	<5.0	<0.5	<0.5	<0.5	<0.5	<0.5
VC01	30/10/2019	VC01_1.0-1.1	1.0 - 1.1														
VC02	30/10/2019	VC02_0.0-0.2	0.0 - 0.2														
VC02	30/10/2019	VC02_0.5-0.6	0.5 - 0.6														
VC02	30/10/2019	VC02_0.5-1.0	0.5 - 1.0														
VC02	30/10/2019	VC02_1.0-1.2	1.0 - 1.2														
VC02	30/10/2019	VC02_1.0-1.5	1.0 - 1.5														
VC02	30/10/2019	VC02_1.5-1.6	1.5 - 1.6														
VC02	31/10/2019	VC02_0.0-0.5	0.0 - 0.5														
VC03	30/10/2019	VC03_0.0-0.2	0.0 - 0.2														
VC03	30/10/2019	VC03_0.0-0.5	0.0 - 0.5														
VC03	30/10/2019	VC03_0.3-0.4	0.3 - 0.4														
VC03	30/10/2019	VC03_0.4-0.6	0.4 - 0.6														
VC03	30/10/2019	VC03_0.5-1.0	0.5 - 1.0														
VC03	30/10/2019	VC03_0.6-0.7	0.6 - 0.7														
VC03	30/10/2019	VC03_1.0-1.2	1.0 - 1.2														
VC04	30/10/2019	VC04_0.0-0.1	0.0 - 0.1														
VC04	30/10/2019	VC04_0.3-0.4	0.3 - 0.4														
VC04	30/10/2019	VC04_0.5-1.0	0.5 - 1.0	<0.6	<1.0	<1.0	<0.6	<0.6	<0.6	<0.6	<1.2	<5.0	<0.6	<0.6	<0.6	<0.6	<0.6
VC04	31/10/2019	VC04_0.5-0.6	0.5 - 0.6														
VC04	31/10/2019	VC04_0.7-0.8	0.7 - 0.8														
VC04	31/10/2019	VC04_0.9-1.0	0.9 - 1.0														
VC05	30/10/2019	VC05_0.0-0.1	0.0 - 0.1														
VC05	30/10/2019	VC05_0.5-0.7	0.5 - 0.7														
VC05	30/10/2019	VC05_0.5-0.9	0.5 - 0.9														
VC05	30/10/2019	VC05_0.8-0.9	0.8 - 0.9														
VC06	31/10/2019	VC06_0.0-0.1	0.0 - 0.1														
VC06	31/10/2019	VC06_0.0-0.5	0.0 - 0.5														
VC06	31/10/2019	VC06_0.3-0.4	0.3 - 0.4														
VC06	31/10/2019	VC06_0.5-0.6	0.5 - 0.6														
VC06	31/10/2019	VC06_0.5-1.0	0.5 - 1.0														
VC06	31/10/2019	VC06_0.7-0.8	0.7 - 0.8														
VC06	31/10/2019	VC06_0.8-0.9	0.8 - 0.9														
VC07	30/10/2019	VC07_0.0-0.2	0.0 - 0.2														
VC07	30/10/2019	VC07_0.0-0.5	0.0 - 0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0	<5.0	<0.5	<0.5	<0.5	<0.5	<0.5
VC07	30/10/2019	VC07_0.2-0.4	0.2 - 0.4														
VC07	30/10/2019	VC07_0.5-0.6	0.5 - 0.6														
VC07	30/10/2019	VC07_0.5-1.0	0.5 - 1.0														
VC07	30/10/2019	VC07_0.7-0.8	0.7 - 0.7														
VC07	30/10/2019	VC07_1.0-1.2	1.0 - 1.2														
VC08	31/10/2019	VC08_0.0-0.1	0.0 - 0.1														
VC08	31/10/2019	VC08_0.3-0.4	0.3 - 0.4														
VC08	31/10/2019	VC08_0.0-0.5	0.0-0.5														
VC08	31/10/2019	VC08_0.5-0.6	0.5 - 0.6														
VC08	31/10/2019	VC08_0.5-1.0	0.5 - 1.0														
VC08	31/10/2019	VC08_0.7-0.8	0.7 - 0.8														
VC08	31/10/2019	VC08_1.0-1.1	1.0 - 1.1														
VC08	31/10/2019	VC08_1.0-1.5	1.0 - 1.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0	<5.0	<0.5	<0.5	<0.5	<0.5	<0.5
VC08	31/10/2019	VC08_1.3-1.4	1.3 - 1.4														
VC08	31/10/2019	VC08_1.5-1.6	1.5 - 1.6														
VC09	30/10/2019	VC09_0.0-0.2	0.0 - 0.2														
VC09	30/10/2019	VC09_0.0-0.5	0.0 - 0.5														
VC09	30/10/2019	VC09_0.4-0.6	0.4 - 0.6														
VC09	30/10/2019	VC09_0.5-1.0	0.5 - 1.0														
VC09	30/10/2019	VC09_0.7-0.8	0.7 - 0.8														

				Explosives				Nitroaromatics			Nitrosoamines	Phthalates					
				1,3,5-Trinitrobenzene	2,4-Dinitrotoluene	2,6-dinitrotoluene	Nitrobenzene	2-Picoline	4-aminobiphenyl	Pentachloronitrobenzene	N-Nitrosodiphenyl & Diphenylamine	Bis(2-ethylhexyl) phthalate	Butyl benzyl phthalate	Diethylphthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VC09	30/10/2019	VC09_0.8-1.0	0.8 - 1.0														
VC10	30/10/2019	VC10_0.7-0.8	0.7 - 0.8														
VC10	31/10/2019	VC10_0.0-0.2	0.0 - 0.2														
VC10	31/10/2019	VC10_0.0-0.5	0.0 - 0.5														
VC10	31/10/2019	VC10_0.5-0.6	0.5 - 0.6														
VC11	30/10/2019	VC11_0.0-0.2	0.0 - 0.2														
VC11	30/10/2019	VC11_0.0-0.5	0.0 - 0.5														
VC11	30/10/2019	VC11_0.5-0.7	0.5 - 0.7														
VC11	30/10/2019	VC11_0.5-1.0	0.5 - 1.0														
VC11	30/10/2019	VC11_1.0-1.2	1.0 - 1.2														
VC12	31/10/2019	VC12_0.0-0.5	0.0 - 0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0	<5.0	<0.5	<0.5	<0.5	<0.5	<0.5
VC12	31/10/2019	VC12_0.3-0.4	0.3 - 0.4														
VC12	31/10/2019	VC12_0.5-0.6	0.5 - 0.6														
VC12	31/10/2019	VC12_0.8-0.9	0.8 - 0.9														
VC12	31/10/2019	VC12_1.0-1.1	1.0 - 1.1														
VC13	31/10/2019	VC13_0.0-0.1	0.0 - 0.1														
VC13	31/10/2019	VC13_0.0-0.5	0.0 - 0.5														
VC13	31/10/2019	VC13_0.3-0.4	0.3 - 0.4														
VC13	31/10/2019	VC13_0.5-0.6	0.5 - 0.6														
VC13	31/10/2019	VC13_0.5-1.0	0.5 - 1.0														
VC13	31/10/2019	VC13_0.7-0.8	0.7 - 0.8														
VC13	31/10/2019	VC13_1.0-1.1	1.0 - 1.1														
VC14	31/10/2019	VC14_0.0-0.1	0.0 - 0.1														
VC14	31/10/2019	VC14_0.0-0.5	0.0 - 0.5														
VC14	31/10/2019	VC14_0.3-0.4	0.3 - 0.4														
VC14	31/10/2019	VC14_0.5-1.0	0.5 - 1.0														
VC14	31/10/2019	VC14_0.7-0.8	0.7 - 0.8														
VC14	31/10/2019	VC14_1.0-1.1	1.0 - 1.1														
VC14	31/10/2019	VC14_1.3-1.4	1.3 - 1.4														
VC14	31/10/2019	VC14-0.5-0.6	0.5 - 0.6														

Statistics

Number of Results	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.5	<1	<1	<0.5	<0.5	<0.5	<0.5	<1.0	<5.0	<0.5	<0.5	<0.5	<0.5	<0.5
Maximum Concentration	<0.6	<1	<1	<0.6	<0.6	<0.6	<0.6	<1.0	<5.0	<0.6	<0.6	<0.6	<0.6	<0.6

Appendix D - Pro UCL outputs

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.118/12/2019 5:43:05 PM
From File	waste class_rev c_b.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Benzo(a) pyrene

General Statistics

Total Number of Observations	95	Number of Distinct Observations	20
Number of Detects	20	Number of Non-Detects	75
Number of Distinct Detects	18	Number of Distinct Non-Detects	3
Minimum Detect	0.004	Minimum Non-Detect	0.004
Maximum Detect	4	Maximum Non-Detect	0.5
Variance Detects	0.986	Percent Non-Detects	78.95%
Mean Detects	1.113	SD Detects	0.993
Median Detects	0.886	CV Detects	0.893
Skewness Detects	1.59	Kurtosis Detects	3
Mean of Logged Detects	-0.67	SD of Logged Detects	1.898

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.852	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.205	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.192	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.25	KM Standard Error of Mean	0.0678
KM SD	0.631	95% KM (BCA) UCL	0.367
95% KM (t) UCL	0.363	95% KM (Percentile Bootstrap) UCL	0.362
95% KM (z) UCL	0.362	95% KM Bootstrap t UCL	0.402
90% KM Chebyshev UCL	0.454	95% KM Chebyshev UCL	0.546
97.5% KM Chebyshev UCL	0.674	99% KM Chebyshev UCL	0.925

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.144	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.779	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.263	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.201	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.769	k star (bias corrected MLE)	0.687
Theta hat (MLE)	1.448	Theta star (bias corrected MLE)	1.62
nu hat (MLE)	30.74	nu star (bias corrected)	27.46
Mean (detects)	1.113		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.004	Mean	0.255
Maximum	4	Median	0.01
SD	0.633	CV	2.482
k hat (MLE)	0.309	k star (bias corrected MLE)	0.306
Theta hat (MLE)	0.825	Theta star (bias corrected MLE)	0.833
nu hat (MLE)	58.71	nu star (bias corrected)	58.19
Adjusted Level of Significance (β)	0.0475		
Approximate Chi Square Value (58.19, α)	41.65	Adjusted Chi Square Value (58.19, β)	41.44
95% Gamma Approximate UCL (use when n>=50)	0.356	95% Gamma Adjusted UCL (use when n<50)	0.358

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.25	SD (KM)	0.631
Variance (KM)	0.398	SE of Mean (KM)	0.0678
k hat (KM)	0.157	k star (KM)	0.159
nu hat (KM)	29.9	nu star (KM)	30.29
theta hat (KM)	1.591	theta star (KM)	1.571
80% gamma percentile (KM)	0.286	90% gamma percentile (KM)	0.748
95% gamma percentile (KM)	1.361	99% gamma percentile (KM)	3.119

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (30.29, α)	18.72	Adjusted Chi Square Value (30.29, β)	18.58
95% Gamma Approximate KM-UCL (use when n>=50)	0.405	95% Gamma Adjusted KM-UCL (use when n<50)	0.408

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.744	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.333	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.192	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.248	Mean in Log Scale	-4.813
SD in Original Scale	0.634	SD in Log Scale	3.132
95% t UCL (assumes normality of ROS data)	0.356	95% Percentile Bootstrap UCL	0.362
95% BCA Bootstrap UCL	0.39	95% Bootstrap t UCL	0.4
95% H-UCL (Log ROS)	5.379		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.195	KM Geo Mean	0.0151
KM SD (logged)	2.206	95% Critical H Value (KM-Log)	3.67
KM Standard Error of Mean (logged)	0.324	95% H-UCL (KM -Log)	0.396
KM SD (logged)	2.206	95% Critical H Value (KM-Log)	3.67
KM Standard Error of Mean (logged)	0.324		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.405	Mean in Log Scale	-1.741
SD in Original Scale	0.583	SD in Log Scale	1.78
95% t UCL (Assumes normality)	0.505	95% H-Stat UCL	1.517

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

	A	B	C	D	E	F	G	H	I	J	K	L
111												
112	**Suggested UCL to Use**											
113				95% KM (Chebyshev) UCL		0.546						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

Lead

General Statistics

Total Number of Observations	91	Number of Distinct Observations	52
Number of Detects	78	Number of Non-Detects	13
Number of Distinct Detects	52	Number of Distinct Non-Detects	1
Minimum Detect	1.1	Minimum Non-Detect	5
Maximum Detect	318	Maximum Non-Detect	5
Variance Detects	3981	Percent Non-Detects	14.29%
Mean Detects	41.67	SD Detects	63.1
Median Detects	13.75	CV Detects	1.514
Skewness Detects	2.403	Kurtosis Detects	5.8
Mean of Logged Detects	2.878	SD of Logged Detects	1.283

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.642	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.282	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.1	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	36.11	KM Standard Error of Mean	6.291
KM SD	59.62	95% KM (BCA) UCL	47.84
95% KM (t) UCL	46.57	95% KM (Percentile Bootstrap) UCL	47.33
95% KM (z) UCL	46.46	95% KM Bootstrap t UCL	48.94
90% KM Chebyshev UCL	54.98	95% KM Chebyshev UCL	63.53
97.5% KM Chebyshev UCL	75.4	99% KM Chebyshev UCL	98.7

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	3.879	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.797	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.183	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.105	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.708	k star (bias corrected MLE)	0.689
Theta hat (MLE)	58.83	Theta star (bias corrected MLE)	60.43
nu hat (MLE)	110.5	nu star (bias corrected)	107.6
Mean (detects)	41.67		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	35.71
Maximum	318	Median	10.6
SD	60.17	CV	1.685
k hat (MLE)	0.376	k star (bias corrected MLE)	0.371
Theta hat (MLE)	94.95	Theta star (bias corrected MLE)	96.25
nu hat (MLE)	68.46	nu star (bias corrected)	67.54

Adjusted Level of Significance (β)	0.0474		
Approximate Chi Square Value (67.54, α)	49.62	Adjusted Chi Square Value (67.54, β)	49.38
95% Gamma Approximate UCL (use when n>=50)	48.61	95% Gamma Adjusted UCL (use when n<50)	48.85
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	36.11	SD (KM)	59.62
Variance (KM)	3554	SE of Mean (KM)	6.291
k hat (KM)	0.367	k star (KM)	0.362
nu hat (KM)	66.77	nu star (KM)	65.91
theta hat (KM)	98.42	theta star (KM)	99.72
80% gamma percentile (KM)	57.5	90% gamma percentile (KM)	103.7
95% gamma percentile (KM)	155.2	99% gamma percentile (KM)	286.2
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (65.91, α)	48.23	Adjusted Chi Square Value (65.91, β)	47.98
95% Gamma Approximate KM-UCL (use when n>=50)	49.35	95% Gamma Adjusted KM-UCL (use when n<50)	49.6
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Approximate Test Statistic	0.944	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.00401	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.12	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.1	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	35.99	Mean in Log Scale	2.54
SD in Original Scale	60.01	SD in Log Scale	1.466
95% t UCL (assumes normality of ROS data)	46.44	95% Percentile Bootstrap UCL	46.75
95% BCA Bootstrap UCL	48.16	95% Bootstrap t UCL	48.89
95% H-UCL (Log ROS)	56.71		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	2.589	KM Geo Mean	13.32
KM SD (logged)	1.393	95% Critical H Value (KM-Log)	2.658
KM Standard Error of Mean (logged)	0.153	95% H-UCL (KM -Log)	51.96
KM SD (logged)	1.393	95% Critical H Value (KM-Log)	2.658
KM Standard Error of Mean (logged)	0.153		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	36.07	Mean in Log Scale	2.597
SD in Original Scale	59.97	SD in Log Scale	1.373
95% t UCL (Assumes normality)	46.52	95% H-Stat UCL	50.47
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	63.53		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

Mercury

General Statistics

Total Number of Observations	38	Number of Distinct Observations	21
		Number of Missing Observations	2
Number of Detects	22	Number of Non-Detects	16
Number of Distinct Detects	21	Number of Distinct Non-Detects	2
Minimum Detect	0.01	Minimum Non-Detect	0.01
Maximum Detect	4.25	Maximum Non-Detect	0.1
Variance Detects	1.418	Percent Non-Detects	42.11%
Mean Detects	1.055	SD Detects	1.191
Median Detects	0.75	CV Detects	1.128
Skewness Detects	1.318	Kurtosis Detects	1.246
Mean of Logged Detects	-1.007	SD of Logged Detects	1.859

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.835	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.911	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.2	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.184	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.618	KM Standard Error of Mean	0.17
KM SD	1.023	95% KM (BCA) UCL	0.909
95% KM (t) UCL	0.904	95% KM (Percentile Bootstrap) UCL	0.903
95% KM (z) UCL	0.897	95% KM Bootstrap t UCL	1.022
90% KM Chebyshev UCL	1.128	95% KM Chebyshev UCL	1.358
97.5% KM Chebyshev UCL	1.679	99% KM Chebyshev UCL	2.308

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.488	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.797	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.139	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.195	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.585	k star (bias corrected MLE)	0.535
Theta hat (MLE)	1.805	Theta star (bias corrected MLE)	1.972
nu hat (MLE)	25.73	nu star (bias corrected)	23.55
Mean (detects)	1.055		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.617
Maximum	4.25	Median	0.045
SD	1.037	CV	1.68
k hat (MLE)	0.341	k star (bias corrected MLE)	0.331
Theta hat (MLE)	1.811	Theta star (bias corrected MLE)	1.863

nu hat (MLE)	25.9	nu star (bias corrected)	25.19
Adjusted Level of Significance (β)	0.0434		
Approximate Chi Square Value (25.19, α)	14.76	Adjusted Chi Square Value (25.19, β)	14.43
95% Gamma Approximate UCL (use when n>=50)	1.054	95% Gamma Adjusted UCL (use when n<50)	1.078

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.618	SD (KM)	1.023
Variance (KM)	1.047	SE of Mean (KM)	0.17
k hat (KM)	0.365	k star (KM)	0.353
nu hat (KM)	27.71	nu star (KM)	26.85
theta hat (KM)	1.695	theta star (KM)	1.749
80% gamma percentile (KM)	0.98	90% gamma percentile (KM)	1.781
95% gamma percentile (KM)	2.678	99% gamma percentile (KM)	4.963

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (26.85, α)	16.04	Adjusted Chi Square Value (26.85, β)	15.69
95% Gamma Approximate KM-UCL (use when n>=50)	1.034	95% Gamma Adjusted KM-UCL (use when n<50)	1.057

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.911	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.196	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.184	Detected Data Not Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.618	Mean in Log Scale	-2.681
SD in Original Scale	1.037	SD in Log Scale	2.6
95% t UCL (assumes normality of ROS data)	0.902	95% Percentile Bootstrap UCL	0.911
95% BCA Bootstrap UCL	0.974	95% Bootstrap t UCL	0.999
95% H-UCL (Log ROS)	14.7		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.405	KM Geo Mean	0.0902
KM SD (logged)	2.174	95% Critical H Value (KM-Log)	4.005
KM Standard Error of Mean (logged)	0.368	95% H-UCL (KM -Log)	4.014
KM SD (logged)	2.174	95% Critical H Value (KM-Log)	4.005
KM Standard Error of Mean (logged)	0.368		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.624	Mean in Log Scale	-2.268
SD in Original Scale	1.033	SD in Log Scale	2.185
95% t UCL (Assumes normality)	0.907	95% H-Stat UCL	4.77

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	1.057

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

	A	B	C	D	E	F	G	H	I	J	K	L
339	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
340												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.118/12/2019 5:17:54 AM
From File	NAGD_revC_g.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Copper

General Statistics

Total Number of Observations	8	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	4.5	Minimum Non-Detect	1
Maximum Detect	189	Maximum Non-Detect	1
Variance Detects	8690	Percent Non-Detects	62.5%
Mean Detects	104.5	SD Detects	93.22
Median Detects	120	CV Detects	0.892
Skewness Detects	-0.728	Kurtosis Detects	N/A
Mean of Logged Detects	3.844	SD of Logged Detects	2.039

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.233	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	39.81	KM Standard Error of Mean	29.63
KM SD	68.43	95% KM (BCA) UCL	N/A
95% KM (t) UCL	95.95	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	88.55	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	128.7	95% KM Chebyshev UCL	169
97.5% KM Chebyshev UCL	224.9	99% KM Chebyshev UCL	334.7

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	0.745	k star (bias corrected MLE)	N/A
Theta hat (MLE)	140.3	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	4.468	nu star (bias corrected)	N/A
Mean (detects)	104.5		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	39.19
Maximum	189	Median	0.01
SD	73.54	CV	1.876
k hat (MLE)	0.15	k star (bias corrected MLE)	0.177
Theta hat (MLE)	260.5	Theta star (bias corrected MLE)	221
nu hat (MLE)	2.408	nu star (bias corrected)	2.838
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (2.84, α)	0.326	Adjusted Chi Square Value (2.84, β)	0.187
95% Gamma Approximate UCL (use when n>=50)	341.1	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	39.81	SD (KM)	68.43
Variance (KM)	4683	SE of Mean (KM)	29.63
k hat (KM)	0.338	k star (KM)	0.295
nu hat (KM)	5.415	nu star (KM)	4.718
theta hat (KM)	117.6	theta star (KM)	135
80% gamma percentile (KM)	60.79	90% gamma percentile (KM)	117.7
95% gamma percentile (KM)	183.1	99% gamma percentile (KM)	353.7

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (4.72, α)	1.024	Adjusted Chi Square Value (4.72, β)	0.659
95% Gamma Approximate KM-UCL (use when n>=50)	183.4	95% Gamma Adjusted KM-UCL (use when n<50)	284.8

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.345	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	39.31	Mean in Log Scale	-0.572
SD in Original Scale	73.47	SD in Log Scale	4.246
95% t UCL (assumes normality of ROS data)	88.52	95% Percentile Bootstrap UCL	78.47
95% BCA Bootstrap UCL	94.62	95% Bootstrap t UCL	1867
95% H-UCL (Log ROS)	2.989E+12		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.442	KM Geo Mean	4.228
KM SD (logged)	2.122	95% Critical H Value (KM-Log)	6.481
KM Standard Error of Mean (logged)	0.919	95% H-UCL (KM -Log)	7277
KM SD (logged)	2.122	95% Critical H Value (KM-Log)	6.481
KM Standard Error of Mean (logged)	0.919		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	39.5	Mean in Log Scale	1.008
SD in Original Scale	73.35	SD in Log Scale	2.589

	A	B	C	D	E	F	G	H	I	J	K	L
111	95% t UCL (Assumes normality)					88.63	95% H-Stat UCL					164711
112	DL/2 is not a recommended method, provided for comparisons and historical reasons											
113												
114	Nonparametric Distribution Free UCL Statistics											
115	Detected Data appear Normal Distributed at 5% Significance Level											
116												
117	Suggested UCL to Use											
118	95% KM (t) UCL					95.95						
119												
120	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
121	Recommendations are based upon data size, data distribution, and skewness.											
122	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
123	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
124												

Lead

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	1.4	Mean	62.21
Maximum	318	Median	12.6
SD	109.4	Std. Error of Mean	38.68
Coefficient of Variation	1.758	Skewness	2.324

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

Shapiro Wilk Test Statistic	0.633	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.353	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.283	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	135.5	95% Adjusted-CLT UCL (Chen-1995)	159.8
		95% Modified-t UCL (Johnson-1978)	140.8

Gamma GOF Test

A-D Test Statistic	0.494	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.765	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.245	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.31	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.483	k star (bias corrected MLE)	0.385
Theta hat (MLE)	128.8	Theta star (bias corrected MLE)	161.5
nu hat (MLE)	7.73	nu star (bias corrected)	6.165
MLE Mean (bias corrected)	62.21	MLE Sd (bias corrected)	100.2
		Approximate Chi Square Value (0.05)	1.725
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	1.198

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	222.4	95% Adjusted Gamma UCL (use when n<50)	320.2

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.154	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.283	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.336	Mean of logged Data	2.809

	A	B	C	D	E	F	G	H	I	J	K	L
180	Maximum of Logged Data					5.762	SD of logged Data					1.783
181												
182	Assuming Lognormal Distribution											
183	95% H-UCL					3370	90% Chebyshev (MVUE) UCL					162
184	95% Chebyshev (MVUE) UCL					209.8	97.5% Chebyshev (MVUE) UCL					276
185	99% Chebyshev (MVUE) UCL					406.1						
186												
187	Nonparametric Distribution Free UCL Statistics											
188	Data appear to follow a Discernible Distribution at 5% Significance Level											
189												
190	Nonparametric Distribution Free UCLs											
191	95% CLT UCL					125.8	95% Jackknife UCL					135.5
192	95% Standard Bootstrap UCL					122.4	95% Bootstrap-t UCL					600.5
193	95% Hall's Bootstrap UCL					490.8	95% Percentile Bootstrap UCL					127
194	95% BCA Bootstrap UCL					165.7						
195	90% Chebyshev(Mean, Sd) UCL					178.2	95% Chebyshev(Mean, Sd) UCL					230.8
196	97.5% Chebyshev(Mean, Sd) UCL					303.7	99% Chebyshev(Mean, Sd) UCL					447
197												
198	Suggested UCL to Use											
199	95% Adjusted Gamma UCL					320.2						
200												
201	Recommended UCL exceeds the maximum observation											
202												
203	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
204	Recommendations are based upon data size, data distribution, and skewness.											
205	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
206	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

Mercury

General Statistics

Total Number of Observations	8	Number of Distinct Observations	5
Number of Detects	5	Number of Non-Detects	3
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.05	Minimum Non-Detect	0.01
Maximum Detect	4.25	Maximum Non-Detect	0.01
Variance Detects	3.32	Percent Non-Detects	37.5%
Mean Detects	1.216	SD Detects	1.822
Median Detects	0.12	CV Detects	1.498
Skewness Detects	1.619	Kurtosis Detects	2.194
Mean of Logged Detects	-1.238	SD of Logged Detects	2.068

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.326	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.764	KM Standard Error of Mean	0.559
KM SD	1.415	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.823	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.683	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	2.441	95% KM Chebyshev UCL	3.201
97.5% KM Chebyshev UCL	4.256	99% KM Chebyshev UCL	6.327

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.523	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.718	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.326	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.374	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.45	k star (bias corrected MLE)	0.314
Theta hat (MLE)	2.699	Theta star (bias corrected MLE)	3.879
nu hat (MLE)	4.505	nu star (bias corrected)	3.135
Mean (detects)	1.216		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.764

Maximum	4.25	Median	0.05
SD	1.512	CV	1.98
k hat (MLE)	0.308	k star (bias corrected MLE)	0.276
Theta hat (MLE)	2.481	Theta star (bias corrected MLE)	2.77
nu hat (MLE)	4.925	nu star (bias corrected)	4.411
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (4.41, α)	0.891	Adjusted Chi Square Value (4.41, β)	0.562
95% Gamma Approximate UCL (use when n>=50)	3.783	95% Gamma Adjusted UCL (use when n<50)	5.996
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.764	SD (KM)	1.415
Variance (KM)	2.001	SE of Mean (KM)	0.559
k hat (KM)	0.292	k star (KM)	0.266
nu hat (KM)	4.664	nu star (KM)	4.248
theta hat (KM)	2.62	theta star (KM)	2.876
80% gamma percentile (KM)	1.132	90% gamma percentile (KM)	2.281
95% gamma percentile (KM)	3.63	99% gamma percentile (KM)	7.191
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (4.25, α)	0.822	Adjusted Chi Square Value (4.25, β)	0.513
95% Gamma Approximate KM-UCL (use when n>=50)	3.946	95% Gamma Adjusted KM-UCL (use when n<50)	6.327
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.265	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.761	Mean in Log Scale	-3.368
SD in Original Scale	1.514	SD in Log Scale	3.417
95% t UCL (assumes normality of ROS data)	1.775	95% Percentile Bootstrap UCL	1.673
95% BCA Bootstrap UCL	2.147	95% Bootstrap t UCL	26.39
95% H-UCL (Log ROS)	6348866		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.501	KM Geo Mean	0.082
KM SD (logged)	2.19	95% Critical H Value (KM-Log)	6.674
KM Standard Error of Mean (logged)	0.866	95% H-UCL (KM -Log)	226.3
KM SD (logged)	2.19	95% Critical H Value (KM-Log)	6.674
KM Standard Error of Mean (logged)	0.866		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.762	Mean in Log Scale	-2.76
SD in Original Scale	1.513	SD in Log Scale	2.619
95% t UCL (Assumes normality)	1.776	95% H-Stat UCL	4894
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	1.823		

	A–L
317	
318	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
319	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL
320	
321	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
322	Recommendations are based upon data size, data distribution, and skewness.
323	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
324	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Silver

General Statistics

Total Number of Observations	8	Number of Distinct Observations	5
Number of Detects	5	Number of Non-Detects	3
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.2	Minimum Non-Detect	0.1
Maximum Detect	3	Maximum Non-Detect	0.1
Variance Detects	1.503	Percent Non-Detects	37.5%
Mean Detects	1.04	SD Detects	1.226
Median Detects	0.3	CV Detects	1.179
Skewness Detects	1.365	Kurtosis Detects	0.908
Mean of Logged Detects	-0.584	SD of Logged Detects	1.255

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.787	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.327	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.688	KM Standard Error of Mean	0.387
KM SD	0.979	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.421	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.324	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.849	95% KM Chebyshev UCL	2.374
97.5% KM Chebyshev UCL	3.104	99% KM Chebyshev UCL	4.538

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.555	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.693	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.334	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.365	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.934	k star (bias corrected MLE)	0.507
Theta hat (MLE)	1.113	Theta star (bias corrected MLE)	2.051
nu hat (MLE)	9.341	nu star (bias corrected)	5.07
Mean (detects)	1.04		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.654

Maximum	3	Median	0.2
SD	1.069	CV	1.635
k hat (MLE)	0.396	k star (bias corrected MLE)	0.331
Theta hat (MLE)	1.653	Theta star (bias corrected MLE)	1.978
nu hat (MLE)	6.328	nu star (bias corrected)	5.289
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (5.29, α)	1.288	Adjusted Chi Square Value (5.29, β)	0.858
95% Gamma Approximate UCL (use when n>=50)	2.685	95% Gamma Adjusted UCL (use when n<50)	4.031
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.688	SD (KM)	0.979
Variance (KM)	0.959	SE of Mean (KM)	0.387
k hat (KM)	0.493	k star (KM)	0.392
nu hat (KM)	7.889	nu star (KM)	6.264
theta hat (KM)	1.394	theta star (KM)	1.756
80% gamma percentile (KM)	1.107	90% gamma percentile (KM)	1.949
95% gamma percentile (KM)	2.878	99% gamma percentile (KM)	5.218
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (6.26, α)	1.776	Adjusted Chi Square Value (6.26, β)	1.239
95% Gamma Approximate KM-UCL (use when n>=50)	2.424	95% Gamma Adjusted KM-UCL (use when n<50)	3.477
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.83	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.289	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.658	Mean in Log Scale	-1.872
SD in Original Scale	1.066	SD in Log Scale	2.067
95% t UCL (assumes normality of ROS data)	1.372	95% Percentile Bootstrap UCL	1.255
95% BCA Bootstrap UCL	1.555	95% Bootstrap t UCL	5.759
95% H-UCL (Log ROS)	182.6		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.228	KM Geo Mean	0.293
KM SD (logged)	1.216	95% Critical H Value (KM-Log)	3.979
KM Standard Error of Mean (logged)	0.481	95% H-UCL (KM -Log)	3.822
KM SD (logged)	1.216	95% Critical H Value (KM-Log)	3.979
KM Standard Error of Mean (logged)	0.481		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.669	Mean in Log Scale	-1.488
SD in Original Scale	1.059	SD in Log Scale	1.568
95% t UCL (Assumes normality)	1.378	95% H-Stat UCL	14.3
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	1.421		

	A	B	C	D	E	F	G	H	I	J	K	L
435												
436	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
437	Recommendations are based upon data size, data distribution, and skewness.											
438	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
439	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

Zinc

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	7	Number of Non-Detects	1
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	2.1	Minimum Non-Detect	1
Maximum Detect	445	Maximum Non-Detect	1
Variance Detects	27445	Percent Non-Detects	12.5%
Mean Detects	91.67	SD Detects	165.7
Median Detects	14.4	CV Detects	1.807
Skewness Detects	2.124	Kurtosis Detects	4.427
Mean of Logged Detects	2.769	SD of Logged Detects	2.113

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.642	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.389	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.304	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	80.34	KM Standard Error of Mean	55.97
KM SD	146.6	95% KM (BCA) UCL	172.9
95% KM (t) UCL	186.4	95% KM (Percentile Bootstrap) UCL	171.7
95% KM (z) UCL	172.4	95% KM Bootstrap t UCL	1798
90% KM Chebyshev UCL	248.3	95% KM Chebyshev UCL	324.3
97.5% KM Chebyshev UCL	429.9	99% KM Chebyshev UCL	637.3

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.641	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.771	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.314	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.379	k star (bias corrected MLE)	0.312
Theta hat (MLE)	241.6	Theta star (bias corrected MLE)	293.8
nu hat (MLE)	5.311	nu star (bias corrected)	4.368
Mean (detects)	91.67		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	80.21

Maximum	445	Median	8.8
SD	156.8	CV	1.954
k hat (MLE)	0.276	k star (bias corrected MLE)	0.256
Theta hat (MLE)	291.1	Theta star (bias corrected MLE)	313.9
nu hat (MLE)	4.408	nu star (bias corrected)	4.089
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (4.09, α)	0.757	Adjusted Chi Square Value (4.09, β)	0.467
95% Gamma Approximate UCL (use when n>=50)	433.2	95% Gamma Adjusted UCL (use when n<50)	702.7

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	80.34	SD (KM)	146.6
Variance (KM)	21483	SE of Mean (KM)	55.97
k hat (KM)	0.3	k star (KM)	0.271
nu hat (KM)	4.807	nu star (KM)	4.338
theta hat (KM)	267.4	theta star (KM)	296.3
80% gamma percentile (KM)	119.8	90% gamma percentile (KM)	239.5
95% gamma percentile (KM)	379.4	99% gamma percentile (KM)	747.7

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (4.34, α)	0.859	Adjusted Chi Square Value (4.34, β)	0.539
95% Gamma Approximate KM-UCL (use when n>=50)	405.5	95% Gamma Adjusted KM-UCL (use when n<50)	646

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.879	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.205	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.304	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	80.22	Mean in Log Scale	2.121
SD in Original Scale	156.8	SD in Log Scale	2.681
95% t UCL (assumes normality of ROS data)	185.2	95% Percentile Bootstrap UCL	175.6
95% BCA Bootstrap UCL	226.4	95% Bootstrap t UCL	1772
95% H-UCL (Log ROS)	1096022		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.423	KM Geo Mean	11.28
KM SD (logged)	2.046	95% Critical H Value (KM-Log)	6.266
KM Standard Error of Mean (logged)	0.781	95% H-UCL (KM -Log)	11647
KM SD (logged)	2.046	95% Critical H Value (KM-Log)	6.266
KM Standard Error of Mean (logged)	0.781		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	80.28	Mean in Log Scale	2.336
SD in Original Scale	156.7	SD in Log Scale	2.308
95% t UCL (Assumes normality)	185.3	95% H-Stat UCL	67066

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Bootstrap t UCL	1798	Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	646

	A	B	C	D	E	F	G	H	I	J	K	L
550												
551	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
552	Recommendations are based upon data size, data distribution, and skewness.											
553	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
554	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
555												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.120/12/2019 10:21:03 AM								
5	From File			NAGD_revC_j.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Acenaphthene											
11												
12	General Statistics											
13	Total Number of Observations					8	Number of Distinct Observations					5
14	Number of Detects					1	Number of Non-Detects					7
15	Number of Distinct Detects					1	Number of Distinct Non-Detects					4
16												
17	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
18	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
19												
20	The data set for variable Acenaphthene was not processed!											
21												

Acenaphthylene

General Statistics

Total Number of Observations	8	Number of Distinct Observations	5
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	2
Minimum Detect	0.105	Minimum Non-Detect	0.004
Maximum Detect	0.192	Maximum Non-Detect	0.005
Variance Detects	0.00215	Percent Non-Detects	62.5%
Mean Detects	0.158	SD Detects	0.0464
Median Detects	0.176	CV Detects	0.293
Skewness Detects	-1.505	Kurtosis Detects	N/A
Mean of Logged Detects	-1.878	SD of Logged Detects	0.326

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.321	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0618	KM Standard Error of Mean	0.0338
KM SD	0.0781	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.126	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.117	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.163	95% KM Chebyshev UCL	0.209
97.5% KM Chebyshev UCL	0.273	99% KM Chebyshev UCL	0.398

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	15.28	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0103	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	91.68	nu star (bias corrected)	N/A
Mean (detects)	0.158		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0755

	A–E	F	G–K	L
77	Maximum	0.192	Median	0.0466
78	SD	0.0745	CV	0.987
79	k hat (MLE)	1.022	k star (bias corrected MLE)	0.722
80	Theta hat (MLE)	0.0739	Theta star (bias corrected MLE)	0.105
81	nu hat (MLE)	16.35	nu star (bias corrected)	11.55
82	Adjusted Level of Significance (β)	0.0195		
83	Approximate Chi Square Value (11.55, α)	4.934	Adjusted Chi Square Value (11.55, β)	3.898
84	95% Gamma Approximate UCL (use when n>=50)	0.177	95% Gamma Adjusted UCL (use when n<50)	N/A
85				
86	**Estimates of Gamma Parameters using KM Estimates**			
87	Mean (KM)	0.0618	SD (KM)	0.0781
88	Variance (KM)	0.0061	SE of Mean (KM)	0.0338
89	k hat (KM)	0.626	k star (KM)	0.474
90	nu hat (KM)	10.01	nu star (KM)	7.589
91	theta hat (KM)	0.0987	theta star (KM)	0.13
92	80% gamma percentile (KM)	0.101	90% gamma percentile (KM)	0.169
93	95% gamma percentile (KM)	0.242	99% gamma percentile (KM)	0.422
94				
95	**Gamma Kaplan-Meier (KM) Statistics**			
96	Approximate Chi Square Value (7.59, α)	2.499	Adjusted Chi Square Value (7.59, β)	1.825
97	95% Gamma Approximate KM-UCL (use when n>=50)	0.188	95% Gamma Adjusted KM-UCL (use when n<50)	0.257
98				
99	**Lognormal GOF Test on Detected Observations Only**			
100	Shapiro Wilk Test Statistic	0.855	**Shapiro Wilk GOF Test**	
101	5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
102	Lilliefors Test Statistic	0.337	**Lilliefors GOF Test**	
103	5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
104	**Detected Data appear Lognormal at 5% Significance Level**			
105				
106	**Lognormal ROS Statistics Using Imputed Non-Detects**			
107	Mean in Original Scale	0.0915	Mean in Log Scale	-2.583
108	SD in Original Scale	0.0617	SD in Log Scale	0.659
109	95% t UCL (assumes normality of ROS data)	0.133	95% Percentile Bootstrap UCL	0.128
110	95% BCA Bootstrap UCL	0.133	95% Bootstrap t UCL	0.171
111	95% H-UCL (Log ROS)	0.182		
112				
113	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
114	KM Mean (logged)	-4.155	KM Geo Mean	0.0157
115	KM SD (logged)	1.771	95% Critical H Value (KM-Log)	5.492
116	KM Standard Error of Mean (logged)	0.767	95% H-UCL (KM -Log)	2.977
117	KM SD (logged)	1.771	95% Critical H Value (KM-Log)	5.492
118	KM Standard Error of Mean (logged)	0.767		
119				
120	**DL/2 Statistics**			
121	**DL/2 Normal**		**DL/2 Log-Transformed**	
122	Mean in Original Scale	0.0606	Mean in Log Scale	-4.56
123	SD in Original Scale	0.0844	SD in Log Scale	2.229
124	95% t UCL (Assumes normality)	0.117	95% H-Stat UCL	38.23
125	**DL/2 is not a recommended method, provided for comparisons and historical reasons**			
126				
127	**Nonparametric Distribution Free UCL Statistics**			
128	**Detected Data appear Normal Distributed at 5% Significance Level**			
129				
130	**Suggested UCL to Use**			
131	95% KM (t) UCL	0.126		

	A	B	C	D	E	F	G	H	I	J	K	L
132												
133	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
134	Recommendations are based upon data size, data distribution, and skewness.											
135	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
136	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

Anthracene

General Statistics

Total Number of Observations	8	Number of Distinct Observations	5
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	2
Minimum Detect	0.101	Minimum Non-Detect	0.004
Maximum Detect	0.11	Maximum Non-Detect	0.005
Variance Detects	2.3268E-5	Percent Non-Detects	62.5%
Mean Detects	0.107	SD Detects	0.00482
Median Detects	0.109	CV Detects	0.0451
Skewness Detects	-1.506	Kurtosis Detects	N/A
Mean of Logged Detects	-2.236	SD of Logged Detects	0.0457

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.881	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.321	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0426	KM Standard Error of Mean	0.0216
KM SD	0.0499	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0835	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0781	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.107	95% KM Chebyshev UCL	0.137
97.5% KM Chebyshev UCL	0.177	99% KM Chebyshev UCL	0.257

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	725.2	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.4741E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	4351	nu star (bias corrected)	N/A
Mean (detects)	0.107		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0832	Mean	0.0965

Maximum	0.11	Median	0.0943
SD	0.00973	CV	0.101
k hat (MLE)	113.6	k star (bias corrected MLE)	71.06
Theta hat (MLE)	8.4950E-4	Theta star (bias corrected MLE)	0.00136
nu hat (MLE)	1817	nu star (bias corrected)	1137
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (N/A, α)	1060	Adjusted Chi Square Value (N/A, β)	1041
95% Gamma Approximate UCL (use when n>=50)	0.104	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0426	SD (KM)	0.0499
Variance (KM)	0.00249	SE of Mean (KM)	0.0216
k hat (KM)	0.729	k star (KM)	0.539
nu hat (KM)	11.67	nu star (KM)	8.625
theta hat (KM)	0.0584	theta star (KM)	0.079
80% gamma percentile (KM)	0.0701	90% gamma percentile (KM)	0.113
95% gamma percentile (KM)	0.159	99% gamma percentile (KM)	0.271
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (8.62, α)	3.102	Adjusted Chi Square Value (8.62, β)	2.327
95% Gamma Approximate KM-UCL (use when n>=50)	0.118	95% Gamma Adjusted KM-UCL (use when n<50)	0.158
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.324	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.097	Mean in Log Scale	-2.337
SD in Original Scale	0.0092	SD in Log Scale	0.0939
95% t UCL (assumes normality of ROS data)	0.103	95% Percentile Bootstrap UCL	0.102
95% BCA Bootstrap UCL	0.103	95% Bootstrap t UCL	0.105
95% H-UCL (Log ROS)	N/A		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.29	KM Geo Mean	0.0137
KM SD (logged)	1.59	95% Critical H Value (KM-Log)	4.989
KM Standard Error of Mean (logged)	0.689	95% H-UCL (KM -Log)	0.975
KM SD (logged)	1.59	95% Critical H Value (KM-Log)	4.989
KM Standard Error of Mean (logged)	0.689		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0414	Mean in Log Scale	-4.695
SD in Original Scale	0.0543	SD in Log Scale	2.037
95% t UCL (Assumes normality)	0.0778	95% H-Stat UCL	8.898
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0835		

	A	B	C	D	E	F	G	H	I	J	K	L
247												
248	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
249	Recommendations are based upon data size, data distribution, and skewness.											
250	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
251	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

Benz(a)anthracene

General Statistics

Total Number of Observations	8	Number of Distinct Observations	6
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	2
Minimum Detect	0.006	Minimum Non-Detect	0.004
Maximum Detect	0.762	Maximum Non-Detect	0.005
Variance Detects	0.0958	Percent Non-Detects	50%
Mean Detects	0.4	SD Detects	0.309
Median Detects	0.417	CV Detects	0.773
Skewness Detects	-0.314	Kurtosis Detects	1.503
Mean of Logged Detects	-1.785	SD of Logged Detects	2.239

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.251	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.202	KM Standard Error of Mean	0.112
KM SD	0.274	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.414	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.386	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.538	95% KM Chebyshev UCL	0.69
97.5% KM Chebyshev UCL	0.901	99% KM Chebyshev UCL	1.316

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.607	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.673	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.407	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.406	Detected Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.696	k star (bias corrected MLE)	0.341
Theta hat (MLE)	0.575	Theta star (bias corrected MLE)	1.175
nu hat (MLE)	5.565	nu star (bias corrected)	2.725
Mean (detects)	0.4		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.006	Mean	0.205

	A–E	F	G–K	L
307	Maximum	0.762	Median	0.01
308	SD	0.291	CV	1.418
309	k hat (MLE)	0.407	k star (bias corrected MLE)	0.338
310	Theta hat (MLE)	0.504	Theta star (bias corrected MLE)	0.607
311	nu hat (MLE)	6.516	nu star (bias corrected)	5.406
312	Adjusted Level of Significance (β)	0.0195		
313	Approximate Chi Square Value (5.41, α)	1.344	Adjusted Chi Square Value (5.41, β)	0.901
314	95% Gamma Approximate UCL (use when n>=50)	0.825	95% Gamma Adjusted UCL (use when n<50)	N/A
315				
316	**Estimates of Gamma Parameters using KM Estimates**			
317	Mean (KM)	0.202	SD (KM)	0.274
318	Variance (KM)	0.0752	SE of Mean (KM)	0.112
319	k hat (KM)	0.544	k star (KM)	0.423
320	nu hat (KM)	8.697	nu star (KM)	6.769
321	theta hat (KM)	0.372	theta star (KM)	0.478
322	80% gamma percentile (KM)	0.328	90% gamma percentile (KM)	0.565
323	95% gamma percentile (KM)	0.824	99% gamma percentile (KM)	1.47
324				
325	**Gamma Kaplan-Meier (KM) Statistics**			
326	Approximate Chi Square Value (6.77, α)	2.045	Adjusted Chi Square Value (6.77, β)	1.454
327	95% Gamma Approximate KM-UCL (use when n>=50)	0.669	95% Gamma Adjusted KM-UCL (use when n<50)	0.941
328				
329	**Lognormal GOF Test on Detected Observations Only**			
330	Shapiro Wilk Test Statistic	0.743	**Shapiro Wilk GOF Test**	
331	5% Shapiro Wilk Critical Value	0.748	Detected Data Not Lognormal at 5% Significance Level	
332	Lilliefors Test Statistic	0.401	**Lilliefors GOF Test**	
333	5% Lilliefors Critical Value	0.375	Detected Data Not Lognormal at 5% Significance Level	
334	**Detected Data Not Lognormal at 5% Significance Level**			
335				
336	**Lognormal ROS Statistics Using Imputed Non-Detects**			
337	Mean in Original Scale	0.201	Mean in Log Scale	-4.65
338	SD in Original Scale	0.294	SD in Log Scale	3.512
339	95% t UCL (assumes normality of ROS data)	0.398	95% Percentile Bootstrap UCL	0.358
340	95% BCA Bootstrap UCL	0.391	95% Bootstrap t UCL	0.511
341	95% H-UCL (Log ROS)	5103921		
342				
343	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
344	KM Mean (logged)	-3.653	KM Geo Mean	0.0259
345	KM SD (logged)	2.317	95% Critical H Value (KM-Log)	7.038
346	KM Standard Error of Mean (logged)	0.946	95% H-UCL (KM -Log)	180.4
347	KM SD (logged)	2.317	95% Critical H Value (KM-Log)	7.038
348	KM Standard Error of Mean (logged)	0.946		
349				
350	**DL/2 Statistics**			
351	**DL/2 Normal**		**DL/2 Log-Transformed**	
352	Mean in Original Scale	0.201	Mean in Log Scale	-3.972
353	SD in Original Scale	0.294	SD in Log Scale	2.76
354	95% t UCL (Assumes normality)	0.398	95% H-Stat UCL	4960
355	**DL/2 is not a recommended method, provided for comparisons and historical reasons**			
356				
357	**Nonparametric Distribution Free UCL Statistics**			
358	**Detected Data appear Normal Distributed at 5% Significance Level**			
359				
360	**Suggested UCL to Use**			
361	95% KM (t) UCL	0.414		

	A	B	C	D	E	F	G	H	I	J	K	L
362												
363	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
364	Recommendations are based upon data size, data distribution, and skewness.											
365	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
366	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

Benzo(a) pyrene

General Statistics

Total Number of Observations	8	Number of Distinct Observations	6
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	2
Minimum Detect	0.01	Minimum Non-Detect	0.004
Maximum Detect	0.83	Maximum Non-Detect	0.005
Variance Detects	0.137	Percent Non-Detects	50%
Mean Detects	0.537	SD Detects	0.37
Median Detects	0.653	CV Detects	0.688
Skewness Detects	-1.469	Kurtosis Detects	1.97
Mean of Logged Detects	-1.416	SD of Logged Detects	2.133

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.868	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.272	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.27	KM Standard Error of Mean	0.143
KM SD	0.35	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.541	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.505	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.698	95% KM Chebyshev UCL	0.892
97.5% KM Chebyshev UCL	1.162	99% KM Chebyshev UCL	1.69

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.743	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.67	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.413	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.405	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.754	k star (bias corrected MLE)	0.355
Theta hat (MLE)	0.712	Theta star (bias corrected MLE)	1.512
nu hat (MLE)	6.028	nu star (bias corrected)	2.84
Mean (detects)	0.537		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.276

	A	B	C	D	E	F	G	H	I	J	K	L
422					Maximum	0.83					Median	0.0209
423					SD	0.369					CV	1.337
424					k hat (MLE)	0.414					k star (bias corrected MLE)	0.342
425					Theta hat (MLE)	0.666					Theta star (bias corrected MLE)	0.807
426					nu hat (MLE)	6.629					nu star (bias corrected)	5.476
427					Adjusted Level of Significance (β)	0.0195						
428					Approximate Chi Square Value (5.48, α)	1.378					Adjusted Chi Square Value (5.48, β)	0.927
429					95% Gamma Approximate UCL (use when n>=50)	1.097					95% Gamma Adjusted UCL (use when n<50)	N/A
430												
431	Estimates of Gamma Parameters using KM Estimates											
432					Mean (KM)	0.27					SD (KM)	0.35
433					Variance (KM)	0.122					SE of Mean (KM)	0.143
434					k hat (KM)	0.598					k star (KM)	0.457
435					nu hat (KM)	9.576					nu star (KM)	7.318
436					theta hat (KM)	0.452					theta star (KM)	0.591
437					80% gamma percentile (KM)	0.442					90% gamma percentile (KM)	0.745
438					95% gamma percentile (KM)	1.072					99% gamma percentile (KM)	1.884
439												
440	Gamma Kaplan-Meier (KM) Statistics											
441					Approximate Chi Square Value (7.32, α)	2.347					Adjusted Chi Square Value (7.32, β)	1.7
442					95% Gamma Approximate KM-UCL (use when n>=50)	0.843					95% Gamma Adjusted KM-UCL (use when n<50)	1.164
443												
444	Lognormal GOF Test on Detected Observations Only											
445					Shapiro Wilk Test Statistic	0.698	**Shapiro Wilk GOF Test**					
446					5% Shapiro Wilk Critical Value	0.748	Detected Data Not Lognormal at 5% Significance Level					
447					Lilliefors Test Statistic	0.401	**Lilliefors GOF Test**					
448					5% Lilliefors Critical Value	0.375	Detected Data Not Lognormal at 5% Significance Level					
449	**Detected Data Not Lognormal at 5% Significance Level**											
450												
451	Lognormal ROS Statistics Using Imputed Non-Detects											
452					Mean in Original Scale	0.269					Mean in Log Scale	-4.043
453					SD in Original Scale	0.374					SD in Log Scale	3.242
454					95% t UCL (assumes normality of ROS data)	0.52					95% Percentile Bootstrap UCL	0.48
455					95% BCA Bootstrap UCL	0.501					95% Bootstrap t UCL	0.646
456					95% H-UCL (Log ROS)	494796						
457												
458	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
459					KM Mean (logged)	-3.469					KM Geo Mean	0.0312
460					KM SD (logged)	2.433					95% Critical H Value (KM-Log)	7.37
461					KM Standard Error of Mean (logged)	0.993					95% H-UCL (KM -Log)	527.5
462					KM SD (logged)	2.433					95% Critical H Value (KM-Log)	7.37
463					KM Standard Error of Mean (logged)	0.993						
464												
465	DL/2 Statistics											
466	DL/2 Normal						DL/2 Log-Transformed					
467					Mean in Original Scale	0.269					Mean in Log Scale	-3.787
468					SD in Original Scale	0.374					SD in Log Scale	2.895
469					95% t UCL (Assumes normality)	0.52					95% H-Stat UCL	20447
470	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
471												
472	Nonparametric Distribution Free UCL Statistics											
473	**Detected Data appear Normal Distributed at 5% Significance Level**											
474												
475	Suggested UCL to Use											
476					95% KM (t) UCL	0.541						

	A	B	C	D	E	F	G	H	I	J	K	L
477												
478	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
479	Recommendations are based upon data size, data distribution, and skewness.											
480	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
481	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

Chrysene

General Statistics			
Total Number of Observations	8	Number of Distinct Observations	5
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	2
Minimum Detect	0.005	Minimum Non-Detect	0.004
Maximum Detect	0.667	Maximum Non-Detect	0.005
Variance Detects	0.0731	Percent Non-Detects	50%
Mean Detects	0.346	SD Detects	0.27
Median Detects	0.356	CV Detects	0.781
Skewness Detects	-0.225	Kurtosis Detects	1.526
Mean of Logged Detects	-1.942	SD of Logged Detects	2.257
Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use			
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.			
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).			
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1			
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.261	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level	
Detected Data appear Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.175	KM Standard Error of Mean	0.0972
KM SD	0.238	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.359	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.335	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.467	95% KM Chebyshev UCL	0.599
97.5% KM Chebyshev UCL	0.782	99% KM Chebyshev UCL	1.142
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.617	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.673	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.414	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.406	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.688	k star (bias corrected MLE)	0.339
Theta hat (MLE)	0.503	Theta star (bias corrected MLE)	1.022
nu hat (MLE)	5.502	nu star (bias corrected)	2.709
Mean (detects)	0.346		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.005	Mean	0.178

Maximum	0.667	Median	0.01
SD	0.252	CV	1.417
k hat (MLE)	0.422	k star (bias corrected MLE)	0.347
Theta hat (MLE)	0.422	Theta star (bias corrected MLE)	0.513
nu hat (MLE)	6.746	nu star (bias corrected)	5.549
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (5.55, α)	1.414	Adjusted Chi Square Value (5.55, β)	0.955
95% Gamma Approximate UCL (use when n>=50)	0.699	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.175	SD (KM)	0.238
Variance (KM)	0.0567	SE of Mean (KM)	0.0972
k hat (KM)	0.541	k star (KM)	0.421
nu hat (KM)	8.649	nu star (KM)	6.739
theta hat (KM)	0.324	theta star (KM)	0.416
80% gamma percentile (KM)	0.284	90% gamma percentile (KM)	0.49
95% gamma percentile (KM)	0.714	99% gamma percentile (KM)	1.276
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (6.74, α)	2.028	Adjusted Chi Square Value (6.74, β)	1.441
95% Gamma Approximate KM-UCL (use when n>=50)	0.581	95% Gamma Adjusted KM-UCL (use when n<50)	0.819
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.741	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.405	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.173	Mean in Log Scale	-4.826
SD in Original Scale	0.256	SD in Log Scale	3.535
95% t UCL (assumes normality of ROS data)	0.345	95% Percentile Bootstrap UCL	0.333
95% BCA Bootstrap UCL	0.344	95% Bootstrap t UCL	0.436
95% H-UCL (Log ROS)	5607830		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.732	KM Geo Mean	0.024
KM SD (logged)	2.261	95% Critical H Value (KM-Log)	6.877
KM Standard Error of Mean (logged)	0.923	95% H-UCL (KM -Log)	110.2
KM SD (logged)	2.261	95% Critical H Value (KM-Log)	6.877
KM Standard Error of Mean (logged)	0.923		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.174	Mean in Log Scale	-4.05
SD in Original Scale	0.255	SD in Log Scale	2.696
95% t UCL (Assumes normality)	0.345	95% H-Stat UCL	2605
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.359		

	A	B	C	D	E	F	G	H	I	J	K	L
592												
593	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
594	Recommendations are based upon data size, data distribution, and skewness.											
595	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
596	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

Dibenz(a,h)anthracene

General Statistics

Total Number of Observations	8	Number of Distinct Observations	5
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	2
Minimum Detect	0.0777	Minimum Non-Detect	0.004
Maximum Detect	0.121	Maximum Non-Detect	0.005
Variance Detects	5.8070E-4	Percent Non-Detects	62.5%
Mean Detects	0.105	SD Detects	0.0241
Median Detects	0.118	CV Detects	0.229
Skewness Detects	-1.695	Kurtosis Detects	N/A
Mean of Logged Detects	-2.269	SD of Logged Detects	0.248

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.807	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.361	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.042	KM Standard Error of Mean	0.0219
KM SD	0.0506	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0835	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.078	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.108	95% KM Chebyshev UCL	0.137
97.5% KM Chebyshev UCL	0.179	99% KM Chebyshev UCL	0.26

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	25.84	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00408	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	155	nu star (bias corrected)	N/A
Mean (detects)	0.105		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0607

Maximum	0.121	Median	0.0496
SD	0.0414	CV	0.682
k hat (MLE)	2.095	k star (bias corrected MLE)	1.392
Theta hat (MLE)	0.029	Theta star (bias corrected MLE)	0.0436
nu hat (MLE)	33.51	nu star (bias corrected)	22.28
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (22.28, α)	12.55	Adjusted Chi Square Value (22.28, β)	10.75
95% Gamma Approximate UCL (use when n>=50)	0.108	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.042	SD (KM)	0.0506
Variance (KM)	0.00256	SE of Mean (KM)	0.0219
k hat (KM)	0.691	k star (KM)	0.515
nu hat (KM)	11.06	nu star (KM)	8.246
theta hat (KM)	0.0608	theta star (KM)	0.0816
80% gamma percentile (KM)	0.0691	90% gamma percentile (KM)	0.113
95% gamma percentile (KM)	0.16	99% gamma percentile (KM)	0.274
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (8.25, α)	2.878	Adjusted Chi Square Value (8.25, β)	2.139
95% Gamma Approximate KM-UCL (use when n>=50)	0.12	95% Gamma Adjusted KM-UCL (use when n<50)	0.162
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.797	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.365	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0686	Mean in Log Scale	-2.783
SD in Original Scale	0.0341	SD in Log Scale	0.482
95% t UCL (assumes normality of ROS data)	0.0914	95% Percentile Bootstrap UCL	0.0869
95% BCA Bootstrap UCL	0.0903	95% Bootstrap t UCL	0.105
95% H-UCL (Log ROS)	0.106		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.302	KM Geo Mean	0.0135
KM SD (logged)	1.579	95% Critical H Value (KM-Log)	4.958
KM Standard Error of Mean (logged)	0.684	95% H-UCL (KM -Log)	0.909
KM SD (logged)	1.579	95% Critical H Value (KM-Log)	4.958
KM Standard Error of Mean (logged)	0.684		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0408	Mean in Log Scale	-4.707
SD in Original Scale	0.055	SD in Log Scale	2.025
95% t UCL (Assumes normality)	0.0777	95% H-Stat UCL	8.084
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0835		

	A–L
707	
708	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
709	Recommendations are based upon data size, data distribution, and skewness.
710	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
711	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Fluoranthene

General Statistics

Total Number of Observations	8	Number of Distinct Observations	6
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	2
Minimum Detect	0.01	Minimum Non-Detect	0.004
Maximum Detect	1.429	Maximum Non-Detect	0.005
Variance Detects	0.339	Percent Non-Detects	50%
Mean Detects	0.675	SD Detects	0.582
Median Detects	0.631	CV Detects	0.863
Skewness Detects	0.45	Kurtosis Detects	1.523
Mean of Logged Detects	-1.294	SD of Logged Detects	2.242

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.253	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.339	KM Standard Error of Mean	0.2
KM SD	0.49	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.718	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.668	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.939	95% KM Chebyshev UCL	1.211
97.5% KM Chebyshev UCL	1.588	99% KM Chebyshev UCL	2.328

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.493	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.673	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.371	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.407	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.675	k star (bias corrected MLE)	0.335
Theta hat (MLE)	1.001	Theta star (bias corrected MLE)	2.013
nu hat (MLE)	5.397	nu star (bias corrected)	2.683
Mean (detects)	0.675		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.342

Maximum	1.429	Median	0.01
SD	0.521	CV	1.522
k hat (MLE)	0.357	k star (bias corrected MLE)	0.306
Theta hat (MLE)	0.96	Theta star (bias corrected MLE)	1.118
nu hat (MLE)	5.711	nu star (bias corrected)	4.903
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (4.90, α)	1.108	Adjusted Chi Square Value (4.90, β)	0.721
95% Gamma Approximate UCL (use when n>=50)	1.516	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.339	SD (KM)	0.49
Variance (KM)	0.24	SE of Mean (KM)	0.2
k hat (KM)	0.481	k star (KM)	0.384
nu hat (KM)	7.693	nu star (KM)	6.142
theta hat (KM)	0.706	theta star (KM)	0.884
80% gamma percentile (KM)	0.545	90% gamma percentile (KM)	0.966
95% gamma percentile (KM)	1.431	99% gamma percentile (KM)	2.605
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (6.14, α)	1.713	Adjusted Chi Square Value (6.14, β)	1.188
95% Gamma Approximate KM-UCL (use when n>=50)	1.217	95% Gamma Adjusted KM-UCL (use when n<50)	1.755
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.781	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.384	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.338	Mean in Log Scale	-4.258
SD in Original Scale	0.524	SD in Log Scale	3.614
95% t UCL (assumes normality of ROS data)	0.689	95% Percentile Bootstrap UCL	0.663
95% BCA Bootstrap UCL	0.746	95% Bootstrap t UCL	0.996
95% H-UCL (Log ROS)	24385129		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.408	KM Geo Mean	0.0331
KM SD (logged)	2.521	95% Critical H Value (KM-Log)	7.622
KM Standard Error of Mean (logged)	1.029	95% H-UCL (KM -Log)	1131
KM SD (logged)	2.521	95% Critical H Value (KM-Log)	7.622
KM Standard Error of Mean (logged)	1.029		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.339	Mean in Log Scale	-3.726
SD in Original Scale	0.524	SD in Log Scale	2.987
95% t UCL (Assumes normality)	0.69	95% H-Stat UCL	52063
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.718		

	A	B	C	D	E	F	G	H	I	J	K	L
822												
823	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
824	Recommendations are based upon data size, data distribution, and skewness.											
825	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
826	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

Fluorene

General Statistics

Total Number of Observations	8	Number of Distinct Observations	5
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	2
Minimum Detect	0.0235	Minimum Non-Detect	0.004
Maximum Detect	0.039	Maximum Non-Detect	0.005
Variance Detects	6.2123E-5	Percent Non-Detects	62.5%
Mean Detects	0.0321	SD Detects	0.00788
Median Detects	0.0337	CV Detects	0.246
Skewness Detects	-0.876	Kurtosis Detects	N/A
Mean of Logged Detects	-3.461	SD of Logged Detects	0.261

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.247	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0145	KM Standard Error of Mean	0.00613
KM SD	0.0142	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0261	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0246	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0329	95% KM Chebyshev UCL	0.0413
97.5% KM Chebyshev UCL	0.0528	99% KM Chebyshev UCL	0.0755

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	23.14	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00139	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	138.8	nu star (bias corrected)	N/A
Mean (detects)	0.0321		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0188

882	Maximum	0.039	Median	0.0121
883	SD	0.0119	CV	0.63
884	k hat (MLE)	3.308	k star (bias corrected MLE)	2.151
885	Theta hat (MLE)	0.00569	Theta star (bias corrected MLE)	0.00875
886	nu hat (MLE)	52.92	nu star (bias corrected)	34.41
887	Adjusted Level of Significance (β)	0.0195		
888	Approximate Chi Square Value (34.41, α)	21.99	Adjusted Chi Square Value (34.41, β)	19.52
889	95% Gamma Approximate UCL (use when n>=50)	0.0294	95% Gamma Adjusted UCL (use when n<50)	N/A
890				
891	**Estimates of Gamma Parameters using KM Estimates**			
892	Mean (KM)	0.0145	SD (KM)	0.0142
893	Variance (KM)	2.0044E-4	SE of Mean (KM)	0.00613
894	k hat (KM)	1.054	k star (KM)	0.742
895	nu hat (KM)	16.86	nu star (KM)	11.87
896	theta hat (KM)	0.0138	theta star (KM)	0.0196
897	80% gamma percentile (KM)	0.0238	90% gamma percentile (KM)	0.036
898	95% gamma percentile (KM)	0.0484	99% gamma percentile (KM)	0.078
899				
900	**Gamma Kaplan-Meier (KM) Statistics**			
901	Approximate Chi Square Value (11.87, α)	5.142	Adjusted Chi Square Value (11.87, β)	4.079
902	95% Gamma Approximate KM-UCL (use when n>=50)	0.0336	95% Gamma Adjusted KM-UCL (use when n<50)	0.0423
903				
904	**Lognormal GOF Test on Detected Observations Only**			
905	Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk GOF Test**	
906	5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
907	Lilliefors Test Statistic	0.273	**Lilliefors GOF Test**	
908	5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
909	**Detected Data appear Lognormal at 5% Significance Level**			
910				
911	**Lognormal ROS Statistics Using Imputed Non-Detects**			
912	Mean in Original Scale	0.0197	Mean in Log Scale	-4.064
913	SD in Original Scale	0.0113	SD in Log Scale	0.561
914	95% t UCL (assumes normality of ROS data)	0.0273	95% Percentile Bootstrap UCL	0.0262
915	95% BCA Bootstrap UCL	0.027	95% Bootstrap t UCL	0.0303
916	95% H-UCL (Log ROS)	0.0339		
917				
918	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
919	KM Mean (logged)	-4.749	KM Geo Mean	0.00866
920	KM SD (logged)	1.006	95% Critical H Value (KM-Log)	3.441
921	KM Standard Error of Mean (logged)	0.436	95% H-UCL (KM -Log)	0.0532
922	KM SD (logged)	1.006	95% Critical H Value (KM-Log)	3.441
923	KM Standard Error of Mean (logged)	0.436		
924				
925	**DL/2 Statistics**			
926	**DL/2 Normal**		**DL/2 Log-Transformed**	
927	Mean in Original Scale	0.0133	Mean in Log Scale	-5.154
928	SD in Original Scale	0.0161	SD in Log Scale	1.411
929	95% t UCL (Assumes normality)	0.0241	95% H-Stat UCL	0.172
930	**DL/2 is not a recommended method, provided for comparisons and historical reasons**			
931				
932	**Nonparametric Distribution Free UCL Statistics**			
933	**Detected Data appear Normal Distributed at 5% Significance Level**			
934				
935	**Suggested UCL to Use**			
936	95% KM (t) UCL	0.0261		

	A	B	C	D	E	F	G	H	I	J	K	L
937												
938	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
939	Recommendations are based upon data size, data distribution, and skewness.											
940	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
941	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

Naphthalene

General Statistics

Total Number of Observations	8	Number of Distinct Observations	4
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.0294	Minimum Non-Detect	0.005
Maximum Detect	0.0571	Maximum Non-Detect	0.0709
Variance Detects	3.8451E-4	Percent Non-Detects	75%
Mean Detects	0.0433	SD Detects	0.0196
Median Detects	0.0433	CV Detects	0.453
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.194	SD of Logged Detects	0.47

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use

guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.

For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).

Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0159	KM Standard Error of Mean	0.0101
KM SD	0.0188	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.035	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0325	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0461	95% KM Chebyshev UCL	0.0598
97.5% KM Chebyshev UCL	0.0787	99% KM Chebyshev UCL	0.116

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	9.397	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00461	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	37.59	nu star (bias corrected)	N/A
Mean (detects)	0.0433		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0159	SD (KM)	0.0188
Variance (KM)	3.5394E-4	SE of Mean (KM)	0.0101
k hat (KM)	0.718	k star (KM)	0.532
nu hat (KM)	11.48	nu star (KM)	8.509
theta hat (KM)	0.0222	theta star (KM)	0.03
80% gamma percentile (KM)	0.0262	90% gamma percentile (KM)	0.0426
95% gamma percentile (KM)	0.0599	99% gamma percentile (KM)	0.102

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0195

Approximate Chi Square Value (8.51, α)	3.033	Adjusted Chi Square Value (8.51, β)	2.269
95% Gamma Approximate KM-UCL (use when n>=50)	0.0447	95% Gamma Adjusted KM-UCL (use when n<50)	0.0598
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0151	Mean in Log Scale	-4.849
SD in Original Scale	0.0192	SD in Log Scale	1.24
95% t UCL (assumes normality of ROS data)	0.0279	95% Percentile Bootstrap UCL	0.0254
95% BCA Bootstrap UCL	0.0303	95% Bootstrap t UCL	0.0699
95% H-UCL (Log ROS)	0.112		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-4.697	KM Geo Mean	0.00912
KM SD (logged)	0.967	95% Critical H Value (KM-Log)	3.345
KM Standard Error of Mean (logged)	0.517	95% H-UCL (KM -Log)	0.0494
KM SD (logged)	0.967	95% Critical H Value (KM-Log)	3.345
KM Standard Error of Mean (logged)	0.517		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0168	Mean in Log Scale	-4.961
SD in Original Scale	0.0212	SD in Log Scale	1.434
95% t UCL (Assumes normality)	0.031	95% H-Stat UCL	0.232
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.035	KM H-UCL	0.0494
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

Phenanthrene

General Statistics

Total Number of Observations	8	Number of Distinct Observations	6
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	2
Minimum Detect	0.016	Minimum Non-Detect	0.004
Maximum Detect	0.667	Maximum Non-Detect	0.005
Variance Detects	0.0713	Percent Non-Detects	50%
Mean Detects	0.32	SD Detects	0.267
Median Detects	0.298	CV Detects	0.835
Skewness Detects	0.479	Kurtosis Detects	1.561
Mean of Logged Detects	-1.741	SD of Logged Detects	1.641

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.259	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.162	KM Standard Error of Mean	0.0928
KM SD	0.227	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.338	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.315	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.44	95% KM Chebyshev UCL	0.566
97.5% KM Chebyshev UCL	0.741	99% KM Chebyshev UCL	1.085

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.416	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.667	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.34	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.403	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.965	k star (bias corrected MLE)	0.408
Theta hat (MLE)	0.331	Theta star (bias corrected MLE)	0.784
nu hat (MLE)	7.72	nu star (bias corrected)	3.263
Mean (detects)	0.32		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.165

	A	B	C	D	E	F	G	H	I	J	K	L
1091	Maximum					0.667	Median					0.013
1092	SD					0.241	CV					1.461
1093	k hat (MLE)					0.468	k star (bias corrected MLE)					0.376
1094	Theta hat (MLE)					0.352	Theta star (bias corrected MLE)					0.438
1095	nu hat (MLE)					7.492	nu star (bias corrected)					6.016
1096	Adjusted Level of Significance (β)					0.0195						
1097	Approximate Chi Square Value (6.02, α)					1.648	Adjusted Chi Square Value (6.02, β)					1.137
1098	95% Gamma Approximate UCL (use when n>=50)					0.602	95% Gamma Adjusted UCL (use when n<50)					N/A
1099												
1100	**Estimates of Gamma Parameters using KM Estimates**											
1101	Mean (KM)					0.162	SD (KM)					0.227
1102	Variance (KM)					0.0517	SE of Mean (KM)					0.0928
1103	k hat (KM)					0.507	k star (KM)					0.4
1104	nu hat (KM)					8.111	nu star (KM)					6.403
1105	theta hat (KM)					0.319	theta star (KM)					0.404
1106	80% gamma percentile (KM)					0.261	90% gamma percentile (KM)					0.457
1107	95% gamma percentile (KM)					0.672	99% gamma percentile (KM)					1.214
1108												
1109	**Gamma Kaplan-Meier (KM) Statistics**											
1110	Approximate Chi Square Value (6.40, α)					1.849	Adjusted Chi Square Value (6.40, β)					1.297
1111	95% Gamma Approximate KM-UCL (use when n>=50)					0.56	95% Gamma Adjusted KM-UCL (use when n<50)					0.799
1112												
1113	**Lognormal GOF Test on Detected Observations Only**											
1114	Shapiro Wilk Test Statistic					0.824	**Shapiro Wilk GOF Test**					
1115	5% Shapiro Wilk Critical Value					0.748	Detected Data appear Lognormal at 5% Significance Level					
1116	Lilliefors Test Statistic					0.364	**Lilliefors GOF Test**					
1117	5% Lilliefors Critical Value					0.375	Detected Data appear Lognormal at 5% Significance Level					
1118	**Detected Data appear Lognormal at 5% Significance Level**											
1119												
1120	**Lognormal ROS Statistics Using Imputed Non-Detects**											
1121	Mean in Original Scale					0.161	Mean in Log Scale					-3.991
1122	SD in Original Scale					0.243	SD in Log Scale					2.727
1123	95% t UCL (assumes normality of ROS data)					0.324	95% Percentile Bootstrap UCL					0.321
1124	95% BCA Bootstrap UCL					0.335	95% Bootstrap t UCL					0.46
1125	95% H-UCL (Log ROS)					3625						
1126												
1127	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1128	KM Mean (logged)					-3.631	KM Geo Mean					0.0265
1129	KM SD (logged)					2.141	95% Critical H Value (KM-Log)					6.534
1130	KM Standard Error of Mean (logged)					0.874	95% H-UCL (KM -Log)					51.8
1131	KM SD (logged)					2.141	95% Critical H Value (KM-Log)					6.534
1132	KM Standard Error of Mean (logged)					0.874						
1133												
1134	**DL/2 Statistics**											
1135	**DL/2 Normal**						**DL/2 Log-Transformed**					
1136	Mean in Original Scale					0.161	Mean in Log Scale					-3.95
1137	SD in Original Scale					0.244	SD in Log Scale					2.595
1138	95% t UCL (Assumes normality)					0.324	95% H-Stat UCL					1219
1139	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
1140												
1141	**Nonparametric Distribution Free UCL Statistics**											
1142	**Detected Data appear Normal Distributed at 5% Significance Level**											
1143												
1144	**Suggested UCL to Use**											
1145	95% KM (t) UCL					0.338						

	A	B	C	D	E	F	G	H	I	J	K	L
1146												
1147	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1148	Recommendations are based upon data size, data distribution, and skewness.											
1149	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1150	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

Pyrene

General Statistics

Total Number of Observations	8	Number of Distinct Observations	6
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	2
Minimum Detect	0.011	Minimum Non-Detect	0.004
Maximum Detect	1.429	Maximum Non-Detect	0.005
Variance Detects	0.337	Percent Non-Detects	50%
Mean Detects	0.677	SD Detects	0.581
Median Detects	0.635	CV Detects	0.858
Skewness Detects	0.436	Kurtosis Detects	1.605
Mean of Logged Detects	-1.266	SD of Logged Detects	2.196

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.277	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.341	KM Standard Error of Mean	0.2
KM SD	0.49	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.719	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.669	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.94	95% KM Chebyshev UCL	1.212
97.5% KM Chebyshev UCL	1.589	99% KM Chebyshev UCL	2.33

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.524	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.673	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.387	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.406	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.691	k star (bias corrected MLE)	0.339
Theta hat (MLE)	0.98	Theta star (bias corrected MLE)	1.995
nu hat (MLE)	5.53	nu star (bias corrected)	2.716
Mean (detects)	0.677		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.344

Maximum	1.429	Median	0.0105
SD	0.521	CV	1.517
k hat (MLE)	0.359	k star (bias corrected MLE)	0.308
Theta hat (MLE)	0.958	Theta star (bias corrected MLE)	1.117
nu hat (MLE)	5.739	nu star (bias corrected)	4.92
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (4.92, α)	1.116	Adjusted Chi Square Value (4.92, β)	0.727
95% Gamma Approximate UCL (use when n>=50)	1.516	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.341	SD (KM)	0.49
Variance (KM)	0.24	SE of Mean (KM)	0.2
k hat (KM)	0.484	k star (KM)	0.386
nu hat (KM)	7.741	nu star (KM)	6.171
theta hat (KM)	0.704	theta star (KM)	0.883
80% gamma percentile (KM)	0.547	90% gamma percentile (KM)	0.968
95% gamma percentile (KM)	1.433	99% gamma percentile (KM)	2.607
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (6.17, α)	1.728	Adjusted Chi Square Value (6.17, β)	1.201
95% Gamma Approximate KM-UCL (use when n>=50)	1.216	95% Gamma Adjusted KM-UCL (use when n<50)	1.751
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.774	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.393	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.339	Mean in Log Scale	-4.152
SD in Original Scale	0.524	SD in Log Scale	3.522
95% t UCL (assumes normality of ROS data)	0.691	95% Percentile Bootstrap UCL	0.618
95% BCA Bootstrap UCL	0.716	95% Bootstrap t UCL	0.941
95% H-UCL (Log ROS)	9460188		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.394	KM Geo Mean	0.0336
KM SD (logged)	2.517	95% Critical H Value (KM-Log)	7.613
KM Standard Error of Mean (logged)	1.028	95% H-UCL (KM -Log)	1117
KM SD (logged)	2.517	95% Critical H Value (KM-Log)	7.613
KM Standard Error of Mean (logged)	1.028		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.34	Mean in Log Scale	-3.712
SD in Original Scale	0.524	SD in Log Scale	2.986
95% t UCL (Assumes normality)	0.691	95% H-Stat UCL	52081
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.719		

	A	B	C	D	E	F	G	H	I	J	K	L
1261												
1262	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1263	Recommendations are based upon data size, data distribution, and skewness.											
1264	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1265	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

PAHs (Sum of total)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	6
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	2
Minimum Detect	0.079	Minimum Non-Detect	0.004
Maximum Detect	7.143	Maximum Non-Detect	0.005
Variance Detects	10.18	Percent Non-Detects	50%
Mean Detects	4.72	SD Detects	3.191
Median Detects	5.83	CV Detects	0.676
Skewness Detects	-1.657	Kurtosis Detects	2.79
Mean of Logged Detects	0.736	SD of Logged Detects	2.187

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.835	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.316	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.362	KM Standard Error of Mean	1.25
KM SD	3.063	95% KM (BCA) UCL	N/A
95% KM (t) UCL	4.731	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	4.419	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	6.113	95% KM Chebyshev UCL	7.812
97.5% KM Chebyshev UCL	10.17	99% KM Chebyshev UCL	14.8

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.804	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.671	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.435	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.405	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.736	k star (bias corrected MLE)	0.351
Theta hat (MLE)	6.417	Theta star (bias corrected MLE)	13.47
nu hat (MLE)	5.885	nu star (bias corrected)	2.805
Mean (detects)	4.72		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	2.43

Maximum	7.143	Median	0.304
SD	3.223	CV	1.326
k hat (MLE)	0.297	k star (bias corrected MLE)	0.269
Theta hat (MLE)	8.185	Theta star (bias corrected MLE)	9.037
nu hat (MLE)	4.751	nu star (bias corrected)	4.302
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (4.30, α)	0.845	Adjusted Chi Square Value (4.30, β)	0.529
95% Gamma Approximate UCL (use when n>=50)	12.38	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	2.362	SD (KM)	3.063
Variance (KM)	9.38	SE of Mean (KM)	1.25
k hat (KM)	0.595	k star (KM)	0.455
nu hat (KM)	9.518	nu star (KM)	7.282
theta hat (KM)	3.971	theta star (KM)	5.19
80% gamma percentile (KM)	3.859	90% gamma percentile (KM)	6.513
95% gamma percentile (KM)	9.382	99% gamma percentile (KM)	16.5
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (7.28, α)	2.327	Adjusted Chi Square Value (7.28, β)	1.683
95% Gamma Approximate KM-UCL (use when n>=50)	7.393	95% Gamma Adjusted KM-UCL (use when n<50)	10.22
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.683	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.413	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	2.369	Mean in Log Scale	-1.917
SD in Original Scale	3.269	SD in Log Scale	3.283
95% t UCL (assumes normality of ROS data)	4.558	95% Percentile Bootstrap UCL	4.289
95% BCA Bootstrap UCL	4.243	95% Bootstrap t UCL	5.353
95% H-UCL (Log ROS)	6388852		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.393	KM Geo Mean	0.0914
KM SD (logged)	3.403	95% Critical H Value (KM-Log)	10.18
KM Standard Error of Mean (logged)	1.389	95% H-UCL (KM -Log)	14497316
KM SD (logged)	3.403	95% Critical H Value (KM-Log)	10.18
KM Standard Error of Mean (logged)	1.389		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	2.361	Mean in Log Scale	-2.711
SD in Original Scale	3.275	SD in Log Scale	3.954
95% t UCL (Assumes normality)	4.555	95% H-Stat UCL	7.385E+9
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	4.731		

	A	B	C	D	E	F	G	H	I	J	K	L
1376												
1377	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1378	Recommendations are based upon data size, data distribution, and skewness.											
1379	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1380	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

PCBs (Total)

General Statistics

Total Number of Observations	8	Number of Distinct Observations	5
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	3
Minimum Detect	0.0645	Minimum Non-Detect	0.00177
Maximum Detect	0.102	Maximum Non-Detect	0.0062
Variance Detects	6.9522E-4	Percent Non-Detects	75%
Mean Detects	0.0831	SD Detects	0.0264
Median Detects	0.0831	CV Detects	0.317
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-2.513	SD of Logged Detects	0.323

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0221	KM Standard Error of Mean	0.0182
KM SD	0.0364	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0566	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0521	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0768	95% KM Chebyshev UCL	0.102
97.5% KM Chebyshev UCL	0.136	99% KM Chebyshev UCL	0.203

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	19.54	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00425	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	78.15	nu star (bias corrected)	N/A
Mean (detects)	0.0831		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0221	SD (KM)	0.0364
Variance (KM)	0.00133	SE of Mean (KM)	0.0182
k hat (KM)	0.368	k star (KM)	0.313
nu hat (KM)	5.891	nu star (KM)	5.015
theta hat (KM)	0.06	theta star (KM)	0.0705
80% gamma percentile (KM)	0.0343	90% gamma percentile (KM)	0.0649
95% gamma percentile (KM)	0.0997	99% gamma percentile (KM)	0.19

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0195

Approximate Chi Square Value (5.02, α)	1.159	Adjusted Chi Square Value (5.02, β)	0.76
95% Gamma Approximate KM-UCL (use when n>=50)	0.0957	95% Gamma Adjusted KM-UCL (use when n<50)	0.146
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0333	Mean in Log Scale	-3.765
SD in Original Scale	0.033	SD in Log Scale	0.878
95% t UCL (assumes normality of ROS data)	0.0553	95% Percentile Bootstrap UCL	0.0522
95% BCA Bootstrap UCL	0.0587	95% Bootstrap t UCL	0.116
95% H-UCL (Log ROS)	0.0962		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.38	KM Geo Mean	0.00461
KM SD (logged)	1.659	95% Critical H Value (KM-Log)	5.178
KM Standard Error of Mean (logged)	0.829	95% H-UCL (KM -Log)	0.469
KM SD (logged)	1.659	95% Critical H Value (KM-Log)	5.178
KM Standard Error of Mean (logged)	0.829		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0225	Mean in Log Scale	-5.225
SD in Original Scale	0.0387	SD in Log Scale	1.72
95% t UCL (Assumes normality)	0.0485	95% H-Stat UCL	0.766
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0566	KM H-UCL	0.469
95% KM (BCA) UCL	N/A		
Warning: One or more Recommended UCL(s) not available!			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

TBT

General Statistics

Total Number of Observations	8	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	9.9291E-4	Minimum Non-Detect	5.0000E-4
Maximum Detect	0.0203	Maximum Non-Detect	5.0000E-4
Variance Detects	1.1886E-4	Percent Non-Detects	62.5%
Mean Detects	0.0136	SD Detects	0.0109
Median Detects	0.0194	CV Detects	0.803
Skewness Detects	-1.72	Kurtosis Detects	N/A
Mean of Logged Detects	-4.918	SD of Logged Detects	1.73

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.784	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.371	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0054	KM Standard Error of Mean	0.00362
KM SD	0.00835	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0123	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0114	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0163	95% KM Chebyshev UCL	0.0212
97.5% KM Chebyshev UCL	0.028	99% KM Chebyshev UCL	0.0414

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	0.941	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0144	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	5.645	nu star (bias corrected)	N/A
Mean (detects)	0.0136		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	9.9291E-4	Mean	0.0113

Maximum	0.0203	Median	0.01
SD	0.00611	CV	0.539
k hat (MLE)	2.21	k star (bias corrected MLE)	1.465
Theta hat (MLE)	0.00513	Theta star (bias corrected MLE)	0.00774
nu hat (MLE)	35.37	nu star (bias corrected)	23.44
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (23.44, α)	13.42	Adjusted Chi Square Value (23.44, β)	11.55
95% Gamma Approximate UCL (use when n>=50)	0.0198	95% Gamma Adjusted UCL (use when n<50)	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0054	SD (KM)	0.00835
Variance (KM)	6.9763E-5	SE of Mean (KM)	0.00362
k hat (KM)	0.418	k star (KM)	0.345
nu hat (KM)	6.693	nu star (KM)	5.516
theta hat (KM)	0.0129	theta star (KM)	0.0157
80% gamma percentile (KM)	0.00853	90% gamma percentile (KM)	0.0156
95% gamma percentile (KM)	0.0236	99% gamma percentile (KM)	0.044
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (5.52, α)	1.398	Adjusted Chi Square Value (5.52, β)	0.942
95% Gamma Approximate KM-UCL (use when n>=50)	0.0213	95% Gamma Adjusted KM-UCL (use when n<50)	0.0316
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.761	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.381	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00514	Mean in Log Scale	-8.439
SD in Original Scale	0.0091	SD in Log Scale	3.4
95% t UCL (assumes normality of ROS data)	0.0112	95% Percentile Bootstrap UCL	0.0102
95% BCA Bootstrap UCL	0.0124	95% Bootstrap t UCL	0.138
95% H-UCL (Log ROS)	33148		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.595	KM Geo Mean	0.00137
KM SD (logged)	1.561	95% Critical H Value (KM-Log)	4.907
KM Standard Error of Mean (logged)	0.676	95% H-UCL (KM -Log)	0.0835
KM SD (logged)	1.561	95% Critical H Value (KM-Log)	4.907
KM Standard Error of Mean (logged)	0.676		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00525	Mean in Log Scale	-7.028
SD in Original Scale	0.00903	SD in Log Scale	1.977
95% t UCL (Assumes normality)	0.0113	95% H-Stat UCL	0.584
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.0123		

	A	B	C	D	E	F	G	H	I	J	K	L
1585												
1586	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1587	Recommendations are based upon data size, data distribution, and skewness.											
1588	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1589	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

C10-C36

General Statistics

Total Number of Observations	8	Number of Distinct Observations	6
Number of Detects	5	Number of Non-Detects	3
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	5	Minimum Non-Detect	3
Maximum Detect	650	Maximum Non-Detect	3
Variance Detects	70189	Percent Non-Detects	37.5%
Mean Detects	195.6	SD Detects	264.9
Median Detects	88	CV Detects	1.354
Skewness Detects	1.823	Kurtosis Detects	3.358
Mean of Logged Detects	4.276	SD of Logged Detects	1.847

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.785	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.291	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	123.4	KM Standard Error of Mean	82.72
KM SD	209.3	95% KM (BCA) UCL	256.3
95% KM (t) UCL	280.1	95% KM (Percentile Bootstrap) UCL	260
95% KM (z) UCL	259.5	95% KM Bootstrap t UCL	689.4
90% KM Chebyshev UCL	371.6	95% KM Chebyshev UCL	484
97.5% KM Chebyshev UCL	640	99% KM Chebyshev UCL	946.5

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.172	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.705	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.142	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.369	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.615	k star (bias corrected MLE)	0.379
Theta hat (MLE)	318	Theta star (bias corrected MLE)	515.7
nu hat (MLE)	6.152	nu star (bias corrected)	3.794
Mean (detects)	195.6		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	122.3

Maximum	650	Median	19.17
SD	224.4	CV	1.835
k hat (MLE)	0.192	k star (bias corrected MLE)	0.203
Theta hat (MLE)	637.4	Theta star (bias corrected MLE)	601.7
nu hat (MLE)	3.069	nu star (bias corrected)	3.252
Adjusted Level of Significance (β)	0.0195		
Approximate Chi Square Value (3.25, α)	0.451	Adjusted Chi Square Value (3.25, β)	0.262
95% Gamma Approximate UCL (use when n>=50)	882.2	95% Gamma Adjusted UCL (use when n<50)	1518
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	123.4	SD (KM)	209.3
Variance (KM)	43793	SE of Mean (KM)	82.72
k hat (KM)	0.348	k star (KM)	0.301
nu hat (KM)	5.564	nu star (KM)	4.811
theta hat (KM)	354.9	theta star (KM)	410.4
80% gamma percentile (KM)	189.4	90% gamma percentile (KM)	363.9
95% gamma percentile (KM)	564.1	99% gamma percentile (KM)	1084
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (4.81, α)	1.066	Adjusted Chi Square Value (4.81, β)	0.69
95% Gamma Approximate KM-UCL (use when n>=50)	557	95% Gamma Adjusted KM-UCL (use when n<50)	860
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.986	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.143	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	122.5	Mean in Log Scale	2.343
SD in Original Scale	224.3	SD in Log Scale	3.09
95% t UCL (assumes normality of ROS data)	272.7	95% Percentile Bootstrap UCL	259.8
95% BCA Bootstrap UCL	316.9	95% Bootstrap t UCL	861.8
95% H-UCL (Log ROS)	61950364		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	3.084	KM Geo Mean	21.85
KM SD (logged)	2.018	95% Critical H Value (KM-Log)	6.186
KM Standard Error of Mean (logged)	0.798	95% H-UCL (KM -Log)	18738
KM SD (logged)	2.018	95% Critical H Value (KM-Log)	6.186
KM Standard Error of Mean (logged)	0.798		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	122.8	Mean in Log Scale	2.824
SD in Original Scale	224.1	SD in Log Scale	2.442
95% t UCL (Assumes normality)	272.9	95% H-Stat UCL	305752
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 5% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	280.1		

	A–L
1700	
1701	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
1702	Recommendations are based upon data size, data distribution, and skewness.
1703	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
1704	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.
1705	

Appendix E - Laboratory certificates

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8259 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENT ☐ Standard TAT (List due date):		FOR LABORATORY USE ONLY (Circle)
OFFICE: level 15, 133 Castlereagh St, Sydney	(Standard TAT may be longer for some tests e.g. Ultra Trace) ☐ Non Standard or urgent TAT (List due date):		Custody Seal Intact? Yes No N/A
PROJECT: 12517046	ALS QUOTE NO.: SY-552-19	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 8.9 °C
PROJECT MANAGER: Carmen Yi CONTACT PH: 0451 962 988		OF: 1 2 3 4 5 6 7	Other comment:

	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
SAMPLER: Sarah Eccleshall SAMPLER MOBILE: 0459 546 332				
COC emailed to ALS? (YES / NO) EDD FORMAT (or default):	S. Eccleshall	Sp - ALS Crows Nest		Scoffle ALS
Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com	DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed):	31/10/19 5:15 pm	31/10/19 1715		31/10/19 1845

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).															
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (pH field ad pHfox)	Phenols	TRH	BTEXN	TOC	TCN	OC/OP/PCB	PAH	Total Fluoride	VOCs	Particle Size distribution	ICMPS Metals (15 metals + low level Hg)				Hold
1	VC09_0.0-0.2	30/10/2019 20:45	S	Jar	1		x	x	x	x	x	x	x				x				
2	VC09_0.4-0.6	30/10/2019 20:45	S	Jar	1																x
3	VC09_0.7-0.8	30/10/2019 20:45	S	Jar	1																x
4	VC09_0.8-1.0	30/10/2019 20:45	S	Jar	1																x
5	VC09_0.0-0.5	30/10/2019 20:45	S	Jar	2																x
6	VC09_0.5-1.0	30/10/2019 20:45	S	Jar	2																x
7	VC07_0.0-0.2	30/10/2019 21:00	S	Jar	1		x	x	x	x	x	x	x	x	x		x				
8	VC07_0.5-0.6	30/10/2019 21:00	S	Jar	1																x
9	VC07_0.7-0.8	30/10/2019 21:00	S	Jar	1																x
10	VC07_1.0-1.2	30/10/2019 21:00	S	Jar	1																x
11	VC07_0.0-0.5	30/10/2019 21:00	S	jar and B	4				x	x	x										
12	VC07_0.5-1.0	30/10/2019 21:00	S	Jar	3																x
				TOTAL																	

Subcon / Forward Lab / Split WO
Lab / Analysis:
Organised By / Date:
Relinquished By / Date:
Connote / Courier:
WO No:
Attach By PO / Internal Sheet:

Environmental Division
Sydney
Work Order Reference
ES1936029

Telephone : + 61-2-8784 8555

Subcon / Forward Lab / Split WO
Lab / Analysis:
Organised By / Date:
Relinquished By / Date:
Connote / Courier:
WO No:
Attach By PO / Internal Sheet:

Subcon / Forward Lab / Split WO
Lab / Analysis:
Organised By / Date:
Relinquished By / Date:
Connote / Courier:
WO No:
Attach By PO / Internal Sheet:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS

CHAIN OF CUSTODY

ALS Laboratory. please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENT	☐ Standard TAT (List due date):	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: level 15, 133 Castlereagh St, Sydney	(Standard TAT may be longer for some tests e.g.. Ultra Trace	☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: 12517046	ALS QUOTE NO.: SY-552-19	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 3.9 °C
PROJECT MANAGER: Carmen Yi	CONTACT PH: 0451 962 988	OF: 1 2 3 4 5 6 7	Other comment:

SAMPLER: Sarah Eccleshall	SAMPLER MOBILE: 0459 546 332	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	S. Eccleshall	Sep M.		[illegible]
Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com		DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed):					31/10/19 1845

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please inform GHD contacts of any possible holding time issues that are pecieved with these samples

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).															
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (pH field ad pHfox)	Phenols	TRH	BTEXN	TOC	TCN	OC/OP/PCB	PAH	Total Fluoride	VOCs	Particle Size distribution	ICMPS Metals (15 metals + low level Hg)				Hold
13	VC03_0.0-0.1	30/10/2019 22:15	S	ASS	1	x															
14	VC03_0.5-0.6	30/10/2019 22:15	S	ASS	1	x															
15	VC03_10-1.1	30/10/2019 22:15	S	ASS	1	x															
16	VC01_0.0-0.1	30/10/2019 23:45	S	ASS	1	x															
17	vc01_0.5-0.6	30/10/2019 23:45	S	ASS	1	x															
18	VC01_1.0-1.1	30/10/2019 23:45	S	ASS	1	x															
19	VC02_0.0-0.1	30/10/2019 23:45	S	ASS	1	x															
20	VC02_0.5-0.6	30/10/2019 23:45	S	ASS	1	x															
21	VC02_0.9-1.0	30/10/2019 23:45	S	ASS	1	x															
22	VC02_1.5-1.6	30/10/2019 23:45	S	ASS	1	x															
23	VC10_0.0-0.1	31/10/2019 0:45	S	ASS	1	x															
24	VC10_0.5-0.6	31/10/2019 0:45	S	ASS	1	x															
				TOTAL		12															

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS

CHAIN OF CUSTODY

ALS Laboratory: please tick →

□ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
□BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
□GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
□MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
□MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
□MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
□NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
□NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
□PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
□SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
□TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
□WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd

OFFICE: level 15, 133 Castlereagh St, Sydney

PROJECT: 12517046

ORDER NUMBER:

PROJECT MANAGER: Carmen Yi — CONTACT PH: 0451 962 988

SAMPLER: Sarah Eccleshall — SAMPLER MOBILE: 0459 546 332

COC emailed to ALS? (YES / NO) — EDD FORMAT (or default):

Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com

Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENT (Standard TAT may be longer for some tests e.g., Ultra Trace
☐ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: SY-552-19

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: 3.9 °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
S. Eccleshall	Dep M.		Sasstighe AS
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME: 31/10/19 1845

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please inform GHD contacts of any possible holding time issues that are pecieved with these samples

ALS USE — SAMPLE DETAILS MATRIX: SOLID (S) WATER (W) — CONTAINER INFORMATION — ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (pH field ad pHfox)	Phenols	TRH	BTEXN	TOC	TCN	OC/OP/PCB	PAH	Total Fluoride	VOCs	Particle Size distribution	ICMPS Metals (15 metals + low level Hg)				Hold
25	VC11_0.0-0.1	30/10/2019 20:00	S	ASS	1	x															
26	VC11_0.5-0.6	30/10/2019 20:00	S	ASS	1	x															
27	VC11_1.0-1.1	30/10/2019 20:00	S	ASS	1	x															
28	VC09_0.0-0.1	30/10/2019 20:45	S	ASS	1	x															
29	VC09_0.5-0.6	30/10/2019 20:45	S	ASS	1	x															
30	VC09_0.9-1.0	30/10/2019 20:45	S	ASS	1	x															
31	VC07_0.0-0.1	30/10/2019 21:00	S	ASS	1	x															
32	VC07_0.5-0.6	30/10/2019 21:00	S	ASS	1	x															
33	VC07_1.0-1.1	30/10/2019 21:00	S	ASS	1	x															
34	VC05_0.0-0.1	30/10/2019 21:45	S	ASS	1	x															
35	VC05_0.5-0.6	30/10/2019 21:45	S	ASS	1	x															
36	VC05_0.8-1.0	30/10/2019 21:45	S	ASS	1	x															
				TOTAL		12															

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS

ALS Laboratory: please tick →

CHAIN OF CUSTODY

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd
OFFICE: level 15, 133 Castlereagh St, Sydney
PROJECT: 12517046
ORDER NUMBER:
PROJECT MANAGER: Carmen Yi **CONTACT PH:** 0451 962 988
SAMPLER: Sarah Eccleshall **SAMPLER MOBILE:** 0459 546 332
COC emailed to ALS? (YES / NO) **EDD FORMAT (or default):**
Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com
Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENT (Standard TAT may be longer for some tests e.g. Ultra Trace
☐ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: SY-552-19

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C 3.9
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
S. Eccleshall	Sep M.		Sonyyu ALS
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME: 31/10/19 1845

ALS USE | **SAMPLE DETAILS** MATRIX: SOLID (S) WATER (W) | **CONTAINER INFORMATION** | **ANALYSIS REQUIRED including SUITES** (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (pH field ad pHfox)	Phenols	TRH	BTEXN	TOC	TCN	OC/OP/PCB	PAH	Total Fluoride	VOCs	Particle Size distribution	ICMPS Metals (15 metals + low level Hg)				Hold
37	VC04_0.0-0.1	31/10/2019 1:00	S	ASS	1	x															
38	VC04_0.9-1.0	31/10/2019 1:00	S	ASS	1	x															
39	VC11_0.0-0.2	30/10/2019 20:00	S	JAR	1																x
40	VC11_0.5-0.7	30/10/2019 20:00	S	JAR	1		x	x	x	x	x	x	x	x	x		x				
41	VC11_1.0-1.2	30/10/2019 20:00	S	JAR	1																x
42	VC11_0.0-0.5	30/10/2019 20:00	S	JAR	3																x
43	VC11_0.5-1.0	30/10/2019 20:00	S	JAR	3																x
44	VC07_0.2-0.4	30/10/2019 21:00	S	JAR	1																x
					TOTAL																

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd
OFFICE: level 15, 133 Castlereagh St, Sydney
PROJECT: 12517046
ORDER NUMBER:
PROJECT MANAGER: Carmen Yi **CONTACT PH:** 0451 962 988
SAMPLER: Sarah Eccleshall **SAMPLER MOBILE:** 0459 546 332
COC emailed to ALS? (YES / NO) **EDD FORMAT (or default):**
Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com
Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENT (Standard TAT may be longer for some tests e.g., Ultra Trace)
☐ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: SY-552-19

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: 3.9 °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
S. Eccleshall	Sep M.		Saysthoyhu AJ
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME: 31/10/19 1845

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).															
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (pH field ad pHfox)	Phenols	TRH	BTEXN	TOC	TCN	OC/OP/PCB	PAH	Total Fluoride	VOCs	Particle Size distribution	ICMPS Metals (15 metals + low level Hg)				Hold
45	VC05_0.0-0.1	30/10/2019 21:45	S	jar	1																x
46	VC05_0.5-0.7	30/10/2019 21:45	S	jar	1																x
47	VC05_0.8-0.9	30/10/2019 21:45	S	jar	1		x	x	x	x	x	x	x	x	x		x				
48	VC05_0.0-0.5	30/10/2019 21:45	S	jar	3																x
49	VC05_0.5-0.9	30/10/2019 21:45	S	jar	3																x
50	VC03_0.0-0.2	30/10/2019 22:15	S	Jar	1																x
51	VC03_0.3-0.4	30/10/2019 22:15	S	Jar	1		x	x	x	x	x	x	x	x	x		x				x
52	VC03_0.4-0.6	30/10/2019 22:15	S	Jar	1																x
53	VC03_0.6-0.7	30/10/2019 22:15	S	Jat	1																x
54	VC03_1.0-1.2	30/10/2019 22:15	S	Jar	1																x
55	VC03_0.0-0.5	30/10/2019 22:15	S	jar & B	4		x	x	x	x	x	x	x			x	x				
56	VC03_0.5-1.0	30/10/2019 22:15	S	jar	3																x
				TOTAL																	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag

ALS

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd

OFFICE: level 15, 133 Castlereagh St, Sydney

PROJECT: 12517046

ORDER NUMBER:

PROJECT MANAGER: Carmen Yi — CONTACT PH: 0451 962 988

SAMPLER: Sarah Eccleshall — SAMPLER MOBILE: 0459 546 332

COC emailed to ALS? (YES / NO) — EDD FORMAT (or default):

Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com

Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENT (Standard TAT may be longer for some tests e.g. Ultra Trace
☐ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: SY-552-19

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: 3.9 °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
S. Eccleshall	Sep Mc		Sops Kyle Ped
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME: 31/10/19 1845

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE | SAMPLE DETAILS MATRIX: SOLID (S) WATER (W) | CONTAINER INFORMATION | ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (pH field ad pHfox)	Phenols	TRH	BTEXN	TOC	TCN	OC/OP/PCB	PAH	Total Fluoride	VOCs	Particle Size distribution	ICMPS Metals (15 metals + low level Hg)				Hold
57	VC04_0.0-0.1	31/10/2019 1:00	S	jar	1																x
58	VC04_0.4-0.5	31/10/2019 1:00	S	jar	1		x	x	x	x	x	x	x				x				
59	VC04_0.5-0.6	31/10/2019 1:00	S	jar	1																x
60	VC04_0.7-0.8	31/10/2019 1:00	S	jar	1																x
61	VC04_0.9-1.0	31/10/2019 1:00	S	jar	1																x
62	VC04_0.0-0.5	31/10/2019 1:00	S	jar	3																x
63	VC04_0.5-1.0	31/10/2019 1:00	S	jar and bag	4		x	x	x	x	x	x	x			x	x				
64	VC02_0.0-0.2	30/10/2019 23:45	S	jar	1																x
65	VC02_0.5-0.6	30/10/2019 23:45	S	jar	1																x
66	VC02_1.0-1.2	30/10/2019 23:45	S	jar	1																x
67	VC02_1.5-1.6	30/10/2019 23:45	S	jar	1		x	x	x	x	x	x	x				x				
68	VC02_1.0-1.5	30/10/2019 23:45	S	jar	3																x
				TOTAL																	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle, E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd

OFFICE: level 15, 133 Castlereagh St, Sydney

PROJECT: 12517046

ORDER NUMBER:

PROJECT MANAGER: Carmen Yi CONTACT PH: 0451 962 988

SAMPLER: Sarah Eccleshall SAMPLER MOBILE: 0459 546 332

COC emailed to ALS? (YES / NO) EDD FORMAT (or default):

Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com

Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENT (Standard TAT may be longer for some tests e.g., Ultra Trace ☐ Standard TAT (List due date): ☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: SY-552-19

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: 3.9 °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
S. Eccleshall	Sep M.		Sanyi Ags
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME: 31/10/19 1845

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE | SAMPLE DETAILS MATRIX: SOLID (S) WATER (W) | CONTAINER INFORMATION

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (pH field ad pHfox)	Phenols	TRH	BTEXN	TOC	TCN	OC/OP/PCB	PAH	Total Fluoride	VOCs	Particle Size distribution	ICMPS Metals (15 metals + low level Hg)				Hold
69	VC01_0.0-0.2	30/10/2019 23:45	S	jar	1																x
70	vc01_0.4-0.6	30/10/2019 23:45	S	jar	1																x
71	VC01_1.0-1.1	30/10/2019 23:45	S	jar	1		x	x	x	x	x	x	x				x				
72	VC01_0.0-0.5	30/10/2019 23:45	S	jar	3																
73	VC01_0.5-1.0	30/10/2019 23:45	S	jar and bag	4		x	x	x	x	x	x	x			x	x				x
74	VC10_0.0-0.2	31/10/2019 0:45	S	jar	1																x
75	VC10_0.5-0.6	31/10/2019 0:45	S	jar	1																x
76	VC10_0.7-0.8	31/10/2019 0:45	S	jar	1		x	x	x	x	x	x	x				x				
77	VC10_0.0-0.5	31/10/2019 0:45	S	jar ad b	4		x	x	x	x	x	x	x			x	x				
78	VC10_0.5-1.0	31/10/2019 0:45	S	jar	3																x
79	VC02_0.0-0.5	30/10/2019 23:45	S	jar and b	4		x	x	x	x	x	x	x			x	x				
80	VC02_0.5-1.0	30/10/2019 23:45	S	jar	3																x
				TOTAL																	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com	☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com	☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com	☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com	☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com	☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com	☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com	☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com	☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com	☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd

OFFICE: level 15, 133 Castlereagh St, Sydney

PROJECT: 12517045

ORDER NUMBER:

PROJECT MANAGER: Carmen Yi — CONTACT PH: 0451 962 988

SAMPLER: Sarah Eccleshall — SAMPLER MOBILE: 0459 546 332

COC emailed to ALS? (YES / NO) — EDD FORMAT (or default):

Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com

Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENT (Standard TAT may be longer for some tests e.g.. Ultra Trace
☐ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: SY-552-19

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 8
OF: 1 2 3 4 5 6 8

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: 3.9 °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
S. Eccleshall	Sep M.		Soystegho Ay
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME: 31/10/19 1845

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).															
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (pH field ad pHfox)	Phenols	TRH	BTEXN	TOC	TCN	OC/OP/PCB	PAH	Total Fluoride	VOCs	Particle Size distribution	ICMPS Metals (15 metals + low level Hg)	8 metals	TRH C6-C10	BTEX	Hold
81	FD01	30/10/2019	S	JAR	1		x	x	x	x	x	x	x				x				
—	FD02	30/10/2019	S	JAR	1		x	x	x	x	x	x	x				x	Please forward to eurofins			
82	FD03	30/10/2019	S	JAR																	x
83	FD05	31/10/2019	S	Jar	1		x	x	x	x	x	x	x				x				
84	RIN_01	30/10/2019 0:00	W		4			x	x				x					x			
85	TS1	30/10/2019 0:00	S	jar					x												
86	TB1	30/10/2019 0:00	S	jar															x	x	
87	TSC																				
				TOTAL																	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

8.11.19 TBT / SVOC

Kim Phan

From: Loren Schiavon
Sent: Thursday, 7 November 2019 10:26 AM
To: Kim Phan
Subject: FW: [EXTERNAL] - RE: Additional analysis requerst for: ES1936029:
Attachments: image001.png; image002.png; image003.png; image004.png

Environmental Division
Sydney
Work Order Reference
ES1936029

Telephone : +61-2-8784 8555

Hi Kim,

Can I get you to assist with this one?

We need to add in the testing requested below to two active work orders. Please leave the current due dates and email CS to send a prelim - we then need to create the separate batches for the dioxins. Vanessa has confirmed 10 days from receipt for the TBT.

Thanks.

Kind Regards
Loren Schiavon
Sample Administration Coordinator, Environmental

T +61 2 8784 8555
F +61 2 8784 8500
Loren.schiavon@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164
AUSTRALIA

Subcon / Forward Lab / Split WO
Lab / Analysis: Brisbane
Organised By / Date: TBT - 11, 63, 73.
Relinquished By / Date:
Connote / Courier:
WO No: ES1936029
Attach By PO / Internal Sheet:

7.11.19

Right Solutions • Right Partner
https://aus01.safelinks.protection.outlook.com/?url=www.alsglobal.com&data=02%7C01%7CKim.Phan%40alsglobal.com%7C822e6d0d1a2e415fdefc08d76310b269%7C485ca04e6f7440509764cdb4bfa89c25%7C0%7C0%7C637086795685299636&sdata=EyqawOcQknLkqagzwxAPSDeCzRtw1wXYtpWrHbo9C1E%3D&reserved=0

-----Original Message-----
From: Grace White
Sent: Thursday, 7 November 2019 8:52 AM
To: Loren Schiavon <loren.schiavon@alsglobal.com>
Subject: FW: [EXTERNAL] - RE: Additional analysis requerst for: ES1936029:

Hey Loren,

Can you please organise making the below amendments?

Thank you!

Grace White
Client Services Officer, Environmental
Sydney

T +61 2 8784 8555 D +61 2 8784 8531
F +61 2 8784 8500
grace.white@alsglobal.com
277-289 Woodpark Road
Smithfield, NSW, 2164

https://aus01.safelinks.protection.outlook.com/?url=www.alsglobal.com&data=02%7C01%7CKim.Phan%40alsglobal.com%7C822e6d0d1a2e415fdefc08d76310b269%7C485ca04e6f7440509764cdb4bfa89c25%7C0%7C0%7C637086795685299636&sdata=EyqawOcQknLkqagzwxAPSDeCzRtw1wXYtpWrHbo9C1E%3D&reserved=0

-----Original Message-----
From: Carmen Yi [mailto:Carmen.Yi@ghd.com]
Sent: Wednesday, 6 November 2019 11:07 PM
To: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Cc: Sarah.Eccleshall@ghd.com; Brenda Hong <Brenda.Hong@alsglobal.com>
Subject: [EXTERNAL] - RE: Additional analysis requerst for: ES1936029:

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi ALS team,

We have now received approval to go ahead with the TBT, dioxin and SVOC tests for ES1936183 and ES1936029. Would you please test the following samples on standard turnaround time please?

ES1936183

VC08_1.0-1.5

VC12_0.0-0.5

ES1936029

VC01_0.5-1.0 73

VC04_0.5-1.0 63

VC07_0.0-0.5 11

Kind regards

Carmen Yi

B81

Vishal Patel

From: Angus Harding
Sent: Tuesday, 3 December 2019 2:21 PM
To: Vishal Patel
Cc: Loren Schiavon
Subject: FW: [EXTERNAL] - RE: ES1938004

Hey Vishal,

Could you get down sample 055 from ES1936029 (S685-S690) if we still have the jar we will need to send to EB for TBT.

Cheers.

Kind Regards,

Angus Harding

Client Services Officer, Environmental
Sydney

T +61 2 8784 8555
F +61 2 8784 8500
D +61 2 8784 8503
angus.harding@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA

Environmental Division
Sydney
Work Order Reference
ES1936029

Telephone : +61-2-8784 8555

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1936029**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Jessica Watson	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jessica.watson@ghd.com	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 12517046	Page	: 1 of 6
Order number	: ----	Quote number	: ES2019GHDSER0030 (SY/522/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Sarah Eccleshall		

Dates

Date Samples Received	: 31-Oct-2019 17:15	Issue Date	: 07-Nov-2019
Client Requested Due Date	: 07-Nov-2019	Scheduled Reporting Date	: **07-Nov-2019**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 3.9'C - Ice present
Receipt Detail	: ESKIES	No. of samples received / analysed	: 87 / 47

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- 1/11/19: This is an updated SRN which indicates the updated analysis as discussed wih Sarah.
- 4/11/19: This is an updated SRN which indicates the updated code for phenol analysis.
- 6/11/19: This is an updated SRN which indicates total metals for the sample RIN_01.
- **FD02 forward to Eurofins.**
- **Sample with ID VC04_0.4-0.5 not received but was labelled with ID VC04_0.3-0.4.**
- **07/11/19: This is an updated SRA which indicates TBT and SVOC for the samples VC07_0.0-0.5 (#11), VC04_0.5-1.0 (#63), VC01_0.5-1.0 (#73).**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **ASS Field Screen and TOC analysis will be conducted by ALS Brisbane.**
- **Fluoride and PSD analysis will be conducted by ALS Newcastle.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Preliminary results will be available on the scheduled reporting date listed in this report. However the final report with TBT and SVOC analysis will be complete on 21/11/19.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA055-103 Moisture Content	SOIL - EK026SF (Solids) Total Cyanide By Segmented Flow Analyser	SOIL - EP003 Total Organic Carbon (TOC) in Soil	SOIL - EP071 - SD TRH ultra trace in sediments	SOIL - EP080-SD TRH(V)/BTEXN in Sediments	SOIL - SD-02 OC/OP/PCB/PAH ultra trace	SOIL - SD-03 Metals by ICPMS (15 metals + low level Hg)
ES1936029-001	30-Oct-2019 00:00	VC09_0.0-0.2	✓	✓	✓	✓	✓	✓	✓
ES1936029-007	30-Oct-2019 00:00	VC07_0.0-0.2	✓	✓	✓	✓	✓	✓	✓
ES1936029-011	30-Oct-2019 00:00	VC07_0.0-0.5	✓	✓	✓	✓	✓	✓	✓
ES1936029-040	30-Oct-2019 00:00	VC11_0.5-0.7	✓	✓	✓	✓	✓	✓	✓
ES1936029-047	30-Oct-2019 00:00	VC05_0.8-0.9	✓	✓	✓	✓	✓	✓	✓
ES1936029-051	30-Oct-2019 00:00	VC03_0.3-0.4	✓	✓	✓	✓	✓	✓	✓
ES1936029-055	30-Oct-2019 00:00	VC03_0.0-0.5	✓	✓	✓	✓	✓	✓	✓
ES1936029-058	30-Oct-2019 00:00	VC04_0.3-0.4	✓	✓	✓	✓	✓	✓	✓
ES1936029-063	30-Oct-2019 00:00	VC04_0.5-1.0	✓	✓	✓	✓	✓	✓	✓
ES1936029-067	30-Oct-2019 00:00	VC02_1.5-1.6	✓	✓	✓	✓	✓	✓	✓
ES1936029-071	30-Oct-2019 00:00	VC01_1.0-1.1	✓	✓	✓	✓	✓	✓	✓
ES1936029-073	30-Oct-2019 00:00	VC01_0.5-1.0	✓	✓	✓	✓	✓	✓	✓
ES1936029-076	30-Oct-2019 00:00	VC10_0.7-0.8	✓	✓	✓	✓	✓	✓	✓
ES1936029-077	31-Oct-2019 00:00	VC10_0.0-0.5	✓	✓	✓	✓	✓	✓	✓
ES1936029-079	31-Oct-2019 00:00	VC02_0.0-0.5	✓	✓	✓	✓	✓	✓	✓
ES1936029-081	30-Oct-2019 00:00	FD01	✓	✓	✓	✓	✓	✓	✓
ES1936029-083	31-Oct-2019 00:00	FD05	✓	✓	✓	✓	✓	✓	✓

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	(On Hold) SOIL No analysis requested	SOIL - EA150H Particle Size Analysis by Hydrometer: AS1289	SOIL - EK040T Total Fluoride	SOIL - EP074 (solids) Volatile Organic Compounds	SOIL - EP075 (solids) Semivolatile Organic Compounds	SOIL - EP075 SIM Phenols only SIM - Phenols only	SOIL - EP090 (solids) Organotins
ES1936029-001	30-Oct-2019 00:00	VC09_0.0-0.2						✓	
ES1936029-002	30-Oct-2019 00:00	VC09_0.4-0.6	✓						
ES1936029-003	30-Oct-2019 00:00	VC09_07-0.8	✓						
ES1936029-004	30-Oct-2019 00:00	VC09_0.8-1.0	✓						
ES1936029-005	30-Oct-2019 00:00	VC09_0.0-0.5	✓						
ES1936029-006	30-Oct-2019 00:00	VC09_0.5-1.0	✓						
ES1936029-007	30-Oct-2019 00:00	VC07_0.0-0.2			✓	✓		✓	

			(On Hold) SOIL No analysis requested	SOIL - EA150H Particle Size Analysis by Hydrometer: AS1289	SOIL - EK040T Total Fluoride	SOIL - EP074 (solids) Volatile Organic Compounds	SOIL - EP075 (solids) Semivolatile Organic Compounds	SOIL - EP075 SIM Phenols only SIM - Phenols only	SOIL - EP090 (solids) Organotins
ES1936029-008	30-Oct-2019 00:00	VC07_0.5-0.6	✓						
ES1936029-009	30-Oct-2019 00:00	VC07_0.7-0.8	✓						
ES1936029-010	30-Oct-2019 00:00	VC07_1.0-1.2	✓						
ES1936029-011	30-Oct-2019 00:00	VC07_0.0-0.5		✓			✓	✓	✓
ES1936029-012	30-Oct-2019 00:00	VC07_0.5-1.0	✓						
ES1936029-039	30-Oct-2019 00:00	VC11_0.0-0.2	✓						
ES1936029-040	30-Oct-2019 00:00	VC11_0.5-0.7			✓	✓		✓	
ES1936029-041	30-Oct-2019 00:00	VC11_1.0-1.2	✓						
ES1936029-042	30-Oct-2019 00:00	VC11_0.0-0.5	✓						
ES1936029-043	30-Oct-2019 00:00	VC11_0.5-1.0	✓						
ES1936029-044	30-Oct-2019 00:00	VC07_0.2-0.4	✓						
ES1936029-045	30-Oct-2019 00:00	VC05_0.0-0.1	✓						
ES1936029-046	30-Oct-2019 00:00	VC05_0.5-0.7	✓						
ES1936029-047	30-Oct-2019 00:00	VC05_0.8-0.9			✓	✓		✓	
ES1936029-048	30-Oct-2019 00:00	VC05_0.0-0.5	✓						
ES1936029-049	30-Oct-2019 00:00	VC03_0.5-0.9	✓						
ES1936029-050	30-Oct-2019 00:00	VC03_0.0-0.2	✓						
ES1936029-051	30-Oct-2019 00:00	VC03_0.3-0.4			✓	✓		✓	
ES1936029-052	30-Oct-2019 00:00	VC03_0.4-0.6	✓						
ES1936029-053	30-Oct-2019 00:00	VC03_0.6-0.7	✓						
ES1936029-054	30-Oct-2019 00:00	VC03_1.0-1.2	✓						
ES1936029-055	30-Oct-2019 00:00	VC03_0.0-0.5		✓				✓	
ES1936029-056	30-Oct-2019 00:00	VC03_0.5-1.0	✓						
ES1936029-057	30-Oct-2019 00:00	VC04_0.0-0.1	✓						
ES1936029-058	30-Oct-2019 00:00	VC04_0.3-0.4						✓	
ES1936029-059	30-Oct-2019 00:00	VC04_0.5-0.6	✓						
ES1936029-060	30-Oct-2019 00:00	VC04_0.7-0.8	✓						
ES1936029-061	30-Oct-2019 00:00	VC04_0.9-1.0	✓						
ES1936029-062	30-Oct-2019 00:00	VC04_0.0-0.5	✓						
ES1936029-063	30-Oct-2019 00:00	VC04_0.5-1.0		✓			✓	✓	✓
ES1936029-064	30-Oct-2019 00:00	VC02_0.0-0.2	✓						
ES1936029-065	30-Oct-2019 00:00	VC02_0.5-0.6	✓						
ES1936029-066	30-Oct-2019 00:00	VC02_1.0-1.2	✓						
ES1936029-067	30-Oct-2019 00:00	VC02_1.5-1.6						✓	
ES1936029-068	30-Oct-2019 00:00	VC02_1.0-1.5	✓						
ES1936029-069	30-Oct-2019 00:00	VC01_0.0-0.2	✓						
ES1936029-070	30-Oct-2019 00:00	VC01_0.4-0.6	✓						
ES1936029-071	30-Oct-2019 00:00	VC01_1.0-1.1						✓	
ES1936029-072	30-Oct-2019 00:00	VC01_0.0-0.5	✓						
ES1936029-073	30-Oct-2019 00:00	VC01_0.5-1.0		✓			✓	✓	✓
ES1936029-074	31-Oct-2019 00:00	VC10_0.0-0.2	✓						

			(On Hold) SOIL No analysis requested	SOIL - EA150H Particle Size Analysis by Hydrometer: AS1289	SOIL - EK040T Total Fluoride	SOIL - EP074 (solids) Volatile Organic Compounds	SOIL - EP075 (solids) Semivolatile Organic Compounds	SOIL - EP075 SIM Phenols only SIM - Phenols only	SOIL - EP090 (solids) Organotins
ES1936029-075	31-Oct-2019 00:00	VC10_0.5-0.6	✓						
ES1936029-076	30-Oct-2019 00:00	VC10_0.7-0.8						✓	
ES1936029-077	31-Oct-2019 00:00	VC10_0.0-0.5		✓				✓	
ES1936029-078	31-Oct-2019 00:00	VC10_0.5-1.0	✓						
ES1936029-079	31-Oct-2019 00:00	VC02_0.0-0.5		✓				✓	
ES1936029-080	31-Oct-2019 00:00	VC02_0.5-1.0	✓						
ES1936029-081	30-Oct-2019 00:00	FD01						✓	
ES1936029-082	30-Oct-2019 00:00	FD03	✓						
ES1936029-083	31-Oct-2019 00:00	FD05						✓	

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA037 ASS Field Screening Analysis	SOIL - S-18 (NO MOIST) TRH(C6-C9)/BTEXN with No Moisture for TBs
ES1936029-013	30-Oct-2019 00:00	VC03_0.0-0.1	✓	
ES1936029-014	30-Oct-2019 00:00	VC03_0.5-0.6	✓	
ES1936029-015	30-Oct-2019 00:00	VC03_1.0-1.1	✓	
ES1936029-016	30-Oct-2019 00:00	VC01_0.0-0.1	✓	
ES1936029-017	30-Oct-2019 00:00	VC01_0.5-0.6	✓	
ES1936029-018	30-Oct-2019 00:00	VC01_1.0-1.1	✓	
ES1936029-019	30-Oct-2019 00:00	VC02_0.0-0.1	✓	
ES1936029-020	30-Oct-2019 00:00	VC02_0.5-0.6	✓	
ES1936029-021	30-Oct-2019 00:00	VC02_0.9-1.0	✓	
ES1936029-022	30-Oct-2019 00:00	VC02_1.5-1.6	✓	
ES1936029-023	31-Oct-2019 00:00	VC10_0.0-0.1	✓	
ES1936029-024	31-Oct-2019 00:00	VC10_0.5-0.6	✓	
ES1936029-025	30-Oct-2019 00:00	VC11_0.0-0.1	✓	
ES1936029-026	30-Oct-2019 00:00	VC11_0.5-0.6	✓	
ES1936029-027	30-Oct-2019 00:00	VC11_1.0-1.1	✓	
ES1936029-028	30-Oct-2019 00:00	VC09_0.0-0.1	✓	
ES1936029-029	30-Oct-2019 00:00	VC09_0.5-0.6	✓	
ES1936029-030	30-Oct-2019 00:00	VC09_0.9-1.0	✓	
ES1936029-031	30-Oct-2019 00:00	VC07_0.0-0.1	✓	
ES1936029-032	30-Oct-2019 00:00	VC07_0.5-0.6	✓	
ES1936029-033	30-Oct-2019 00:00	VC07_1.0-1.1	✓	

			SOIL - EA037 ASS Field Screening Analysis	SOIL - S-18 (NO MOIST) TRH(C6-C9)/BTEXN with No Moisture for TBs
ES1936029-034	30-Oct-2019 00:00	VC05_0.0-0.1	✓	
ES1936029-035	30-Oct-2019 00:00	VC05_0.5-0.6	✓	
ES1936029-036	30-Oct-2019 00:00	VC05_0.8-1.0	✓	
ES1936029-037	31-Oct-2019 00:00	VC04_0.0-0.1	✓	
ES1936029-038	31-Oct-2019 00:00	VC04_0.9-1.0	✓	
ES1936029-085	31-Oct-2019 00:00	TS1		✓
ES1936029-086	30-Oct-2019 00:00	TB1		✓
ES1936029-087	31-Oct-2019 00:00	TSC		✓

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - W-02T 8 metals (Total)	WATER - W-26 TRH/BTEXN/PAH/8 Metals
ES1936029-084	30-Oct-2019 00:00	RIN_01	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (Hobart)		
- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com
Accounts Payable Australia		
- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com
CARMEN YI		
- *AU Certificate of Analysis - NATA (COA)	Email	carmen.yi@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	carmen.yi@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	carmen.yi@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	carmen.yi@ghd.com
- A4 - AU Tax Invoice (INV)	Email	carmen.yi@ghd.com
- Chain of Custody (CoC) (COC)	Email	carmen.yi@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	carmen.yi@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	carmen.yi@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	carmen.yi@ghd.com
GHD LAB REPORTS		
- *AU Certificate of Analysis - NATA (COA)	Email	ghdlabreports@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ghdlabreports@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ghdlabreports@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ghdlabreports@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ghdlabreports@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ghdlabreports@ghd.com
SARAH ECCLESHALL		
- *AU Certificate of Analysis - NATA (COA)	Email	sarah.eccleshall@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sarah.eccleshall@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sarah.eccleshall@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	sarah.eccleshall@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	sarah.eccleshall@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	sarah.eccleshall@ghd.com

CERTIFICATE OF ANALYSIS

Work Order	: **ES1936029**	Page	: 1 of 60
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Jessica Watson	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 31-Oct-2019 17:15
Order number	: ----	Date Analysis Commenced	: 01-Nov-2019
C-O-C number	: ----	Issue Date	: 10-Dec-2019 16:51
Sampler	: Sarah Eccleshall		
Site	: ----		
Quote number	: SY/522/19		
No. of samples received	: 87		
No. of samples analysed	: 47		

NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Diana Mesa	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Dianne Blane	Laboratory Coordinator (2IC)	Newcastle - Inorganics, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield West, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075(SIM) : LOR has been raised due to high amount of moisture present.
- EA150H: Soil Particle Density required for Hydrometer analysis according to AS 1289.3.5.1 2006 was not requested by the client. Typical sediment SPD values used for calculations and consequently NATA endorsement does not apply to hydrometer results.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP131B : Positive PCB result for particular sample ES1936029_011 is confirmed by re-extraction and re-analysis.
- EP132B-SD and EP131B : Particular sample raised LOR due to high amount of moistures is present.
- EG020: Poor precision was obtained for some Copper, Lead and Zinc on sample EM1918213-#002. Results have been confirmed by re-extraction and reanalysis.
- EP075: LOR for sample raised due to high amount of moisture present.
- EG035: Positive Hg results for ES1936029 #7,11,79 have been confirmed by reanalysis.
- EP074: Poor matrix spike recovery due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- EP080: The trip spike and its control have been analysed for volatile TPH and BTEX only. The trip spike and control were prepared in the lab using reagent grade sand spiked with petrol. The spike was dispatched from the lab and the control retained.
- EP132B-SD : Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.
- EP090 Organotin: Particular sample shows poor matrix spike recovery due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- EP090 Organotin: Particular sample shows poor matrix spike recovery for MBT due to matrix interference.
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.
- EP075: 'Sum of PAH' is the sum of the USEPA 16 priority PAHs

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.0-0.2	VC07_0.0-0.2	VC07_0.0-0.5	VC03_0.0-0.1	VC03_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-001	ES1936029-007	ES1936029-011	ES1936029-013	ES1936029-014
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	----	----	----	7.9	7.5
ø pH (Fox)	----	0.1	pH Unit	----	----	----	6.2	5.7
ø Reaction Rate	----	1	-	----	----	----	2	3
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	34.5	1.5	31.3	----	----
EA150: Particle Sizing								
+75µm	----	1	%	----	----	68	----	----
+150µm	----	1	%	----	----	63	----	----
+300µm	----	1	%	----	----	47	----	----
+425µm	----	1	%	----	----	31	----	----
+600µm	----	1	%	----	----	16	----	----
+1180µm	----	1	%	----	----	8	----	----
+2.36mm	----	1	%	----	----	4	----	----
+4.75mm	----	1	%	----	----	2	----	----
+9.5mm	----	1	%	----	----	<1	----	----
+19.0mm	----	1	%	----	----	<1	----	----
+37.5mm	----	1	%	----	----	<1	----	----
+75.0mm	----	1	%	----	----	<1	----	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	----	----	22	----	----
Silt (2-60 µm)	----	1	%	----	----	9	----	----
Sand (0.06-2.00 mm)	----	1	%	----	----	64	----	----
Gravel (>2mm)	----	1	%	----	----	5	----	----
Cobbles (>6cm)	----	1	%	----	----	<1	----	----
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	8120	3930	5550	----	----
Iron	7439-89-6	50	mg/kg	4720	11800	15600	----	----
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	----	----
Arsenic	7440-38-2	1.00	mg/kg	1.74	6.28	9.04	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
Chromium	7440-47-3	1.0	mg/kg	10.3	12.5	16.6	----	----
Copper	7440-50-8	1.0	mg/kg	<1.0	38.2	189	----	----
Cobalt	7440-48-4	0.5	mg/kg	0.8	1.4	2.4	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.0-0.2	VC07_0.0-0.2	VC07_0.0-0.5	VC03_0.0-0.1	VC03_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-001	ES1936029-007	ES1936029-011	ES1936029-013	ES1936029-014
				Result	Result	Result	Result	Result
EG020-SD: Total Metals in Sediments by ICPMS - Continued								
Lead	7439-92-1	1.0	mg/kg	10.7	67.7	110	----	----
Manganese	7439-96-5	10	mg/kg	20	34	37	----	----
Nickel	7440-02-0	1.0	mg/kg	1.8	3.0	4.4	----	----
Selenium	7782-49-2	0.1	mg/kg	0.2	0.2	0.3	----	----
Silver	7440-22-4	0.1	mg/kg	0.1	0.3	1.5	----	----
Vanadium	7440-62-2	2.0	mg/kg	15.4	11.9	16.2	----	----
Zinc	7440-66-6	1.0	mg/kg	2.9	96.6	158	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	0.02	0.84	1.61	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	<1	----	----
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	----	80	----	----	----
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.08	1.28	1.05	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	----	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	----	----	----
Styrene	100-42-5	0.5	mg/kg	----	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	----	----	----
Isopropylbenzene	98-82-8	0.5	mg/kg	----	<0.5	----	----	----
n-Propylbenzene	103-65-1	0.5	mg/kg	----	<0.5	----	----	----
1.3.5-Trimethylbenzene	108-67-8	0.5	mg/kg	----	<0.5	----	----	----
sec-Butylbenzene	135-98-8	0.5	mg/kg	----	<0.5	----	----	----
1.2.4-Trimethylbenzene	95-63-6	0.5	mg/kg	----	<0.5	----	----	----
tert-Butylbenzene	98-06-6	0.5	mg/kg	----	<0.5	----	----	----
p-Isopropyltoluene	99-87-6	0.5	mg/kg	----	<0.5	----	----	----
n-Butylbenzene	104-51-8	0.5	mg/kg	----	<0.5	----	----	----
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	5	mg/kg	----	<5	----	----	----
2-Butanone (MEK)	78-93-3	5	mg/kg	----	<5	----	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	5	mg/kg	----	<5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.0-0.2	VC07_0.0-0.2	VC07_0.0-0.5	VC03_0.0-0.1	VC03_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-001	ES1936029-007	ES1936029-011	ES1936029-013	ES1936029-014
				Result	Result	Result	Result	Result
EP074B: Oxygenated Compounds - Continued								
2-Hexanone (MBK)	591-78-6	5	mg/kg	----	<5	----	----	----
EP074C: Sulfonated Compounds								
Carbon disulfide	75-15-0	0.5	mg/kg	----	<0.5	----	----	----
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	0.5	mg/kg	----	<0.5	----	----	----
1.2-Dichloropropane	78-87-5	0.5	mg/kg	----	<0.5	----	----	----
cis-1.3-Dichloropropylene	10061-01-5	0.5	mg/kg	----	<0.5	----	----	----
trans-1.3-Dichloropropylene	10061-02-6	0.5	mg/kg	----	<0.5	----	----	----
1.2-Dibromoethane (EDB)	106-93-4	0.5	mg/kg	----	<0.5	----	----	----
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	5	mg/kg	----	<5	----	----	----
Chloromethane	74-87-3	5	mg/kg	----	<5	----	----	----
Vinyl chloride	75-01-4	5	mg/kg	----	<5	----	----	----
Bromomethane	74-83-9	5	mg/kg	----	<5	----	----	----
Chloroethane	75-00-3	5	mg/kg	----	<5	----	----	----
Trichlorofluoromethane	75-69-4	5	mg/kg	----	<5	----	----	----
1.1-Dichloroethene	75-35-4	0.5	mg/kg	----	<0.5	----	----	----
Iodomethane	74-88-4	0.5	mg/kg	----	<0.5	----	----	----
trans-1.2-Dichloroethene	156-60-5	0.5	mg/kg	----	<0.5	----	----	----
1.1-Dichloroethane	75-34-3	0.5	mg/kg	----	<0.5	----	----	----
cis-1.2-Dichloroethene	156-59-2	0.5	mg/kg	----	<0.5	----	----	----
1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	----	<0.5	----	----	----
1.1-Dichloropropylene	563-58-6	0.5	mg/kg	----	<0.5	----	----	----
Carbon Tetrachloride	56-23-5	0.5	mg/kg	----	<0.5	----	----	----
1.2-Dichloroethane	107-06-2	0.5	mg/kg	----	<0.5	----	----	----
Trichloroethene	79-01-6	0.5	mg/kg	----	<0.5	----	----	----
Dibromomethane	74-95-3	0.5	mg/kg	----	<0.5	----	----	----
1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	----	<0.5	----	----	----
1.3-Dichloropropane	142-28-9	0.5	mg/kg	----	<0.5	----	----	----
Tetrachloroethene	127-18-4	0.5	mg/kg	----	<0.5	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	----	<0.5	----	----	----
trans-1.4-Dichloro-2-butene	110-57-6	0.5	mg/kg	----	<0.5	----	----	----
cis-1.4-Dichloro-2-butene	1476-11-5	0.5	mg/kg	----	<0.5	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	----	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.0-0.2	VC07_0.0-0.2	VC07_0.0-0.5	VC03_0.0-0.1	VC03_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-001	ES1936029-007	ES1936029-011	ES1936029-013	ES1936029-014
				Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued								
1.2.3-Trichloropropane	96-18-4	0.5	mg/kg	----	<0.5	----	----	----
Pentachloroethane	76-01-7	0.5	mg/kg	----	<0.5	----	----	----
1.2-Dibromo-3-chloropropane	96-12-8	0.5	mg/kg	----	<0.5	----	----	----
Hexachlorobutadiene	87-68-3	0.5	mg/kg	----	<0.5	----	----	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	0.5	mg/kg	----	<0.5	----	----	----
Bromobenzene	108-86-1	0.5	mg/kg	----	<0.5	----	----	----
2-Chlorotoluene	95-49-8	0.5	mg/kg	----	<0.5	----	----	----
4-Chlorotoluene	106-43-4	0.5	mg/kg	----	<0.5	----	----	----
1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	----	<0.5	----	----	----
1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	----	<0.5	----	----	----
1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	----	<0.5	----	----	----
1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	----	<0.5	----	----	----
1.2.3-Trichlorobenzene	87-61-6	0.5	mg/kg	----	<0.5	----	----	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	0.5	mg/kg	----	<0.5	----	----	----
Bromodichloromethane	75-27-4	0.5	mg/kg	----	<0.5	----	----	----
Dibromochloromethane	124-48-1	0.5	mg/kg	----	<0.5	----	----	----
Bromoform	75-25-2	0.5	mg/kg	----	<0.5	----	----	----
EP074H: Naphthalene								
Naphthalene	91-20-3	1	mg/kg	----	<1	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.0-0.2	VC07_0.0-0.2	VC07_0.0-0.5	VC03_0.0-0.1	VC03_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-001	ES1936029-007	ES1936029-011	ES1936029-013	ES1936029-014
				Result	Result	Result	Result	Result
EP075A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	----	----	<0.5	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg	----	----	<0.5	----	----
2-Methylphenol	95-48-7	0.5	mg/kg	----	----	<0.5	----	----
3- & 4-Methylphenol	1319-77-3	0.5	mg/kg	----	----	<0.5	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg	----	----	<0.5	----	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	----	----	<0.5	----	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	----	----	<0.5	----	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	----	----	<0.5	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	----	----	<0.5	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	----	----	<0.5	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	----	----	<0.5	----	----
Pentachlorophenol	87-86-5	1	mg/kg	----	----	<1	----	----
EP075B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	----	<0.5	----	----
2-Methylnaphthalene	91-57-6	0.5	mg/kg	----	----	<0.5	----	----
2-Chloronaphthalene	91-58-7	0.5	mg/kg	----	----	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	----	----	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg	----	----	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	----	----	**0.7**	----	----
Anthracene	120-12-7	0.5	mg/kg	----	----	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	----	----	**1.5**	----	----
Pyrene	129-00-0	0.5	mg/kg	----	----	**1.5**	----	----
N-2-Fluorenyl Acetamide	53-96-3	0.5	mg/kg	----	----	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	**0.8**	----	----
Chrysene	218-01-9	0.5	mg/kg	----	----	**0.7**	----	----
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	----	----	**1**	----	----
7.12-Dimethylbenz(a)anthracene	57-97-6	0.5	mg/kg	----	----	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	**0.8**	----	----
3-Methylcholanthrene	56-49-5	0.5	mg/kg	----	----	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	----	**0.5**	----	----
^ Sum of PAHs	----	0.5	mg/kg	----	----	**7.5**	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.0-0.2	VC07_0.0-0.2	VC07_0.0-0.5	VC03_0.0-0.1	VC03_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-001	ES1936029-007	ES1936029-011	ES1936029-013	ES1936029-014
				Result	Result	Result	Result	Result
EP075B: Polynuclear Aromatic Hydrocarbons - Continued								
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	----	1.0	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	----	1.3	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	----	1.5	----	----
EP075C: Phthalate Esters								
Dimethyl phthalate	131-11-3	0.5	mg/kg	----	----	<0.5	----	----
Diethyl phthalate	84-66-2	0.5	mg/kg	----	----	<0.5	----	----
Di-n-butyl phthalate	84-74-2	0.5	mg/kg	----	----	<0.5	----	----
Butyl benzyl phthalate	85-68-7	0.5	mg/kg	----	----	<0.5	----	----
bis(2-ethylhexyl) phthalate	117-81-7	5.0	mg/kg	----	----	<5.0	----	----
Di-n-octylphthalate	117-84-0	0.5	mg/kg	----	----	<0.5	----	----
EP075D: Nitrosamines								
N-Nitrosomethylethylamine	10595-95-6	0.5	mg/kg	----	----	<0.5	----	----
N-Nitrosodiethylamine	55-18-5	0.5	mg/kg	----	----	<0.5	----	----
N-Nitrosopyrrolidine	930-55-2	1.0	mg/kg	----	----	<1.0	----	----
N-Nitrosomorpholine	59-89-2	0.5	mg/kg	----	----	<0.5	----	----
N-Nitrosodi-n-propylamine	621-64-7	0.5	mg/kg	----	----	<0.5	----	----
N-Nitrosopiperidine	100-75-4	0.5	mg/kg	----	----	<0.5	----	----
N-Nitrosodibutylamine	924-16-3	0.5	mg/kg	----	----	<0.5	----	----
N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	1.0	mg/kg	----	----	<1.0	----	----
Methapyrilene	91-80-5	0.5	mg/kg	----	----	<0.5	----	----
EP075E: Nitroaromatics and Ketones								
2-Picoline	109-06-8	0.5	mg/kg	----	----	<0.5	----	----
Acetophenone	98-86-2	0.5	mg/kg	----	----	<0.5	----	----
Nitrobenzene	98-95-3	0.5	mg/kg	----	----	<0.5	----	----
Isophorone	78-59-1	0.5	mg/kg	----	----	<0.5	----	----
2.6-Dinitrotoluene	606-20-2	1.0	mg/kg	----	----	<1.0	----	----
2.4-Dinitrotoluene	121-14-2	1.0	mg/kg	----	----	<1.0	----	----
1-Naphthylamine	134-32-7	0.5	mg/kg	----	----	<0.5	----	----
4-Nitroquinoline-N-oxide	56-57-5	0.5	mg/kg	----	----	<0.5	----	----
5-Nitro-o-toluidine	99-55-8	0.5	mg/kg	----	----	<0.5	----	----
Azobenzene	103-33-3	1	mg/kg	----	----	<1	----	----
1.3.5-Trinitrobenzene	99-35-4	0.5	mg/kg	----	----	<0.5	----	----
Phenacetin	62-44-2	0.5	mg/kg	----	----	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.0-0.2	VC07_0.0-0.2	VC07_0.0-0.5	VC03_0.0-0.1	VC03_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-001	ES1936029-007	ES1936029-011	ES1936029-013	ES1936029-014
				Result	Result	Result	Result	Result
EP075E: Nitroaromatics and Ketones - Continued								
4-Aminobiphenyl	92-67-1	0.5	mg/kg	----	----	<0.5	----	----
Pentachloronitrobenzene	82-68-8	0.5	mg/kg	----	----	<0.5	----	----
Pronamide	23950-58-5	0.5	mg/kg	----	----	<0.5	----	----
Dimethylaminoazobenzene	60-11-7	0.5	mg/kg	----	----	<0.5	----	----
Chlorobenzilate	510-15-6	0.5	mg/kg	----	----	<0.5	----	----
EP075F: Haloethers								
Bis(2-chloroethyl) ether	111-44-4	0.5	mg/kg	----	----	<0.5	----	----
Bis(2-chloroethoxy) methane	111-91-1	0.5	mg/kg	----	----	<0.5	----	----
4-Chlorophenyl phenyl ether	7005-72-3	0.5	mg/kg	----	----	<0.5	----	----
4-Bromophenyl phenyl ether	101-55-3	0.5	mg/kg	----	----	<0.5	----	----
EP075G: Chlorinated Hydrocarbons								
1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	----	----	<0.5	----	----
1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	----	----	<0.5	----	----
1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	----	----	<0.5	----	----
Hexachloroethane	67-72-1	0.5	mg/kg	----	----	<0.5	----	----
1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	----	----	<0.5	----	----
Hexachloropropylene	1888-71-7	0.5	mg/kg	----	----	<0.5	----	----
Hexachlorobutadiene	87-68-3	0.5	mg/kg	----	----	<0.5	----	----
Hexachlorocyclopentadiene	77-47-4	2.5	mg/kg	----	----	<2.5	----	----
Pentachlorobenzene	608-93-5	0.5	mg/kg	----	----	<0.5	----	----
Hexachlorobenzene (HCB)	118-74-1	1.0	mg/kg	----	----	<1.0	----	----
EP075H: Anilines and Benzidines								
Aniline	62-53-3	0.5	mg/kg	----	----	<0.5	----	----
4-Chloroaniline	106-47-8	0.5	mg/kg	----	----	<0.5	----	----
2-Nitroaniline	88-74-4	1.0	mg/kg	----	----	<1.0	----	----
3-Nitroaniline	99-09-2	1.0	mg/kg	----	----	<1.0	----	----
Dibenzofuran	132-64-9	0.5	mg/kg	----	----	<0.5	----	----
4-Nitroaniline	100-01-6	0.5	mg/kg	----	----	<0.5	----	----
Carbazole	86-74-8	0.5	mg/kg	----	----	<0.5	----	----
3.3`-Dichlorobenzidine	91-94-1	0.5	mg/kg	----	----	<0.5	----	----
EP075I: Organochlorine Pesticides								
alpha-BHC	319-84-6	0.5	mg/kg	----	----	<0.5	----	----
beta-BHC	319-85-7	0.5	mg/kg	----	----	<0.5	----	----
gamma-BHC	58-89-9	0.5	mg/kg	----	----	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.0-0.2	VC07_0.0-0.2	VC07_0.0-0.5	VC03_0.0-0.1	VC03_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-001	ES1936029-007	ES1936029-011	ES1936029-013	ES1936029-014
				Result	Result	Result	Result	Result
EP075I: Organochlorine Pesticides - Continued								
delta-BHC	319-86-8	0.5	mg/kg	----	----	<0.5	----	----
Heptachlor	76-44-8	0.5	mg/kg	----	----	<0.5	----	----
Aldrin	309-00-2	0.5	mg/kg	----	----	<0.5	----	----
Heptachlor epoxide	1024-57-3	0.5	mg/kg	----	----	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	mg/kg	----	----	<0.5	----	----
4.4`-DDE	72-55-9	0.5	mg/kg	----	----	<0.5	----	----
Dieldrin	60-57-1	0.5	mg/kg	----	----	<0.5	----	----
Endrin	72-20-8	0.5	mg/kg	----	----	<0.5	----	----
beta-Endosulfan	33213-65-9	0.5	mg/kg	----	----	<0.5	----	----
4.4`-DDD	72-54-8	0.5	mg/kg	----	----	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	mg/kg	----	----	<0.5	----	----
4.4`-DDT	50-29-3	1.0	mg/kg	----	----	<1.0	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	mg/kg	----	----	<0.5	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	mg/kg	----	----	<0.5	----	----
EP075J: Organophosphorus Pesticides								
Dichlorvos	62-73-7	0.5	mg/kg	----	----	<0.5	----	----
Dimethoate	60-51-5	0.5	mg/kg	----	----	<0.5	----	----
Diazinon	333-41-5	0.5	mg/kg	----	----	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	mg/kg	----	----	<0.5	----	----
Malathion	121-75-5	0.5	mg/kg	----	----	<0.5	----	----
Fenthion	55-38-9	0.5	mg/kg	----	----	<0.5	----	----
Chlorpyrifos	2921-88-2	0.5	mg/kg	----	----	<0.5	----	----
Pirimphos-ethyl	23505-41-1	0.5	mg/kg	----	----	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	mg/kg	----	----	<0.5	----	----
Prothiofos	34643-46-4	0.5	mg/kg	----	----	<0.5	----	----
Ethion	563-12-2	0.5	mg/kg	----	----	<0.5	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
>C10 - C16 Fraction	----	3	mg/kg	<3	**4**	**7**	----	----
>C16 - C34 Fraction	----	3	mg/kg	<3	**122**	**176**	----	----
>C34 - C40 Fraction	----	5	mg/kg	<5	**49**	**69**	----	----
>C10 - C40 Fraction (sum)	----	3	mg/kg	<3	**175**	**252**	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	3	mg/kg	<3	**4**	**7**	----	----
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.0-0.2	VC07_0.0-0.2	VC07_0.0-0.5	VC03_0.0-0.1	VC03_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-001	ES1936029-007	ES1936029-011	ES1936029-013	ES1936029-014
				Result	Result	Result	Result	Result
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons - Continued								
C6 - C9 Fraction	----	3	mg/kg	<3	<3	<3	----	----
C10 - C14 Fraction	----	3	mg/kg	<3	<3	<3	----	----
C15 - C28 Fraction	----	3	mg/kg	<3	**68**	**101**	----	----
C29 - C36 Fraction	----	5	mg/kg	<5	**79**	**111**	----	----
^ C10 - C36 Fraction (sum)	----	3	mg/kg	<3	**147**	**212**	----	----
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons								
C6 - C10 Fraction	C6_C10	3	mg/kg	<3	<3	<3	----	----
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	3.0	mg/kg	<3.0	<3.0	<3.0	----	----
EP080-SD: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Naphthalene	91-20-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
EP090: Organotin Compounds								
Tributyltin	56573-85-4	0.5	µgSn/kg	----	----	**20.4**	----	----
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	<10	----	----
Carbophenothion	786-19-6	10	µg/kg	<10	<10	<10	----	----
Chlorfenvinphos (E)	18708-86-6	10.0	µg/kg	<10.0	<10.0	<10.0	----	----
Chlorfenvinphos (Z)	18708-87-7	10	µg/kg	<10	<10	<10	----	----
Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	<10	----	----
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	<10	----	----
Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	<10	----	----
Diazinon	333-41-5	10	µg/kg	<10	<10	<10	----	----
Dichlorvos	62-73-7	10	µg/kg	<10	<10	<10	----	----
Dimethoate	60-51-5	10	µg/kg	<10	<10	<10	----	----
Ethion	563-12-2	10	µg/kg	<10	<10	<10	----	----
Fenamiphos	22224-92-6	10	µg/kg	<10	<10	<10	----	----
Fenthion	55-38-9	10	µg/kg	<10	<10	<10	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.0-0.2	VC07_0.0-0.2	VC07_0.0-0.5	VC03_0.0-0.1	VC03_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-001	ES1936029-007	ES1936029-011	ES1936029-013	ES1936029-014
				Result	Result	Result	Result	Result
EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued								
Malathion	121-75-5	10	µg/kg	<10	<10	<10	----	----
Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	<10	----	----
Monocrotophos	6923-22-4	10	µg/kg	<10	<10	<10	----	----
Parathion	56-38-2	10	µg/kg	<10	<10	<10	----	----
Parathion-methyl	298-00-0	10	µg/kg	<10	<10	<10	----	----
Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	<10	----	----
Prothiofos	34643-46-4	10	µg/kg	<10	<10	<10	----	----
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
4.4`-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
4.4`-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
4.4`-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	<0.25	----	----
Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	<0.25	----	----
trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	<0.25	----	----
^ Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	<0.25	----	----
Oxychlordane	27304-13-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors)								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.0-0.2	VC07_0.0-0.2	VC07_0.0-0.5	VC03_0.0-0.1	VC03_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-001	ES1936029-007	ES1936029-011	ES1936029-013	ES1936029-014
				Result	Result	Result	Result	Result
EP131B: Polychlorinated Biphenyls (as Aroclors) - Continued								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	**67.7**	----	----
Aroclor 1016	12674-11-2	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	**67.7**	----	----
Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	5	µg/kg	<5	**46**	**60**	----	----
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<25	<25	----	----
Acenaphthylene	208-96-8	4	µg/kg	<4	**132**	**202**	----	----
Acenaphthene	83-32-9	4	µg/kg	<4	<25	<25	----	----
Fluorene	86-73-7	4	µg/kg	<4	<25	**41**	----	----
Phenanthrene	85-01-8	4	µg/kg	<4	**226**	**243**	----	----
Anthracene	120-12-7	4	µg/kg	<4	**103**	**116**	----	----
Fluoranthene	206-44-0	4	µg/kg	<4	**595**	**594**	----	----
Pyrene	129-00-0	4	µg/kg	<4	**639**	**646**	----	----
Benz(a)anthracene	56-55-3	4	µg/kg	<4	**417**	**542**	----	----
Chrysene	218-01-9	4	µg/kg	<4	**378**	**473**	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	**606**	**799**	----	----
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	**304**	**375**	----	----
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	**307**	**373**	----	----
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	**627**	**872**	----	----
Perylene	198-55-0	4	µg/kg	<4	**136**	**174**	----	----
Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	**483**	**663**	----	----
Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	**89**	**127**	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	**375**	**517**	----	----
Coronene	191-07-1	5	µg/kg	<5	**256**	**250**	----	----
^ Sum of PAHs	----	4	µg/kg	<4	**5720**	**7070**	----	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.5	%	----	**95.2**	----	----	----
Toluene-D8	2037-26-5	0.5	%	----	**102**	----	----	----
4-Bromofluorobenzene	460-00-4	0.5	%	----	**97.1**	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.0-0.2	VC07_0.0-0.2	VC07_0.0-0.5	VC03_0.0-0.1	VC03_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-001	ES1936029-007	ES1936029-011	ES1936029-013	ES1936029-014
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	86.1	82.5	82.9	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	96.0	92.4	92.6	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	66.6	71.8	73.3	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	116	111	111	----	----
Anthracene-d10	1719-06-8	0.5	%	101	99.2	99.3	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	105	95.6	95.8	----	----
EP075S: Acid Extractable Surrogates								
2-Fluorophenol	367-12-4	0.5	%	----	----	121	----	----
Phenol-d6	13127-88-3	0.5	%	----	----	106	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	111	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	----	----	68.6	----	----
EP075T: Base/Neutral Extractable Surrogates								
Nitrobenzene-D5	4165-60-0	0.5	%	----	----	88.6	----	----
1.2-Dichlorobenzene-D4	2199-69-1	0.5	%	----	----	83.1	----	----
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	91.3	----	----
Anthracene-d10	1719-06-8	0.5	%	----	----	84.8	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	90.0	----	----
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	112	109	105	----	----
Toluene-D8	2037-26-5	0.2	%	125	98.4	93.0	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	116	103	100	----	----
EP090S: Organotin Surrogate								
Tripropyltin	----	0.5	%	----	----	44.5	----	----
EP130S: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	10	%	51.4	71.9	60.2	----	----
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.50	%	68.3	52.3	48.7	----	----
EP131T: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.5	%	65.4	81.6	76.8	----	----
EP132T: Base/Neutral Extractable Surrogates								
2-Fluorobiphenyl	321-60-8	10	%	108	103	84.6	----	----
Anthracene-d10	1719-06-8	10	%	116	107	81.2	----	----
4-Terphenyl-d14	1718-51-0	10	%	110	112	85.4	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC03_1.0-1.1	VC01_0.0-0.1	VC01_0.5-0.6	VC01_1.0-1.1	VC02_0.0-0.1
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-015	ES1936029-016	ES1936029-017	ES1936029-018	ES1936029-019
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	7.4	8.5	7.7	7.3	8.8
ø pH (Fox)	----	0.1	pH Unit	5.4	6.2	5.7	5.2	6.0
ø Reaction Rate	----	1	-	3	3	3	3	3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_0.5-0.6	VC02_0.9-1.0	VC02_1.5-1.6	VC10_0.0-0.1	VC10_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-020	ES1936029-021	ES1936029-022	ES1936029-023	ES1936029-024
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	8.8	7.8	7.4	7.7	7.5
ø pH (Fox)	----	0.1	pH Unit	6.3	6.3	5.9	6.4	5.8
ø Reaction Rate	----	1	-	3	3	3	3	3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC11_0.0-0.1	VC11_0.5-0.6	VC11_1.0-1.1	VC09_0.0-0.1	VC09_0.5-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-025	ES1936029-026	ES1936029-027	ES1936029-028	ES1936029-029
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	**8.8**	**8.8**	**8.9**	**8.8**	**8.0**
ø pH (Fox)	----	0.1	pH Unit	**6.2**	**6.4**	**6.3**	**6.4**	**6.0**
ø Reaction Rate	----	1	-	**3**	**3**	**3**	**3**	**3**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.9-1.0	VC07_0.0-0.1	VC07_0.5-0.6	VC07_1.0-1.1	VC05_0.0-0.1
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-030	ES1936029-031	ES1936029-032	ES1936029-033	ES1936029-034
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	8.1	8.6	8.3	7.9	8.3
ø pH (Fox)	----	0.1	pH Unit	5.6	6.3	6.2	5.9	6.2
ø Reaction Rate	----	1	-	3	3	3	3	3

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC05_0.5-0.6	VC05_0.8-1.0	VC04_0.0-0.1	VC04_0.9-1.0	VC11_0.5-0.7
Client sampling date / time				30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
				ES1936029-035	ES1936029-036	ES1936029-037	ES1936029-038	ES1936029-040
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	**8.0**	**7.4**	**7.5**	**7.4**	----
ø pH (Fox)	----	0.1	pH Unit	**6.0**	**5.3**	**5.8**	**5.6**	----
ø Reaction Rate	----	1	-	**3**	**3**	**3**	**3**	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	----	----	----	----	**28.4**
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	----	----	----	**6760**
Iron	7439-89-6	50	mg/kg	----	----	----	----	**17800**
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	----	----	----	----	<0.50
Arsenic	7440-38-2	1.00	mg/kg	----	----	----	----	**8.73**
Cadmium	7440-43-9	0.1	mg/kg	----	----	----	----	<0.1
Chromium	7440-47-3	1.0	mg/kg	----	----	----	----	**12.2**
Copper	7440-50-8	1.0	mg/kg	----	----	----	----	**3.2**
Cobalt	7440-48-4	0.5	mg/kg	----	----	----	----	**1.4**
Lead	7439-92-1	1.0	mg/kg	----	----	----	----	**7.0**
Manganese	7439-96-5	10	mg/kg	----	----	----	----	**28**
Nickel	7440-02-0	1.0	mg/kg	----	----	----	----	**4.3**
Selenium	7782-49-2	0.1	mg/kg	----	----	----	----	**0.4**
Silver	7440-22-4	0.1	mg/kg	----	----	----	----	**0.4**
Vanadium	7440-62-2	2.0	mg/kg	----	----	----	----	**13.6**
Zinc	7440-66-6	1.0	mg/kg	----	----	----	----	**14.0**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	----	----	----	----	**0.03**
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	----	----	----	----	<1
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	----	----	----	----	**150**
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	----	----	----	----	**0.53**
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	----	----	----	----	<0.2
Toluene	108-88-3	0.5	mg/kg	----	----	----	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	----	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.5-0.6	VC05_0.8-1.0	VC04_0.0-0.1	VC04_0.9-1.0	VC11_0.5-0.7
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-035	ES1936029-036	ES1936029-037	ES1936029-038	ES1936029-040
				Result	Result	Result	Result	Result
EP074A: Monocyclic Aromatic Hydrocarbons - Continued								
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	----	<0.5
Styrene	100-42-5	0.5	mg/kg	----	----	----	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	----	<0.5
Isopropylbenzene	98-82-8	0.5	mg/kg	----	----	----	----	<0.5
n-Propylbenzene	103-65-1	0.5	mg/kg	----	----	----	----	<0.5
1.3.5-Trimethylbenzene	108-67-8	0.5	mg/kg	----	----	----	----	<0.5
sec-Butylbenzene	135-98-8	0.5	mg/kg	----	----	----	----	<0.5
1.2.4-Trimethylbenzene	95-63-6	0.5	mg/kg	----	----	----	----	<0.5
tert-Butylbenzene	98-06-6	0.5	mg/kg	----	----	----	----	<0.5
p-Isopropyltoluene	99-87-6	0.5	mg/kg	----	----	----	----	<0.5
n-Butylbenzene	104-51-8	0.5	mg/kg	----	----	----	----	<0.5
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	5	mg/kg	----	----	----	----	<5
2-Butanone (MEK)	78-93-3	5	mg/kg	----	----	----	----	<5
4-Methyl-2-pentanone (MIBK)	108-10-1	5	mg/kg	----	----	----	----	<5
2-Hexanone (MBK)	591-78-6	5	mg/kg	----	----	----	----	<5
EP074C: Sulfonated Compounds								
Carbon disulfide	75-15-0	0.5	mg/kg	----	----	----	----	<0.5
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	0.5	mg/kg	----	----	----	----	<0.5
1.2-Dichloropropane	78-87-5	0.5	mg/kg	----	----	----	----	<0.5
cis-1.3-Dichloropropylene	10061-01-5	0.5	mg/kg	----	----	----	----	<0.5
trans-1.3-Dichloropropylene	10061-02-6	0.5	mg/kg	----	----	----	----	<0.5
1.2-Dibromoethane (EDB)	106-93-4	0.5	mg/kg	----	----	----	----	<0.5
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	5	mg/kg	----	----	----	----	<5
Chloromethane	74-87-3	5	mg/kg	----	----	----	----	<5
Vinyl chloride	75-01-4	5	mg/kg	----	----	----	----	<5
Bromomethane	74-83-9	5	mg/kg	----	----	----	----	<5
Chloroethane	75-00-3	5	mg/kg	----	----	----	----	<5
Trichlorofluoromethane	75-69-4	5	mg/kg	----	----	----	----	<5
1.1-Dichloroethene	75-35-4	0.5	mg/kg	----	----	----	----	<0.5
Iodomethane	74-88-4	0.5	mg/kg	----	----	----	----	<0.5
trans-1.2-Dichloroethene	156-60-5	0.5	mg/kg	----	----	----	----	<0.5

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC05_0.5-0.6	VC05_0.8-1.0	VC04_0.0-0.1	VC04_0.9-1.0	VC11_0.5-0.7
Client sampling date / time				30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
				ES1936029-035	ES1936029-036	ES1936029-037	ES1936029-038	ES1936029-040
				Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued								
1.1-Dichloroethane	75-34-3	0.5	mg/kg	----	----	----	----	<0.5
cis-1.2-Dichloroethene	156-59-2	0.5	mg/kg	----	----	----	----	<0.5
1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	----	----	----	----	<0.5
1.1-Dichloropropylene	563-58-6	0.5	mg/kg	----	----	----	----	<0.5
Carbon Tetrachloride	56-23-5	0.5	mg/kg	----	----	----	----	<0.5
1.2-Dichloroethane	107-06-2	0.5	mg/kg	----	----	----	----	<0.5
Trichloroethene	79-01-6	0.5	mg/kg	----	----	----	----	<0.5
Dibromomethane	74-95-3	0.5	mg/kg	----	----	----	----	<0.5
1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	----	----	----	----	<0.5
1.3-Dichloropropane	142-28-9	0.5	mg/kg	----	----	----	----	<0.5
Tetrachloroethene	127-18-4	0.5	mg/kg	----	----	----	----	<0.5
1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	----	----	----	----	<0.5
trans-1.4-Dichloro-2-butene	110-57-6	0.5	mg/kg	----	----	----	----	<0.5
cis-1.4-Dichloro-2-butene	1476-11-5	0.5	mg/kg	----	----	----	----	<0.5
1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	----	----	----	----	<0.5
1.2.3-Trichloropropane	96-18-4	0.5	mg/kg	----	----	----	----	<0.5
Pentachloroethane	76-01-7	0.5	mg/kg	----	----	----	----	<0.5
1.2-Dibromo-3-chloropropane	96-12-8	0.5	mg/kg	----	----	----	----	<0.5
Hexachlorobutadiene	87-68-3	0.5	mg/kg	----	----	----	----	<0.5
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	0.5	mg/kg	----	----	----	----	<0.5
Bromobenzene	108-86-1	0.5	mg/kg	----	----	----	----	<0.5
2-Chlorotoluene	95-49-8	0.5	mg/kg	----	----	----	----	<0.5
4-Chlorotoluene	106-43-4	0.5	mg/kg	----	----	----	----	<0.5
1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	----	----	----	----	<0.5
1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	----	----	----	----	<0.5
1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	----	----	----	----	<0.5
1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	----	----	----	----	<0.5
1.2.3-Trichlorobenzene	87-61-6	0.5	mg/kg	----	----	----	----	<0.5
EP074G: Trihalomethanes								
Chloroform	67-66-3	0.5	mg/kg	----	----	----	----	<0.5
Bromodichloromethane	75-27-4	0.5	mg/kg	----	----	----	----	<0.5
Dibromochloromethane	124-48-1	0.5	mg/kg	----	----	----	----	<0.5
Bromoform	75-25-2	0.5	mg/kg	----	----	----	----	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC05_0.5-0.6	VC05_0.8-1.0	VC04_0.0-0.1	VC04_0.9-1.0	VC11_0.5-0.7
Client sampling date / time				30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
				ES1936029-035	ES1936029-036	ES1936029-037	ES1936029-038	ES1936029-040
				Result	Result	Result	Result	Result
EP074H: Naphthalene								
Naphthalene	91-20-3	1	mg/kg	----	----	----	----	<1
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	----	----	----	----	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	----	----	----	----	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	----	----	----	----	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	----	----	----	----	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	----	----	----	----	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	----	----	----	----	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	----	----	----	----	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	----	----	----	----	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	----	----	----	----	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	----	----	----	----	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	----	----	----	----	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	----	----	----	----	<2
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
>C10 - C16 Fraction	----	3	mg/kg	----	----	----	----	<3
>C16 - C34 Fraction	----	3	mg/kg	----	----	----	----	**6**
>C34 - C40 Fraction	----	5	mg/kg	----	----	----	----	<5
>C10 - C40 Fraction (sum)	----	3	mg/kg	----	----	----	----	**6**
>C10 - C16 Fraction minus Naphthalene (F2)	----	3	mg/kg	----	----	----	----	<3
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	3	mg/kg	----	----	----	----	<3
C10 - C14 Fraction	----	3	mg/kg	----	----	----	----	<3
C15 - C28 Fraction	----	3	mg/kg	----	----	----	----	**4**
C29 - C36 Fraction	----	5	mg/kg	----	----	----	----	<5
^ C10 - C36 Fraction (sum)	----	3	mg/kg	----	----	----	----	**4**
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons								
C6 - C10 Fraction	C6_C10	3	mg/kg	----	----	----	----	<3
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	3.0	mg/kg	----	----	----	----	<3.0
EP080-SD: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	----	----	<0.2
Toluene	108-88-3	0.2	mg/kg	----	----	----	----	<0.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC05_0.5-0.6	VC05_0.8-1.0	VC04_0.0-0.1	VC04_0.9-1.0	VC11_0.5-0.7
Client sampling date / time				30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
				ES1936029-035	ES1936029-036	ES1936029-037	ES1936029-038	ES1936029-040
				Result	Result	Result	Result	Result
EP080-SD: BTEXN - Continued								
Ethylbenzene	100-41-4	0.2	mg/kg	----	----	----	----	<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	----	----	----	----	<0.2
ortho-Xylene	95-47-6	0.2	mg/kg	----	----	----	----	<0.2
^ Total Xylenes	----	0.5	mg/kg	----	----	----	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	----	<0.2
Naphthalene	91-20-3	0.2	mg/kg	----	----	----	----	<0.2
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	10	µg/kg	----	----	----	----	<10
Carbophenothion	786-19-6	10	µg/kg	----	----	----	----	<10
Chlorfenvinphos (E)	18708-86-6	10.0	µg/kg	----	----	----	----	<10.0
Chlorfenvinphos (Z)	18708-87-7	10	µg/kg	----	----	----	----	<10
Chlorpyrifos	2921-88-2	10	µg/kg	----	----	----	----	<10
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	----	----	----	----	<10
Demeton-S-methyl	919-86-8	10	µg/kg	----	----	----	----	<10
Diazinon	333-41-5	10	µg/kg	----	----	----	----	<10
Dichlorvos	62-73-7	10	µg/kg	----	----	----	----	<10
Dimethoate	60-51-5	10	µg/kg	----	----	----	----	<10
Ethion	563-12-2	10	µg/kg	----	----	----	----	<10
Fenamiphos	22224-92-6	10	µg/kg	----	----	----	----	<10
Fenthion	55-38-9	10	µg/kg	----	----	----	----	<10
Malathion	121-75-5	10	µg/kg	----	----	----	----	<10
Azinphos Methyl	86-50-0	10	µg/kg	----	----	----	----	<10
Monocrotophos	6923-22-4	10	µg/kg	----	----	----	----	<10
Parathion	56-38-2	10	µg/kg	----	----	----	----	<10
Parathion-methyl	298-00-0	10	µg/kg	----	----	----	----	<10
Pirimphos-ethyl	23505-41-1	10	µg/kg	----	----	----	----	<10
Prothiofos	34643-46-4	10	µg/kg	----	----	----	----	<10
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.50	µg/kg	----	----	----	----	<0.50
alpha-BHC	319-84-6	0.50	µg/kg	----	----	----	----	<0.50
beta-BHC	319-85-7	0.50	µg/kg	----	----	----	----	<0.50
delta-BHC	319-86-8	0.50	µg/kg	----	----	----	----	<0.50
4.4`-DDD	72-54-8	0.50	µg/kg	----	----	----	----	<0.50
4.4`-DDE	72-55-9	0.50	µg/kg	----	----	----	----	<0.50

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC05_0.5-0.6	VC05_0.8-1.0	VC04_0.0-0.1	VC04_0.9-1.0	VC11_0.5-0.7
Client sampling date / time				30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
				ES1936029-035	ES1936029-036	ES1936029-037	ES1936029-038	ES1936029-040
				Result	Result	Result	Result	Result
EP131A: Organochlorine Pesticides - Continued								
4.4`-DDT	50-29-3	0.50	µg/kg	----	----	----	----	<0.50
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.50	µg/kg	----	----	----	----	<0.50
Dieldrin	60-57-1	0.50	µg/kg	----	----	----	----	<0.50
alpha-Endosulfan	959-98-8	0.50	µg/kg	----	----	----	----	<0.50
beta-Endosulfan	33213-65-9	0.50	µg/kg	----	----	----	----	<0.50
Endosulfan sulfate	1031-07-8	0.50	µg/kg	----	----	----	----	<0.50
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	----	----	----	----	<0.50
Endrin	72-20-8	0.50	µg/kg	----	----	----	----	<0.50
Endrin aldehyde	7421-93-4	0.50	µg/kg	----	----	----	----	<0.50
Endrin ketone	53494-70-5	0.50	µg/kg	----	----	----	----	<0.50
Heptachlor	76-44-8	0.50	µg/kg	----	----	----	----	<0.50
Heptachlor epoxide	1024-57-3	0.50	µg/kg	----	----	----	----	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	----	----	----	----	<0.50
gamma-BHC	58-89-9	0.25	µg/kg	----	----	----	----	<0.25
Methoxychlor	72-43-5	0.50	µg/kg	----	----	----	----	<0.50
cis-Chlordane	5103-71-9	0.25	µg/kg	----	----	----	----	<0.25
trans-Chlordane	5103-74-2	0.25	µg/kg	----	----	----	----	<0.25
^ Total Chlordane (sum)	----	0.25	µg/kg	----	----	----	----	<0.25
Oxychlordane	27304-13-8	0.50	µg/kg	----	----	----	----	<0.50
EP131B: Polychlorinated Biphenyls (as Aroclors)								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1016	12674-11-2	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1221	11104-28-2	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1232	11141-16-5	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1242	53469-21-9	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1248	12672-29-6	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1254	11097-69-1	5.0	µg/kg	----	----	----	----	<5.0
Aroclor 1260	11096-82-5	5.0	µg/kg	----	----	----	----	<5.0
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	5	µg/kg	----	----	----	----	<5
2-Methylnaphthalene	91-57-6	5	µg/kg	----	----	----	----	<5
Acenaphthylene	208-96-8	4	µg/kg	----	----	----	----	<4
Acenaphthene	83-32-9	4	µg/kg	----	----	----	----	<4
Fluorene	86-73-7	4	µg/kg	----	----	----	----	<4

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.5-0.6	VC05_0.8-1.0	VC04_0.0-0.1	VC04_0.9-1.0	VC11_0.5-0.7
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-035	ES1936029-036	ES1936029-037	ES1936029-038	ES1936029-040
				Result	Result	Result	Result	Result
EP132B: Polynuclear Aromatic Hydrocarbons - Continued								
Phenanthrene	85-01-8	4	µg/kg	----	----	----	----	<4
Anthracene	120-12-7	4	µg/kg	----	----	----	----	<4
Fluoranthene	206-44-0	4	µg/kg	----	----	----	----	<4
Pyrene	129-00-0	4	µg/kg	----	----	----	----	<4
Benz(a)anthracene	56-55-3	4	µg/kg	----	----	----	----	<4
Chrysene	218-01-9	4	µg/kg	----	----	----	----	<4
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	----	----	----	----	<4
Benzo(k)fluoranthene	207-08-9	4	µg/kg	----	----	----	----	<4
Benzo(e)pyrene	192-97-2	4	µg/kg	----	----	----	----	<4
Benzo(a)pyrene	50-32-8	4	µg/kg	----	----	----	----	<4
Perylene	198-55-0	4	µg/kg	----	----	----	----	<4
Benzo(g.h.i)perylene	191-24-2	4	µg/kg	----	----	----	----	<4
Dibenz(a.h)anthracene	53-70-3	4	µg/kg	----	----	----	----	<4
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	----	----	----	----	<4
Coronene	191-07-1	5	µg/kg	----	----	----	----	<5
^ Sum of PAHs	----	4	µg/kg	----	----	----	----	<4
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.5	%	----	----	----	----	90.8
Toluene-D8	2037-26-5	0.5	%	----	----	----	----	93.9
4-Bromofluorobenzene	460-00-4	0.5	%	----	----	----	----	87.2
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	----	----	----	83.5
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	----	----	92.3
2.4.6-Tribromophenol	118-79-6	0.5	%	----	----	----	----	64.3
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	----	----	113
Anthracene-d10	1719-06-8	0.5	%	----	----	----	----	102
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	----	----	104
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	----	----	110
Toluene-D8	2037-26-5	0.2	%	----	----	----	----	99.6
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	----	----	109
EP130S: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	10	%	----	----	----	----	46.4

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

			Client sample ID	VC05_0.5-0.6	VC05_0.8-1.0	VC04_0.0-0.1	VC04_0.9-1.0	VC11_0.5-0.7
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-035	ES1936029-036	ES1936029-037	ES1936029-038	ES1936029-040
				Result	Result	Result	Result	Result
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.50	%	----	----	----	----	46.9
EP131T: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.5	%	----	----	----	----	86.6
EP132T: Base/Neutral Extractable Surrogates								
2-Fluorobiphenyl	321-60-8	10	%	----	----	----	----	108
Anthracene-d10	1719-06-8	10	%	----	----	----	----	113
4-Terphenyl-d14	1718-51-0	10	%	----	----	----	----	112

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.8-0.9	VC03_0.3-0.4	VC03_0.0-0.5	VC04_0.3-0.4	VC04_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-047	ES1936029-051	ES1936029-055	ES1936029-058	ES1936029-063
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	4.3	12.1	13.1	17.1	64.3
EA150: Particle Sizing								
+75µm	----	1	%	----	----	48	----	80
+150µm	----	1	%	----	----	42	----	72
+300µm	----	1	%	----	----	27	----	36
+425µm	----	1	%	----	----	14	----	16
+600µm	----	1	%	----	----	4	----	3
+1180µm	----	1	%	----	----	<1	----	<1
+2.36mm	----	1	%	----	----	<1	----	<1
+4.75mm	----	1	%	----	----	<1	----	<1
+9.5mm	----	1	%	----	----	<1	----	<1
+19.0mm	----	1	%	----	----	<1	----	<1
+37.5mm	----	1	%	----	----	<1	----	<1
+75.0mm	----	1	%	----	----	<1	----	<1
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	----	----	37	----	16
Silt (2-60 µm)	----	1	%	----	----	12	----	4
Sand (0.06-2.00 mm)	----	1	%	----	----	51	----	80
Gravel (>2mm)	----	1	%	----	----	<1	----	<1
Cobbles (>6cm)	----	1	%	----	----	<1	----	<1
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	4150	11800	11300	14800	14600
Iron	7439-89-6	50	mg/kg	3840	1240	1290	2510	3080
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Arsenic	7440-38-2	1.00	mg/kg	3.22	<1.00	<1.00	<1.00	<1.00
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	4.3	12.5	10.7	13.2	12.0
Copper	7440-50-8	1.0	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Cobalt	7440-48-4	0.5	mg/kg	<0.5	<0.5	0.5	<0.5	<0.5
Lead	7439-92-1	1.0	mg/kg	1.6	13.5	33.6	28.0	4.9
Manganese	7439-96-5	10	mg/kg	<10	<10	<10	<10	<10
Nickel	7440-02-0	1.0	mg/kg	<1.0	1.9	2.0	2.0	1.6
Selenium	7782-49-2	0.1	mg/kg	<0.1	<0.1	0.1	0.2	0.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.8-0.9	VC03_0.3-0.4	VC03_0.0-0.5	VC04_0.3-0.4	VC04_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-047	ES1936029-051	ES1936029-055	ES1936029-058	ES1936029-063
				Result	Result	Result	Result	Result
EG020-SD: Total Metals in Sediments by ICPMS - Continued								
Silver	7440-22-4	0.1	mg/kg	**0.1**	**0.1**	<0.1	**0.1**	**0.3**
Vanadium	7440-62-2	2.0	mg/kg	**15.6**	**5.1**	**5.5**	**10.4**	**8.9**
Zinc	7440-66-6	1.0	mg/kg	**1.5**	**6.2**	**16.7**	**3.4**	**2.3**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	<0.01	**0.04**	**0.05**	<0.01	<0.01
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	<1	<1	<1
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	<40	**40**	----	----	----
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**0.11**	**0.16**	**0.15**	**0.10**	**0.05**
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	----	----
Isopropylbenzene	98-82-8	0.5	mg/kg	<0.5	<0.5	----	----	----
n-Propylbenzene	103-65-1	0.5	mg/kg	<0.5	<0.5	----	----	----
1.3.5-Trimethylbenzene	108-67-8	0.5	mg/kg	<0.5	<0.5	----	----	----
sec-Butylbenzene	135-98-8	0.5	mg/kg	<0.5	<0.5	----	----	----
1.2.4-Trimethylbenzene	95-63-6	0.5	mg/kg	<0.5	<0.5	----	----	----
tert-Butylbenzene	98-06-6	0.5	mg/kg	<0.5	<0.5	----	----	----
p-Isopropyltoluene	99-87-6	0.5	mg/kg	<0.5	<0.5	----	----	----
n-Butylbenzene	104-51-8	0.5	mg/kg	<0.5	<0.5	----	----	----
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	5	mg/kg	<5	<5	----	----	----
2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5	----	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	5	mg/kg	<5	<5	----	----	----
2-Hexanone (MBK)	591-78-6	5	mg/kg	<5	<5	----	----	----
EP074C: Sulfonated Compounds								
Carbon disulfide	75-15-0	0.5	mg/kg	<0.5	<0.5	----	----	----
EP074D: Fumigants								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.8-0.9	VC03_0.3-0.4	VC03_0.0-0.5	VC04_0.3-0.4	VC04_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-047	ES1936029-051	ES1936029-055	ES1936029-058	ES1936029-063
				Result	Result	Result	Result	Result
EP074D: Fumigants - Continued								
2.2-Dichloropropane	594-20-7	0.5	mg/kg	<0.5	<0.5	----	----	----
1.2-Dichloropropane	78-87-5	0.5	mg/kg	<0.5	<0.5	----	----	----
cis-1.3-Dichloropropylene	10061-01-5	0.5	mg/kg	<0.5	<0.5	----	----	----
trans-1.3-Dichloropropylene	10061-02-6	0.5	mg/kg	<0.5	<0.5	----	----	----
1.2-Dibromoethane (EDB)	106-93-4	0.5	mg/kg	<0.5	<0.5	----	----	----
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	5	mg/kg	<5	<5	----	----	----
Chloromethane	74-87-3	5	mg/kg	<5	<5	----	----	----
Vinyl chloride	75-01-4	5	mg/kg	<5	<5	----	----	----
Bromomethane	74-83-9	5	mg/kg	<5	<5	----	----	----
Chloroethane	75-00-3	5	mg/kg	<5	<5	----	----	----
Trichlorofluoromethane	75-69-4	5	mg/kg	<5	<5	----	----	----
1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	<0.5	----	----	----
Iodomethane	74-88-4	0.5	mg/kg	<0.5	<0.5	----	----	----
trans-1.2-Dichloroethene	156-60-5	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1-Dichloroethane	75-34-3	0.5	mg/kg	<0.5	<0.5	----	----	----
cis-1.2-Dichloroethene	156-59-2	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1-Dichloropropylene	563-58-6	0.5	mg/kg	<0.5	<0.5	----	----	----
Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	<0.5	----	----	----
1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	<0.5	----	----	----
Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	----	----	----
Dibromomethane	74-95-3	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	<0.5	----	----	----
1.3-Dichloropropane	142-28-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	<0.5	----	----	----
trans-1.4-Dichloro-2-butene	110-57-6	0.5	mg/kg	<0.5	<0.5	----	----	----
cis-1.4-Dichloro-2-butene	1476-11-5	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	<0.5	----	----	----
1.2.3-Trichloropropane	96-18-4	0.5	mg/kg	<0.5	<0.5	----	----	----
Pentachloroethane	76-01-7	0.5	mg/kg	<0.5	<0.5	----	----	----
1.2-Dibromo-3-chloropropane	96-12-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Hexachlorobutadiene	87-68-3	0.5	mg/kg	<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.8-0.9	VC03_0.3-0.4	VC03_0.0-0.5	VC04_0.3-0.4	VC04_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-047	ES1936029-051	ES1936029-055	ES1936029-058	ES1936029-063
				Result	Result	Result	Result	Result
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Bromobenzene	108-86-1	0.5	mg/kg	<0.5	<0.5	----	----	----
2-Chlorotoluene	95-49-8	0.5	mg/kg	<0.5	<0.5	----	----	----
4-Chlorotoluene	106-43-4	0.5	mg/kg	<0.5	<0.5	----	----	----
1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	<0.5	<0.5	----	----	----
1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	<0.5	<0.5	----	----	----
1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	<0.5	<0.5	----	----	----
1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	<0.5	<0.5	----	----	----
1.2.3-Trichlorobenzene	87-61-6	0.5	mg/kg	<0.5	<0.5	----	----	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5	<0.5	----	----	----
Dibromochloromethane	124-48-1	0.5	mg/kg	<0.5	<0.5	----	----	----
Bromoform	75-25-2	0.5	mg/kg	<0.5	<0.5	----	----	----
EP074H: Naphthalene								
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<2
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	----	----	----	----	<0.6
2-Chlorophenol	95-57-8	0.5	mg/kg	----	----	----	----	<0.6
2-Methylphenol	95-48-7	0.5	mg/kg	----	----	----	----	<0.6
3- & 4-Methylphenol	1319-77-3	0.5	mg/kg	----	----	----	----	<0.6

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.8-0.9	VC03_0.3-0.4	VC03_0.0-0.5	VC04_0.3-0.4	VC04_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-047	ES1936029-051	ES1936029-055	ES1936029-058	ES1936029-063
				Result	Result	Result	Result	Result
EP075A: Phenolic Compounds - Continued								
2-Nitrophenol	88-75-5	0.5	mg/kg	----	----	----	----	<0.6
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	----	----	----	----	<0.6
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	----	----	----	----	<0.6
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	----	----	----	----	<0.6
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	----	----	----	----	<0.6
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	----	----	----	----	<0.6
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	----	----	----	----	<0.6
Pentachlorophenol	87-86-5	1	mg/kg	----	----	----	----	<1
EP075B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	----	----	----	<0.6
2-Methylnaphthalene	91-57-6	0.5	mg/kg	----	----	----	----	<0.6
2-Chloronaphthalene	91-58-7	0.5	mg/kg	----	----	----	----	<0.6
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	----	----	<0.6
Acenaphthene	83-32-9	0.5	mg/kg	----	----	----	----	<0.6
Fluorene	86-73-7	0.5	mg/kg	----	----	----	----	<0.6
Phenanthrene	85-01-8	0.5	mg/kg	----	----	----	----	<0.6
Anthracene	120-12-7	0.5	mg/kg	----	----	----	----	<0.6
Fluoranthene	206-44-0	0.5	mg/kg	----	----	----	----	<0.6
Pyrene	129-00-0	0.5	mg/kg	----	----	----	----	<0.6
N-2-Fluorenyl Acetamide	53-96-3	0.5	mg/kg	----	----	----	----	<0.6
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	----	----	<0.6
Chrysene	218-01-9	0.5	mg/kg	----	----	----	----	<0.6
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	----	----	----	----	<1
7.12-Dimethylbenz(a)anthracene	57-97-6	0.5	mg/kg	----	----	----	----	<0.6
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	----	----	<0.6
3-Methylcholanthrene	56-49-5	0.5	mg/kg	----	----	----	----	<0.6
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	----	----	<0.6
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	----	----	<0.6
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	----	----	----	<0.6
^ Sum of PAHs	----	0.5	mg/kg	----	----	----	----	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	----	----	----	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	----	----	----	**0.7**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	----	----	----	**1.4**
EP075C: Phthalate Esters								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC05_0.8-0.9	VC03_0.3-0.4	VC03_0.0-0.5	VC04_0.3-0.4	VC04_0.5-1.0
Client sampling date / time				30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
				ES1936029-047	ES1936029-051	ES1936029-055	ES1936029-058	ES1936029-063
				Result	Result	Result	Result	Result
EP075C: Phthalate Esters - Continued								
Dimethyl phthalate	131-11-3	0.5	mg/kg	----	----	----	----	<0.6
Diethyl phthalate	84-66-2	0.5	mg/kg	----	----	----	----	<0.6
Di-n-butyl phthalate	84-74-2	0.5	mg/kg	----	----	----	----	<0.6
Butyl benzyl phthalate	85-68-7	0.5	mg/kg	----	----	----	----	<0.6
bis(2-ethylhexyl) phthalate	117-81-7	5.0	mg/kg	----	----	----	----	<5.0
Di-n-octylphthalate	117-84-0	0.5	mg/kg	----	----	----	----	<0.6
EP075D: Nitrosamines								
N-Nitrosomethylethylamine	10595-95-6	0.5	mg/kg	----	----	----	----	<0.6
N-Nitrosodiethylamine	55-18-5	0.5	mg/kg	----	----	----	----	<0.6
N-Nitrosopyrrolidine	930-55-2	1.0	mg/kg	----	----	----	----	<1.0
N-Nitrosomorpholine	59-89-2	0.5	mg/kg	----	----	----	----	<0.6
N-Nitrosodi-n-propylamine	621-64-7	0.5	mg/kg	----	----	----	----	<0.6
N-Nitrosopiperidine	100-75-4	0.5	mg/kg	----	----	----	----	<0.6
N-Nitrosodibutylamine	924-16-3	0.5	mg/kg	----	----	----	----	<0.6
N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	1.0	mg/kg	----	----	----	----	<1.2
Methapyrilene	91-80-5	0.5	mg/kg	----	----	----	----	<0.6
EP075E: Nitroaromatics and Ketones								
2-Picoline	109-06-8	0.5	mg/kg	----	----	----	----	<0.6
Acetophenone	98-86-2	0.5	mg/kg	----	----	----	----	<0.6
Nitrobenzene	98-95-3	0.5	mg/kg	----	----	----	----	<0.6
Isophorone	78-59-1	0.5	mg/kg	----	----	----	----	<0.6
2.6-Dinitrotoluene	606-20-2	1.0	mg/kg	----	----	----	----	<1.0
2.4-Dinitrotoluene	121-14-2	1.0	mg/kg	----	----	----	----	<1.0
1-Naphthylamine	134-32-7	0.5	mg/kg	----	----	----	----	<0.6
4-Nitroquinoline-N-oxide	56-57-5	0.5	mg/kg	----	----	----	----	<0.6
5-Nitro-o-toluidine	99-55-8	0.5	mg/kg	----	----	----	----	<0.6
Azobenzene	103-33-3	1	mg/kg	----	----	----	----	<1
1.3.5-Trinitrobenzene	99-35-4	0.5	mg/kg	----	----	----	----	<0.6
Phenacetin	62-44-2	0.5	mg/kg	----	----	----	----	<0.6
4-Aminobiphenyl	92-67-1	0.5	mg/kg	----	----	----	----	<0.6
Pentachloronitrobenzene	82-68-8	0.5	mg/kg	----	----	----	----	<0.6
Pronamide	23950-58-5	0.5	mg/kg	----	----	----	----	<0.6
Dimethylaminoazobenzene	60-11-7	0.5	mg/kg	----	----	----	----	<0.6
Chlorobenzilate	510-15-6	0.5	mg/kg	----	----	----	----	<0.6

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.8-0.9	VC03_0.3-0.4	VC03_0.0-0.5	VC04_0.3-0.4	VC04_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-047	ES1936029-051	ES1936029-055	ES1936029-058	ES1936029-063
				Result	Result	Result	Result	Result
EP075E: Nitroaromatics and Ketones - Continued								
EP075F: Haloethers								
Bis(2-chloroethyl) ether	111-44-4	0.5	mg/kg	----	----	----	----	<0.6
Bis(2-chloroethoxy) methane	111-91-1	0.5	mg/kg	----	----	----	----	<0.6
4-Chlorophenyl phenyl ether	7005-72-3	0.5	mg/kg	----	----	----	----	<0.6
4-Bromophenyl phenyl ether	101-55-3	0.5	mg/kg	----	----	----	----	<0.6
EP075G: Chlorinated Hydrocarbons								
1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	----	----	----	----	<0.6
1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	----	----	----	----	<0.6
1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	----	----	----	----	<0.6
Hexachloroethane	67-72-1	0.5	mg/kg	----	----	----	----	<0.6
1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	----	----	----	----	<0.6
Hexachloropropylene	1888-71-7	0.5	mg/kg	----	----	----	----	<0.6
Hexachlorobutadiene	87-68-3	0.5	mg/kg	----	----	----	----	<0.6
Hexachlorocyclopentadiene	77-47-4	2.5	mg/kg	----	----	----	----	<2.5
Pentachlorobenzene	608-93-5	0.5	mg/kg	----	----	----	----	<0.6
Hexachlorobenzene (HCB)	118-74-1	1.0	mg/kg	----	----	----	----	<1.0
EP075H: Anilines and Benzidines								
Aniline	62-53-3	0.5	mg/kg	----	----	----	----	<0.6
4-Chloroaniline	106-47-8	0.5	mg/kg	----	----	----	----	<0.6
2-Nitroaniline	88-74-4	1.0	mg/kg	----	----	----	----	<1.0
3-Nitroaniline	99-09-2	1.0	mg/kg	----	----	----	----	<1.0
Dibenzofuran	132-64-9	0.5	mg/kg	----	----	----	----	<0.6
4-Nitroaniline	100-01-6	0.5	mg/kg	----	----	----	----	<0.6
Carbazole	86-74-8	0.5	mg/kg	----	----	----	----	<0.6
3.3`-Dichlorobenzidine	91-94-1	0.5	mg/kg	----	----	----	----	<0.6
EP075I: Organochlorine Pesticides								
alpha-BHC	319-84-6	0.5	mg/kg	----	----	----	----	<0.6
beta-BHC	319-85-7	0.5	mg/kg	----	----	----	----	<0.6
gamma-BHC	58-89-9	0.5	mg/kg	----	----	----	----	<0.6
delta-BHC	319-86-8	0.5	mg/kg	----	----	----	----	<0.6
Heptachlor	76-44-8	0.5	mg/kg	----	----	----	----	<0.6
Aldrin	309-00-2	0.5	mg/kg	----	----	----	----	<0.6
Heptachlor epoxide	1024-57-3	0.5	mg/kg	----	----	----	----	<0.6
alpha-Endosulfan	959-98-8	0.5	mg/kg	----	----	----	----	<0.6

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.8-0.9	VC03_0.3-0.4	VC03_0.0-0.5	VC04_0.3-0.4	VC04_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-047	ES1936029-051	ES1936029-055	ES1936029-058	ES1936029-063
				Result	Result	Result	Result	Result
EP075I: Organochlorine Pesticides - Continued								
4.4`-DDE	72-55-9	0.5	mg/kg	----	----	----	----	<0.6
Dieldrin	60-57-1	0.5	mg/kg	----	----	----	----	<0.6
Endrin	72-20-8	0.5	mg/kg	----	----	----	----	<0.6
beta-Endosulfan	33213-65-9	0.5	mg/kg	----	----	----	----	<0.6
4.4`-DDD	72-54-8	0.5	mg/kg	----	----	----	----	<0.6
Endosulfan sulfate	1031-07-8	0.5	mg/kg	----	----	----	----	<0.6
4.4`-DDT	50-29-3	1.0	mg/kg	----	----	----	----	<1.0
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	mg/kg	----	----	----	----	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	mg/kg	----	----	----	----	<0.5
EP075J: Organophosphorus Pesticides								
Dichlorvos	62-73-7	0.5	mg/kg	----	----	----	----	<0.6
Dimethoate	60-51-5	0.5	mg/kg	----	----	----	----	<0.6
Diazinon	333-41-5	0.5	mg/kg	----	----	----	----	<0.6
Chlorpyrifos-methyl	5598-13-0	0.5	mg/kg	----	----	----	----	<0.6
Malathion	121-75-5	0.5	mg/kg	----	----	----	----	<0.6
Fenthion	55-38-9	0.5	mg/kg	----	----	----	----	<0.6
Chlorpyrifos	2921-88-2	0.5	mg/kg	----	----	----	----	<0.6
Pirimphos-ethyl	23505-41-1	0.5	mg/kg	----	----	----	----	<0.6
Chlorfenvinphos	470-90-6	0.5	mg/kg	----	----	----	----	<0.6
Prothiofos	34643-46-4	0.5	mg/kg	----	----	----	----	<0.6
Ethion	563-12-2	0.5	mg/kg	----	----	----	----	<0.6
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
>C10 - C16 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3
>C16 - C34 Fraction	----	3	mg/kg	<3	<3	<3	<3	**4**
>C34 - C40 Fraction	----	5	mg/kg	<5	<5	<5	<5	<5
>C10 - C40 Fraction (sum)	----	3	mg/kg	<3	<3	<3	<3	**4**
>C10 - C16 Fraction minus Naphthalene (F2)	----	3	mg/kg	<3	<3	<3	<3	<3
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3
C10 - C14 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3
C15 - C28 Fraction	----	3	mg/kg	<3	<3	<3	<3	**5**
C29 - C36 Fraction	----	5	mg/kg	<5	<5	<5	<5	<5
^ C10 - C36 Fraction (sum)	----	3	mg/kg	<3	<3	<3	<3	**5**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**VC05_0.8-0.9**	**VC03_0.3-0.4**	**VC03_0.0-0.5**	**VC04_0.3-0.4**	**VC04_0.5-1.0**
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1936029-047**	**ES1936029-051**	**ES1936029-055**	**ES1936029-058**	**ES1936029-063**
				Result	Result	Result	Result	Result
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons - Continued								
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons								
C6 - C10 Fraction	C6_C10	3	mg/kg	<3	<3	<3	<3	<3
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	3.0	mg/kg	<3.0	<3.0	<3.0	<3.0	<3.0
EP080-SD: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene	91-20-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EP090: Organotin Compounds								
Monobutyltin	78763-54-9	1	µgSn/kg	----	----	<1	----	----
Dibutyltin	1002-53-5	1	µgSn/kg	----	----	<1	----	----
Tributyltin	56573-85-4	0.5	µgSn/kg	----	----	<0.5	----	<0.5
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	<10	<10	<10
Carbophenothion	786-19-6	10	µg/kg	<10	<10	<10	<10	<10
Chlorfenvinphos (E)	18708-86-6	10.0	µg/kg	<10.0	<10.0	<10.0	<10.0	<10.0
Chlorfenvinphos (Z)	18708-87-7	10	µg/kg	<10	<10	<10	<10	<10
Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	<10	<10	<10
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	<10	<10	<10
Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	<10	<10	<10
Diazinon	333-41-5	10	µg/kg	<10	<10	<10	<10	<10
Dichlorvos	62-73-7	10	µg/kg	<10	<10	<10	<10	<10
Dimethoate	60-51-5	10	µg/kg	<10	<10	<10	<10	<10
Ethion	563-12-2	10	µg/kg	<10	<10	<10	<10	<10
Fenamiphos	22224-92-6	10	µg/kg	<10	<10	<10	<10	<10
Fenthion	55-38-9	10	µg/kg	<10	<10	<10	<10	<10
Malathion	121-75-5	10	µg/kg	<10	<10	<10	<10	<10
Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	<10	<10	<10
Monocrotophos	6923-22-4	10	µg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.8-0.9	VC03_0.3-0.4	VC03_0.0-0.5	VC04_0.3-0.4	VC04_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-047	ES1936029-051	ES1936029-055	ES1936029-058	ES1936029-063
				Result	Result	Result	Result	Result
EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued								
Parathion	56-38-2	10	µg/kg	<10	<10	<10	<10	<10
Parathion-methyl	298-00-0	10	µg/kg	<10	<10	<10	<10	<10
Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	<10	<10	<10
Prothiofos	34643-46-4	10	µg/kg	<10	<10	<10	<10	<10
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
^ Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
Oxychlordane	27304-13-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
EP131B: Polychlorinated Biphenyls (as Aroclors)								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<6.2
Aroclor 1016	12674-11-2	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<6.2
Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<6.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.8-0.9	VC03_0.3-0.4	VC03_0.0-0.5	VC04_0.3-0.4	VC04_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-047	ES1936029-051	ES1936029-055	ES1936029-058	ES1936029-063
				Result	Result	Result	Result	Result
EP131B: Polychlorinated Biphenyls (as Aroclors) - Continued								
Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<6.2
Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<6.2
Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<6.2
Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<6.2
Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<6.2
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	<4	<5
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	<4	<5
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	<4	<5
Phenanthrene	85-01-8	4	µg/kg	<4	<4	<4	<4	<5
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	<4	<5
Fluoranthene	206-44-0	4	µg/kg	<4	<4	<4	<4	<5
Pyrene	129-00-0	4	µg/kg	<4	<4	<4	<4	<5
Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	<4	<4	<5
Chrysene	218-01-9	4	µg/kg	<4	<4	<4	<4	<5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	<4	<4	<4	<5
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	<4	<4	<5
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	<4	<4	<5
Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	<4	<4	<5
Perylene	198-55-0	4	µg/kg	<4	<4	<4	<4	<5
Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	<4	<4	<4	<5
Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	<4	<5
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	<4	<4	<5
Coronene	191-07-1	5	µg/kg	<5	<5	<5	<5	<5
^ Sum of PAHs	----	4	µg/kg	<4	<4	<4	<4	<5
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.5	%	**109**	**107**	----	----	----
Toluene-D8	2037-26-5	0.5	%	**113**	**112**	----	----	----
4-Bromofluorobenzene	460-00-4	0.5	%	**105**	**104**	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**83.7**	**85.4**	**84.1**	**84.2**	**86.6**
2-Chlorophenol-D4	93951-73-6	0.5	%	**91.9**	**95.7**	**92.8**	**93.7**	**94.7**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.8-0.9	VC03_0.3-0.4	VC03_0.0-0.5	VC04_0.3-0.4	VC04_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-047	ES1936029-051	ES1936029-055	ES1936029-058	ES1936029-063
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
2.4.6-Tribromophenol	118-79-6	0.5	%	59.3	62.6	61.8	60.6	60.8
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	113	114	114	114	116
Anthracene-d10	1719-06-8	0.5	%	98.4	101	100	101	102
4-Terphenyl-d14	1718-51-0	0.5	%	101	103	103	104	105
EP075S: Acid Extractable Surrogates								
2-Fluorophenol	367-12-4	0.5	%	----	----	----	----	98.0
Phenol-d6	13127-88-3	0.5	%	----	----	----	----	90.8
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	----	----	96.2
2.4.6-Tribromophenol	118-79-6	0.5	%	----	----	----	----	55.5
EP075T: Base/Neutral Extractable Surrogates								
Nitrobenzene-D5	4165-60-0	0.5	%	----	----	----	----	87.5
1.2-Dichlorobenzene-D4	2199-69-1	0.5	%	----	----	----	----	85.6
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	----	----	83.3
Anthracene-d10	1719-06-8	0.5	%	----	----	----	----	92.3
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	----	----	97.5
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	101	106	118	109	116
Toluene-D8	2037-26-5	0.2	%	107	114	126	98.0	126
4-Bromofluorobenzene	460-00-4	0.2	%	105	119	129	107	122
EP090S: Organotin Surrogate								
Tripropyltin	----	0.5	%	----	----	59.0	----	90.4
EP130S: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	10	%	48.8	39.6	41.8	48.4	39.3
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.50	%	47.5	57.7	50.6	65.6	45.7
EP131T: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.5	%	59.2	65.8	60.2	74.9	67.8
EP132T: Base/Neutral Extractable Surrogates								
2-Fluorobiphenyl	321-60-8	10	%	87.1	85.6	113	73.2	72.8
Anthracene-d10	1719-06-8	10	%	99.9	117	120	101	91.8
4-Terphenyl-d14	1718-51-0	10	%	90.3	113	96.8	109	79.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_1.5-1.6	VC01_1.0-1.1	VC01_0.5-1.0	VC10_0.7-0.8	VC10_0.0-0.5
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-067	ES1936029-071	ES1936029-073	ES1936029-076	ES1936029-077
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	13.0	14.5	13.5	18.8	15.4
EA150: Particle Sizing								
+75µm	----	1	%	----	----	70	----	51
+150µm	----	1	%	----	----	64	----	40
+300µm	----	1	%	----	----	43	----	19
+425µm	----	1	%	----	----	26	----	10
+600µm	----	1	%	----	----	9	----	3
+1180µm	----	1	%	----	----	<1	----	<1
+2.36mm	----	1	%	----	----	<1	----	<1
+4.75mm	----	1	%	----	----	<1	----	<1
+9.5mm	----	1	%	----	----	<1	----	<1
+19.0mm	----	1	%	----	----	<1	----	<1
+37.5mm	----	1	%	----	----	<1	----	<1
+75.0mm	----	1	%	----	----	<1	----	<1
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	----	----	20	----	32
Silt (2-60 µm)	----	1	%	----	----	8	----	12
Sand (0.06-2.00 mm)	----	1	%	----	----	72	----	56
Gravel (>2mm)	----	1	%	----	----	<1	----	<1
Cobbles (>6cm)	----	1	%	----	----	<1	----	<1
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	8610	2820	3870	14600	9760
Iron	7439-89-6	50	mg/kg	5400	1020	1470	1230	1360
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Arsenic	7440-38-2	1.00	mg/kg	1.22	<1.00	<1.00	<1.00	<1.00
Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	7440-47-3	1.0	mg/kg	8.9	2.5	3.0	11.9	6.9
Copper	7440-50-8	1.0	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Cobalt	7440-48-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Lead	7439-92-1	1.0	mg/kg	3.1	1.1	1.4	24.5	4.6
Manganese	7439-96-5	10	mg/kg	<10	<10	<10	<10	<10
Nickel	7440-02-0	1.0	mg/kg	1.0	<1.0	<1.0	2.0	1.3
Selenium	7782-49-2	0.1	mg/kg	0.2	<0.1	<0.1	<0.1	0.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_1.5-1.6	VC01_1.0-1.1	VC01_0.5-1.0	VC10_0.7-0.8	VC10_0.0-0.5
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-067	ES1936029-071	ES1936029-073	ES1936029-076	ES1936029-077
				Result	Result	Result	Result	Result
EG020-SD: Total Metals in Sediments by ICPMS - Continued								
Silver	7440-22-4	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Vanadium	7440-62-2	2.0	mg/kg	**14.8**	**2.5**	**3.8**	**4.7**	**6.3**
Zinc	7440-66-6	1.0	mg/kg	**1.9**	<1.0	<1.0	**4.2**	**2.1**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	<0.01	<0.01	<0.01	**0.01**	<0.01
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	<1	<1	<1
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**0.07**	**0.04**	**0.06**	**0.12**	**0.06**
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	----	----	<0.5	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg	----	----	<0.5	----	----
2-Methylphenol	95-48-7	0.5	mg/kg	----	----	<0.5	----	----
3- & 4-Methylphenol	1319-77-3	0.5	mg/kg	----	----	<0.5	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg	----	----	<0.5	----	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	----	----	<0.5	----	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	----	----	<0.5	----	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	----	----	<0.5	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	----	----	<0.5	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	----	----	<0.5	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	----	----	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_1.5-1.6	VC01_1.0-1.1	VC01_0.5-1.0	VC10_0.7-0.8	VC10_0.0-0.5
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-067	ES1936029-071	ES1936029-073	ES1936029-076	ES1936029-077
				Result	Result	Result	Result	Result
EP075A: Phenolic Compounds - Continued								
Pentachlorophenol	87-86-5	1	mg/kg	----	----	<1	----	----
EP075B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	----	<0.5	----	----
2-Methylnaphthalene	91-57-6	0.5	mg/kg	----	----	<0.5	----	----
2-Chloronaphthalene	91-58-7	0.5	mg/kg	----	----	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	----	----	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg	----	----	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	----	----	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	----	----	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	----	----	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg	----	----	<0.5	----	----
N-2-Fluorenyl Acetamide	53-96-3	0.5	mg/kg	----	----	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg	----	----	<0.5	----	----
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	----	----	<1	----	----
7.12-Dimethylbenz(a)anthracene	57-97-6	0.5	mg/kg	----	----	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	<0.5	----	----
3-Methylcholanthrene	56-49-5	0.5	mg/kg	----	----	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	----	<0.5	----	----
^ Sum of PAHs	----	0.5	mg/kg	----	----	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	----	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	----	**0.6**	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	----	**1.2**	----	----
EP075C: Phthalate Esters								
Dimethyl phthalate	131-11-3	0.5	mg/kg	----	----	<0.5	----	----
Diethyl phthalate	84-66-2	0.5	mg/kg	----	----	<0.5	----	----
Di-n-butyl phthalate	84-74-2	0.5	mg/kg	----	----	<0.5	----	----
Butyl benzyl phthalate	85-68-7	0.5	mg/kg	----	----	<0.5	----	----
bis(2-ethylhexyl) phthalate	117-81-7	5.0	mg/kg	----	----	<5.0	----	----
Di-n-octylphthalate	117-84-0	0.5	mg/kg	----	----	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_1.5-1.6	VC01_1.0-1.1	VC01_0.5-1.0	VC10_0.7-0.8	VC10_0.0-0.5
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-067	ES1936029-071	ES1936029-073	ES1936029-076	ES1936029-077
				Result	Result	Result	Result	Result
EP075D: Nitrosamines								
N-Nitrosomethylethylamine	10595-95-6	0.5	mg/kg	----	----	<0.5	----	----
N-Nitrosodiethylamine	55-18-5	0.5	mg/kg	----	----	<0.5	----	----
N-Nitrosopyrrolidine	930-55-2	1.0	mg/kg	----	----	<1.0	----	----
N-Nitrosomorpholine	59-89-2	0.5	mg/kg	----	----	<0.5	----	----
N-Nitrosodi-n-propylamine	621-64-7	0.5	mg/kg	----	----	<0.5	----	----
N-Nitrosopiperidine	100-75-4	0.5	mg/kg	----	----	<0.5	----	----
N-Nitrosodibutylamine	924-16-3	0.5	mg/kg	----	----	<0.5	----	----
N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	1.0	mg/kg	----	----	<1.0	----	----
Methapyrilene	91-80-5	0.5	mg/kg	----	----	<0.5	----	----
EP075E: Nitroaromatics and Ketones								
2-Picoline	109-06-8	0.5	mg/kg	----	----	<0.5	----	----
Acetophenone	98-86-2	0.5	mg/kg	----	----	<0.5	----	----
Nitrobenzene	98-95-3	0.5	mg/kg	----	----	<0.5	----	----
Isophorone	78-59-1	0.5	mg/kg	----	----	<0.5	----	----
2.6-Dinitrotoluene	606-20-2	1.0	mg/kg	----	----	<1.0	----	----
2.4-Dinitrotoluene	121-14-2	1.0	mg/kg	----	----	<1.0	----	----
1-Naphthylamine	134-32-7	0.5	mg/kg	----	----	<0.5	----	----
4-Nitroquinoline-N-oxide	56-57-5	0.5	mg/kg	----	----	<0.5	----	----
5-Nitro-o-toluidine	99-55-8	0.5	mg/kg	----	----	<0.5	----	----
Azobenzene	103-33-3	1	mg/kg	----	----	<1	----	----
1.3.5-Trinitrobenzene	99-35-4	0.5	mg/kg	----	----	<0.5	----	----
Phenacetin	62-44-2	0.5	mg/kg	----	----	<0.5	----	----
4-Aminobiphenyl	92-67-1	0.5	mg/kg	----	----	<0.5	----	----
Pentachloronitrobenzene	82-68-8	0.5	mg/kg	----	----	<0.5	----	----
Pronamide	23950-58-5	0.5	mg/kg	----	----	<0.5	----	----
Dimethylaminoazobenzene	60-11-7	0.5	mg/kg	----	----	<0.5	----	----
Chlorobenzilate	510-15-6	0.5	mg/kg	----	----	<0.5	----	----
EP075F: Haloethers								
Bis(2-chloroethyl) ether	111-44-4	0.5	mg/kg	----	----	<0.5	----	----
Bis(2-chloroethoxy) methane	111-91-1	0.5	mg/kg	----	----	<0.5	----	----
4-Chlorophenyl phenyl ether	7005-72-3	0.5	mg/kg	----	----	<0.5	----	----
4-Bromophenyl phenyl ether	101-55-3	0.5	mg/kg	----	----	<0.5	----	----
EP075G: Chlorinated Hydrocarbons								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_1.5-1.6	VC01_1.0-1.1	VC01_0.5-1.0	VC10_0.7-0.8	VC10_0.0-0.5
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-067	ES1936029-071	ES1936029-073	ES1936029-076	ES1936029-077
				Result	Result	Result	Result	Result
EP075G: Chlorinated Hydrocarbons - Continued								
1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	----	----	<0.5	----	----
1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	----	----	<0.5	----	----
1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	----	----	<0.5	----	----
Hexachloroethane	67-72-1	0.5	mg/kg	----	----	<0.5	----	----
1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	----	----	<0.5	----	----
Hexachloropropylene	1888-71-7	0.5	mg/kg	----	----	<0.5	----	----
Hexachlorobutadiene	87-68-3	0.5	mg/kg	----	----	<0.5	----	----
Hexachlorocyclopentadiene	77-47-4	2.5	mg/kg	----	----	<2.5	----	----
Pentachlorobenzene	608-93-5	0.5	mg/kg	----	----	<0.5	----	----
Hexachlorobenzene (HCB)	118-74-1	1.0	mg/kg	----	----	<1.0	----	----
EP075H: Anilines and Benzidines								
Aniline	62-53-3	0.5	mg/kg	----	----	<0.5	----	----
4-Chloroaniline	106-47-8	0.5	mg/kg	----	----	<0.5	----	----
2-Nitroaniline	88-74-4	1.0	mg/kg	----	----	<1.0	----	----
3-Nitroaniline	99-09-2	1.0	mg/kg	----	----	<1.0	----	----
Dibenzofuran	132-64-9	0.5	mg/kg	----	----	<0.5	----	----
4-Nitroaniline	100-01-6	0.5	mg/kg	----	----	<0.5	----	----
Carbazole	86-74-8	0.5	mg/kg	----	----	<0.5	----	----
3.3`-Dichlorobenzidine	91-94-1	0.5	mg/kg	----	----	<0.5	----	----
EP075I: Organochlorine Pesticides								
alpha-BHC	319-84-6	0.5	mg/kg	----	----	<0.5	----	----
beta-BHC	319-85-7	0.5	mg/kg	----	----	<0.5	----	----
gamma-BHC	58-89-9	0.5	mg/kg	----	----	<0.5	----	----
delta-BHC	319-86-8	0.5	mg/kg	----	----	<0.5	----	----
Heptachlor	76-44-8	0.5	mg/kg	----	----	<0.5	----	----
Aldrin	309-00-2	0.5	mg/kg	----	----	<0.5	----	----
Heptachlor epoxide	1024-57-3	0.5	mg/kg	----	----	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	mg/kg	----	----	<0.5	----	----
4.4`-DDE	72-55-9	0.5	mg/kg	----	----	<0.5	----	----
Dieldrin	60-57-1	0.5	mg/kg	----	----	<0.5	----	----
Endrin	72-20-8	0.5	mg/kg	----	----	<0.5	----	----
beta-Endosulfan	33213-65-9	0.5	mg/kg	----	----	<0.5	----	----
4.4`-DDD	72-54-8	0.5	mg/kg	----	----	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	mg/kg	----	----	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_1.5-1.6	VC01_1.0-1.1	VC01_0.5-1.0	VC10_0.7-0.8	VC10_0.0-0.5
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-067	ES1936029-071	ES1936029-073	ES1936029-076	ES1936029-077
				Result	Result	Result	Result	Result
EP075I: Organochlorine Pesticides - Continued								
4.4`-DDT	50-29-3	1.0	mg/kg	----	----	<1.0	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	mg/kg	----	----	<0.5	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	mg/kg	----	----	<0.5	----	----
EP075J: Organophosphorus Pesticides								
Dichlorvos	62-73-7	0.5	mg/kg	----	----	<0.5	----	----
Dimethoate	60-51-5	0.5	mg/kg	----	----	<0.5	----	----
Diazinon	333-41-5	0.5	mg/kg	----	----	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	mg/kg	----	----	<0.5	----	----
Malathion	121-75-5	0.5	mg/kg	----	----	<0.5	----	----
Fenthion	55-38-9	0.5	mg/kg	----	----	<0.5	----	----
Chlorpyrifos	2921-88-2	0.5	mg/kg	----	----	<0.5	----	----
Pirimphos-ethyl	23505-41-1	0.5	mg/kg	----	----	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	mg/kg	----	----	<0.5	----	----
Prothiofos	34643-46-4	0.5	mg/kg	----	----	<0.5	----	----
Ethion	563-12-2	0.5	mg/kg	----	----	<0.5	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
>C10 - C16 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3
>C16 - C34 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3
>C34 - C40 Fraction	----	5	mg/kg	<5	<5	<5	<5	<5
>C10 - C40 Fraction (sum)	----	3	mg/kg	<3	<3	<3	<3	<3
>C10 - C16 Fraction minus Naphthalene (F2)	----	3	mg/kg	<3	<3	<3	<3	<3
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3
C10 - C14 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3
C15 - C28 Fraction	----	3	mg/kg	<3	<3	<3	<3	<3
C29 - C36 Fraction	----	5	mg/kg	<5	<5	<5	<5	<5
^ C10 - C36 Fraction (sum)	----	3	mg/kg	<3	<3	<3	<3	<3
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons								
C6 - C10 Fraction	C6_C10	3	mg/kg	<3	<3	<3	<3	<3
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	3.0	mg/kg	<3.0	<3.0	<3.0	<3.0	<3.0
EP080-SD: BTEXN								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_1.5-1.6	VC01_1.0-1.1	VC01_0.5-1.0	VC10_0.7-0.8	VC10_0.0-0.5
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-067	ES1936029-071	ES1936029-073	ES1936029-076	ES1936029-077
				Result	Result	Result	Result	Result
EP080-SD: BTEXN - Continued								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene	91-20-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
EP090: Organotin Compounds								
Tributyltin	56573-85-4	0.5	µgSn/kg	----	----	<0.5	----	----
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	<10	<10	<10
Carbophenothion	786-19-6	10	µg/kg	<10	<10	<10	<10	<10
Chlorfenvinphos (E)	18708-86-6	10.0	µg/kg	<10.0	<10.0	<10.0	<10.0	<10.0
Chlorfenvinphos (Z)	18708-87-7	10	µg/kg	<10	<10	<10	<10	<10
Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	<10	<10	<10
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	<10	<10	<10
Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	<10	<10	<10
Diazinon	333-41-5	10	µg/kg	<10	<10	<10	<10	<10
Dichlorvos	62-73-7	10	µg/kg	<10	<10	<10	<10	<10
Dimethoate	60-51-5	10	µg/kg	<10	<10	<10	<10	<10
Ethion	563-12-2	10	µg/kg	<10	<10	<10	<10	<10
Fenamiphos	22224-92-6	10	µg/kg	<10	<10	<10	<10	<10
Fenthion	55-38-9	10	µg/kg	<10	<10	<10	<10	<10
Malathion	121-75-5	10	µg/kg	<10	<10	<10	<10	<10
Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	<10	<10	<10
Monocrotophos	6923-22-4	10	µg/kg	<10	<10	<10	<10	<10
Parathion	56-38-2	10	µg/kg	<10	<10	<10	<10	<10
Parathion-methyl	298-00-0	10	µg/kg	<10	<10	<10	<10	<10
Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	<10	<10	<10
Prothiofos	34643-46-4	10	µg/kg	<10	<10	<10	<10	<10
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_1.5-1.6	VC01_1.0-1.1	VC01_0.5-1.0	VC10_0.7-0.8	VC10_0.0-0.5
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-067	ES1936029-071	ES1936029-073	ES1936029-076	ES1936029-077
				Result	Result	Result	Result	Result
EP131A: Organochlorine Pesticides - Continued								
beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
4.4`-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
^ Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	<0.25	<0.25	<0.25
Oxychlordane	27304-13-8	0.50	µg/kg	<0.50	<0.50	<0.50	<0.50	<0.50
EP131B: Polychlorinated Biphenyls (as Aroclors)								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1016	12674-11-2	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	5	µg/kg	<5	<5	<5	<5	<5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_1.5-1.6	VC01_1.0-1.1	VC01_0.5-1.0	VC10_0.7-0.8	VC10_0.0-0.5
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-067	ES1936029-071	ES1936029-073	ES1936029-076	ES1936029-077
				Result	Result	Result	Result	Result
EP132B: Polynuclear Aromatic Hydrocarbons - Continued								
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	<5	<5	<5
Acenaphthylene	208-96-8	4	µg/kg	<4	<4	<4	<4	<4
Acenaphthene	83-32-9	4	µg/kg	<4	<4	<4	<4	<4
Fluorene	86-73-7	4	µg/kg	<4	<4	<4	<4	<4
Phenanthrene	85-01-8	4	µg/kg	4	<4	<4	8	<4
Anthracene	120-12-7	4	µg/kg	<4	<4	<4	<4	<4
Fluoranthene	206-44-0	4	µg/kg	11	<4	<4	16	<4
Pyrene	129-00-0	4	µg/kg	10	<4	<4	17	<4
Benz(a)anthracene	56-55-3	4	µg/kg	5	<4	<4	12	<4
Chrysene	218-01-9	4	µg/kg	5	<4	<4	8	<4
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	<4	<4	10	<4
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	<4	7	<4
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	<4	6	<4
Benzo(a)pyrene	50-32-8	4	µg/kg	4	<4	<4	13	<4
Perylene	198-55-0	4	µg/kg	<4	<4	<4	<4	<4
Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	<4	<4	8	<4
Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	<4	<4	<4	<4
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	<4	8	<4
Coronene	191-07-1	5	µg/kg	<5	<5	<5	<5	<5
^ Sum of PAHs	----	4	µg/kg	39	<4	<4	113	<4
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	82.9	85.2	83.7	84.6	83.4
2-Chlorophenol-D4	93951-73-6	0.5	%	91.8	95.0	93.5	94.3	92.6
2.4.6-Tribromophenol	118-79-6	0.5	%	59.2	58.1	60.4	60.3	57.4
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	113	115	114	116	113
Anthracene-d10	1719-06-8	0.5	%	98.9	100	100	101	98.9
4-Terphenyl-d14	1718-51-0	0.5	%	102	104	103	104	101
EP075S: Acid Extractable Surrogates								
2-Fluorophenol	367-12-4	0.5	%	----	----	102	----	----
Phenol-d6	13127-88-3	0.5	%	----	----	95.9	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	97.6	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	----	----	52.8	----	----
EP075T: Base/Neutral Extractable Surrogates								

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC02_1.5-1.6	VC01_1.0-1.1	VC01_0.5-1.0	VC10_0.7-0.8	VC10_0.0-0.5
Client sampling date / time				30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
				ES1936029-067	ES1936029-071	ES1936029-073	ES1936029-076	ES1936029-077
				Result	Result	Result	Result	Result
EP075T: Base/Neutral Extractable Surrogates - Continued								
Nitrobenzene-D5	4165-60-0	0.5	%	----	----	91.8	----	----
1.2-Dichlorobenzene-D4	2199-69-1	0.5	%	----	----	90.6	----	----
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	100	----	----
Anthracene-d10	1719-06-8	0.5	%	----	----	94.3	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	103	----	----
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	116	99.7	99.2	98.6	124
Toluene-D8	2037-26-5	0.2	%	123	96.6	105	98.3	129
4-Bromofluorobenzene	460-00-4	0.2	%	119	109	99.5	105	126
EP090S: Organotin Surrogate								
Tripropyltin	----	0.5	%	----	----	68.9	----	----
EP130S: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	10	%	40.7	48.6	52.2	37.8	41.6
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.50	%	52.2	79.9	74.9	52.9	55.5
EP131T: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.5	%	60.9	64.0	72.8	57.5	67.0
EP132T: Base/Neutral Extractable Surrogates								
2-Fluorobiphenyl	321-60-8	10	%	81.6	91.8	95.0	79.3	81.3
Anthracene-d10	1719-06-8	10	%	105	117	106	95.1	113
4-Terphenyl-d14	1718-51-0	10	%	96.6	106	103	92.4	95.8

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_0.0-0.5	FD01	FD05	TS1	TB1
			Client sampling date / time	31-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-079	ES1936029-081	ES1936029-083	ES1936029-085	ES1936029-086
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**49.1**	**28.8**	**15.1**	----	----
EA150: Particle Sizing								
+75µm	----	1	%	**10**	----	----	----	----
+150µm	----	1	%	**4**	----	----	----	----
+300µm	----	1	%	**2**	----	----	----	----
+425µm	----	1	%	<1	----	----	----	----
+600µm	----	1	%	<1	----	----	----	----
+1180µm	----	1	%	<1	----	----	----	----
+2.36mm	----	1	%	<1	----	----	----	----
+4.75mm	----	1	%	<1	----	----	----	----
+9.5mm	----	1	%	<1	----	----	----	----
+19.0mm	----	1	%	<1	----	----	----	----
+37.5mm	----	1	%	<1	----	----	----	----
+75.0mm	----	1	%	<1	----	----	----	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	**26**	----	----	----	----
Silt (2-60 µm)	----	1	%	**52**	----	----	----	----
Sand (0.06-2.00 mm)	----	1	%	**22**	----	----	----	----
Gravel (>2mm)	----	1	%	<1	----	----	----	----
Cobbles (>6cm)	----	1	%	<1	----	----	----	----
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	**12200**	**6720**	**10700**	----	----
Iron	7439-89-6	50	mg/kg	**34900**	**17000**	**2060**	----	----
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	<0.50	<0.50	<0.50	----	----
Arsenic	7440-38-2	1.00	mg/kg	**16.1**	**7.74**	<1.00	----	----
Cadmium	7440-43-9	0.1	mg/kg	**0.5**	<0.1	<0.1	----	----
Chromium	7440-47-3	1.0	mg/kg	**42.0**	**11.4**	**7.6**	----	----
Copper	7440-50-8	1.0	mg/kg	**120**	**2.1**	<1.0	----	----
Cobalt	7440-48-4	0.5	mg/kg	**4.2**	**1.3**	<0.5	----	----
Lead	7439-92-1	1.0	mg/kg	**318**	**5.7**	**3.0**	----	----
Manganese	7439-96-5	10	mg/kg	**88**	**27**	<10	----	----
Nickel	7440-02-0	1.0	mg/kg	**10.4**	**3.8**	**1.9**	----	----
Selenium	7782-49-2	0.1	mg/kg	**0.6**	**0.3**	**0.1**	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_0.0-0.5	FD01	FD05	TS1	TB1
			Client sampling date / time	31-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-079	ES1936029-081	ES1936029-083	ES1936029-085	ES1936029-086
				Result	Result	Result	Result	Result
EG020-SD: Total Metals in Sediments by ICPMS - Continued								
Silver	7440-22-4	0.1	mg/kg	**3.0**	**0.5**	**0.2**	----	----
Vanadium	7440-62-2	2.0	mg/kg	**32.6**	**14.2**	**13.4**	----	----
Zinc	7440-66-6	1.0	mg/kg	**445**	**11.8**	**2.9**	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	**4.25**	**0.02**	<0.01	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	<1	----	----
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**2.82**	**0.39**	**0.09**	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	----	----	**35**	<10
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	----	**44**	<10
>C10 - C16 Fraction	----	3	mg/kg	**4**	<3	<3	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	----	----	**22**	<10
>C16 - C34 Fraction	----	3	mg/kg	**78**	<3	<3	----	----
>C34 - C40 Fraction	----	5	mg/kg	**28**	<5	<5	----	----
>C10 - C40 Fraction (sum)	----	3	mg/kg	**110**	<3	<3	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	3	mg/kg	**4**	<3	<3	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_0.0-0.5	FD01	FD05	TS1	TB1
			Client sampling date / time	31-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-079	ES1936029-081	ES1936029-083	ES1936029-085	ES1936029-086
				Result	Result	Result	Result	Result
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	----	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	----	----	----	**9.4**	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	**1.5**	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	**8.1**	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	**3.4**	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	**22.4**	<0.2
^ Total Xylenes	----	0.5	mg/kg	----	----	----	**11.5**	<0.5
Naphthalene	91-20-3	1	mg/kg	----	----	----	<1	<1
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	3	mg/kg	<3	<3	<3	----	----
C10 - C14 Fraction	----	3	mg/kg	<3	<3	<3	----	----
C15 - C28 Fraction	----	3	mg/kg	**48**	<3	<3	----	----
C29 - C36 Fraction	----	5	mg/kg	**46**	<5	<5	----	----
^ C10 - C36 Fraction (sum)	----	3	mg/kg	**94**	<3	<3	----	----
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons								
C6 - C10 Fraction	C6_C10	3	mg/kg	<3	<3	<3	----	----
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	3.0	mg/kg	<3.0	<3.0	<3.0	----	----
EP080-SD: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Naphthalene	91-20-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	<10	----	----
Carbophenothion	786-19-6	10	µg/kg	<10	<10	<10	----	----
Chlorfenvinphos (E)	18708-86-6	10.0	µg/kg	<10.0	<10.0	<10.0	----	----
Chlorfenvinphos (Z)	18708-87-7	10	µg/kg	<10	<10	<10	----	----
Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	<10	----	----
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	<10	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_0.0-0.5	FD01	FD05	TS1	TB1
			Client sampling date / time	31-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-079	ES1936029-081	ES1936029-083	ES1936029-085	ES1936029-086
				Result	Result	Result	Result	Result
EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued								
Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	<10	----	----
Diazinon	333-41-5	10	µg/kg	<10	<10	<10	----	----
Dichlorvos	62-73-7	10	µg/kg	<10	<10	<10	----	----
Dimethoate	60-51-5	10	µg/kg	<10	<10	<10	----	----
Ethion	563-12-2	10	µg/kg	<10	<10	<10	----	----
Fenamiphos	22224-92-6	10	µg/kg	<10	<10	<10	----	----
Fenthion	55-38-9	10	µg/kg	<10	<10	<10	----	----
Malathion	121-75-5	10	µg/kg	<10	<10	<10	----	----
Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	<10	----	----
Monocrotophos	6923-22-4	10	µg/kg	<10	<10	<10	----	----
Parathion	56-38-2	10	µg/kg	<10	<10	<10	----	----
Parathion-methyl	298-00-0	10	µg/kg	<10	<10	<10	----	----
Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	<10	----	----
Prothiofos	34643-46-4	10	µg/kg	<10	<10	<10	----	----
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
alpha-BHC	319-84-6	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
beta-BHC	319-85-7	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
delta-BHC	319-86-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
4.4`-DDD	72-54-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
4.4`-DDE	72-55-9	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
4.4`-DDT	50-29-3	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Dieldrin	60-57-1	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Endrin	72-20-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Heptachlor	76-44-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	<0.50	<0.50	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_0.0-0.5	FD01	FD05	TS1	TB1
			Client sampling date / time	31-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-079	ES1936029-081	ES1936029-083	ES1936029-085	ES1936029-086
				Result	Result	Result	Result	Result
EP131A: Organochlorine Pesticides - Continued								
gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	<0.25	----	----
Methoxychlor	72-43-5	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	<0.25	----	----
trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	<0.25	----	----
^ Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	<0.25	----	----
Oxychlordane	27304-13-8	0.50	µg/kg	<0.50	<0.50	<0.50	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors)								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1016	12674-11-2	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	<5.0	<5.0	----	----
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	5	µg/kg	**116**	<5	<5	----	----
2-Methylnaphthalene	91-57-6	5	µg/kg	**44**	<5	<5	----	----
Acenaphthylene	208-96-8	4	µg/kg	**297**	<4	<4	----	----
Acenaphthene	83-32-9	4	µg/kg	**44**	<4	<4	----	----
Fluorene	86-73-7	4	µg/kg	**95**	<4	<4	----	----
Phenanthrene	85-01-8	4	µg/kg	**885**	<4	<4	----	----
Anthracene	120-12-7	4	µg/kg	**286**	<4	<4	----	----
Fluoranthene	206-44-0	4	µg/kg	**1890**	<4	<4	----	----
Pyrene	129-00-0	4	µg/kg	**1780**	<4	**4**	----	----
Benz(a)anthracene	56-55-3	4	µg/kg	**1130**	<4	<4	----	----
Chrysene	218-01-9	4	µg/kg	**997**	<4	<4	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	**1490**	<4	<4	----	----
Benzo(k)fluoranthene	207-08-9	4	µg/kg	**661**	<4	<4	----	----
Benzo(e)pyrene	192-97-2	4	µg/kg	**631**	<4	<4	----	----
Benzo(a)pyrene	50-32-8	4	µg/kg	**1570**	<4	**5**	----	----
Perylene	198-55-0	4	µg/kg	**329**	<4	<4	----	----
Benzo(g.h.i)perylene	191-24-2	4	µg/kg	**1000**	<4	<4	----	----
Dibenz(a.h)anthracene	53-70-3	4	µg/kg	**219**	<4	<4	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_0.0-0.5	FD01	FD05	TS1	TB1
			Client sampling date / time	31-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936029-079	ES1936029-081	ES1936029-083	ES1936029-085	ES1936029-086
				Result	Result	Result	Result	Result
EP132B: Polynuclear Aromatic Hydrocarbons - Continued								
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	963	<4	<4	----	----
Coronene	191-07-1	5	µg/kg	375	<5	<5	----	----
^ Sum of PAHs	----	4	µg/kg	14800	<4	9	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	84.6	86.1	84.2	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	93.6	96.2	93.7	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	74.9	67.4	65.7	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	114	116	114	----	----
Anthracene-d10	1719-06-8	0.5	%	102	102	101	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	95.8	102	100	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	----	90.1	101
Toluene-D8	2037-26-5	0.2	%	----	----	----	99.8	106
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	----	104	111
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	109	82.3	108	----	----
Toluene-D8	2037-26-5	0.2	%	99.8	85.8	97.0	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	111	84.3	107	----	----
EP130S: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	10	%	53.6	49.3	37.7	----	----
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.50	%	42.0	60.7	67.4	----	----
EP131T: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.5	%	84.9	65.5	56.5	----	----
EP132T: Base/Neutral Extractable Surrogates								
2-Fluorobiphenyl	321-60-8	10	%	74.2	77.7	78.3	----	----
Anthracene-d10	1719-06-8	10	%	85.2	102	104	----	----
4-Terphenyl-d14	1718-51-0	10	%	98.4	105	113	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TSC	----	----	----	----
			Client sampling date / time	31-Oct-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1936029-087	--------	--------	--------	--------
				Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	**47**	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	**59**	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	**29**	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	**12.7**	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	**2.1**	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	**10.9**	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	**4.5**	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	**30.2**	----	----	----	----
^ Total Xylenes	----	0.5	mg/kg	**15.4**	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**94.8**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	**103**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	**108**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	RIN_01	----	----	----	----
			Client sampling date / time	30-Oct-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1936029-084	--------	--------	--------	--------
				Result	----	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	RIN_01	----	----	----	----
			Client sampling date / time	30-Oct-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1936029-084	--------	--------	--------	--------
				Result	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ Total Xylenes	----	2	µg/L	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**26.1**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	**63.7**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	**80.0**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**87.0**	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	**84.4**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	**85.9**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**90.8**	----	----	----	----
Toluene-D8	2037-26-5	2	%	**95.1**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	**94.3**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	17060-07-0	64	130
Toluene-D8	2037-26-5	66	136
4-Bromofluorobenzene	460-00-4	60	122
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	29	149
Phenol-d6	13127-88-3	32	128
2-Chlorophenol-D4	93951-73-6	32	128
2.4.6-Tribromophenol	118-79-6	13	121
EP075T: Base/Neutral Extractable Surrogates			
Nitrobenzene-D5	4165-60-0	33	125
1.2-Dichlorobenzene-D4	2199-69-1	34	108
2-Fluorobiphenyl	321-60-8	35	121
Anthracene-d10	1719-06-8	35	123
4-Terphenyl-d14	1718-51-0	33	125
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130
EP080-SD: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	67	137
Toluene-D8	2037-26-5	74	134
4-Bromofluorobenzene	460-00-4	73	137
EP090S: Organotin Surrogate			
Tripropyltin	----	35	130
EP130S: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	14	102
EP131S: OC Pesticide Surrogate			
Dibromo-DDE	21655-73-2	10	119
EP131T: PCB Surrogate			

Sub-Matrix: **SOIL**

Compound	*CAS Number*	*Recovery Limits (%)* Low	High
EP131T: PCB Surrogate - Continued			
Decachlorobiphenyl	2051-24-3	10	106
EP132T: Base/Neutral Extractable Surrogates			
2-Fluorobiphenyl	321-60-8	55	135
Anthracene-d10	1719-06-8	70	136
4-Terphenyl-d14	1718-51-0	57	127

Sub-Matrix: **WATER**

Compound	*CAS Number*	*Recovery Limits (%)* Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: **ES1936029**	Page	: 1 of 33
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Jessica Watson	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 31-Oct-2019
Order number	: ----	Date Analysis Commenced	: 01-Nov-2019
C-O-C number	: ----	Issue Date	: 10-Dec-2019
Sampler	: Sarah Eccleshall		
Site	: ----		
Quote number	: SY/522/19		
No. of samples received	: 87		
No. of samples analysed	: 47		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Diana Mesa	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Dianne Blane	Laboratory Coordinator (2IC)	Newcastle - Inorganics, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield West, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES (QC Lot: 2682883)									
ES1936029-071	VC01_1.0-1.1	EG005-SD: Aluminium	7429-90-5	50	mg/kg	2820	3290	15.4	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	1020	930	9.00	0% - 20%
ES1936029-058	VC04_0.3-0.4	EG005-SD: Aluminium	7429-90-5	50	mg/kg	14800	13500	9.21	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	2510	2170	14.3	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QC Lot: 2682884)									
ES1936029-071	VC01_1.0-1.1	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	<0.01	0.00	No Limit
ES1936029-058	VC04_0.3-0.4	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.01	0.00	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 2684165)									
ES1936029-013	VC03_0.0-0.1	EA037: pH (F)	----	0.1	pH Unit	7.9	8.0	0.00	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.2	6.2	0.00	0% - 20%
ES1936029-023	VC10_0.0-0.1	EA037: pH (F)	----	0.1	pH Unit	7.7	7.8	1.55	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.4	6.3	0.00	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 2684166)									
ES1936029-033	VC07_1.0-1.1	EA037: pH (F)	----	0.1	pH Unit	7.9	7.9	0.00	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.9	5.9	0.00	0% - 20%
ES1936183-005	Anonymous	EA037: pH (F)	----	0.1	pH Unit	7.3	7.1	1.67	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.6	5.6	0.00	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2682887)									
EM1918213-004	Anonymous	EA055: Moisture Content	----	0.1	%	38.8	39.1	0.774	0% - 20%
ES1935859-001	Anonymous	EA055: Moisture Content	----	0.1	%	29.3	26.6	9.72	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2682888)									
ES1936029-058	VC04_0.3-0.4	EA055: Moisture Content	----	0.1	%	17.1	17.5	2.34	0% - 50%
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 2682877)									
EM1918213-002	Anonymous	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	0.2	0.1	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 2682877) - continued									
EM1918213-002	Anonymous	EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.9	0.8	0.00	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	0.4	0.3	36.8	No Limit
		EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	<0.50	0.00	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	1.3	0.9	42.4	No Limit
		EG020-SD: Arsenic	7440-38-2	1	mg/kg	9.66	8.58	11.8	No Limit
		EG020-SD: Chromium	7440-47-3	1	mg/kg	11.0	8.7	23.4	0% - 50%
		EG020-SD: Copper	7440-50-8	1	mg/kg	12.2	# 7.0	54.6	0% - 50%
		EG020-SD: Lead	7439-92-1	1	mg/kg	10.0	# 5.1	65.6	0% - 50%
		EG020-SD: Nickel	7440-02-0	1	mg/kg	5.4	4.2	25.3	No Limit
		EG020-SD: Zinc	7440-66-6	1	mg/kg	34.8	# 18.8	59.8	0% - 20%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	60	46	26.2	No Limit
		EG020-SD: Vanadium	7440-62-2	2	mg/kg	21.0	17.6	17.4	0% - 50%
EM1918213-018	Anonymous	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	0.3	0.2	0.00	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.4	0.3	0.00	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	0.3	0.3	0.00	No Limit
		EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	<0.50	0.00	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	1.4	1.2	11.0	No Limit
		EG020-SD: Arsenic	7440-38-2	1	mg/kg	6.87	5.66	19.2	No Limit
		EG020-SD: Chromium	7440-47-3	1	mg/kg	6.5	6.6	1.61	No Limit
		EG020-SD: Copper	7440-50-8	1	mg/kg	12.2	12.8	5.12	0% - 50%
		EG020-SD: Lead	7439-92-1	1	mg/kg	11.8	12.1	2.46	0% - 50%
		EG020-SD: Nickel	7440-02-0	1	mg/kg	3.0	3.0	0.00	No Limit
		EG020-SD: Zinc	7440-66-6	1	mg/kg	46.0	45.5	1.08	0% - 20%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	57	58	0.00	No Limit
		EG020-SD: Vanadium	7440-62-2	2	mg/kg	6.7	6.8	1.68	No Limit
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 2682885)									
ES1936029-058	VC04_0.3-0.4	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	0.2	0.3	0.00	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	0.1	<0.1	0.00	No Limit
		EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	<0.50	0.00	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	<0.5	1.0	71.0	No Limit
		EG020-SD: Arsenic	7440-38-2	1	mg/kg	<1.00	1.15	14.2	No Limit
		EG020-SD: Chromium	7440-47-3	1	mg/kg	13.2	12.3	7.25	0% - 50%
		EG020-SD: Copper	7440-50-8	1	mg/kg	<1.0	1.1	12.6	No Limit
		EG020-SD: Lead	7439-92-1	1	mg/kg	28.0	26.7	4.83	0% - 20%
		EG020-SD: Nickel	7440-02-0	1	mg/kg	2.0	3.6	57.8	No Limit
		EG020-SD: Zinc	7440-66-6	1	mg/kg	3.4	3.0	14.1	No Limit
		EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	<10	0.00	No Limit
		EG020-SD: Vanadium	7440-62-2	2	mg/kg	10.4	6.9	40.0	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 2677335)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 2677335) - continued									
ES1935865-002	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
ES1936029-007	VC07_0.0-0.2	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 2677336)									
ES1936029-076	VC10_0.7-0.8	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
WN1908608-002	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EK040T: Fluoride Total (QC Lot: 2683332)									
EB1928984-011	Anonymous	EK040T: Fluoride	16984-48-8	40	mg/kg	860	820	4.66	0% - 20%
EB1929055-002	Anonymous	EK040T: Fluoride	16984-48-8	40	mg/kg	<40	<40	0.00	No Limit
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 2687095)									
EB1929034-001	Anonymous	EP003: Total Organic Carbon	----	0.02	%	29.6	26.5	11.2	0% - 20%
ES1936029-063	VC04_0.5-1.0	EP003: Total Organic Carbon	----	0.02	%	0.05	0.06	17.8	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 2677735)									
ES1936029-007	VC07_0.0-0.2	EP074: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP074: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.3.5-Trimethylbenzene	108-67-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2.4-Trimethylbenzene	95-63-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 2677735)									
ES1936029-007	VC07_0.0-0.2	EP074: Vinyl Acetate	108-05-4	5	mg/kg	<5	<5	0.00	No Limit
		EP074: 2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	5	mg/kg	<5	<5	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	5	mg/kg	<5	<5	0.00	No Limit
EP074C: Sulfonated Compounds (QC Lot: 2677735)									
ES1936029-007	VC07_0.0-0.2	EP074: Carbon disulfide	75-15-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074D: Fumigants (QC Lot: 2677735)									
ES1936029-007	VC07_0.0-0.2	EP074: 2.2-Dichloropropane	594-20-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074D: Fumigants (QC Lot: 2677735) - continued									
ES1936029-007	VC07_0.0-0.2	EP074: 1.2-Dibromoethane (EDB)	106-93-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 2677735)									
ES1936029-007	VC07_0.0-0.2	EP074: 1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Iodomethane	74-88-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	5	mg/kg	<5	<5	0.00	No Limit
		EP074: Chloromethane	74-87-3	5	mg/kg	<5	<5	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	5	mg/kg	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	5	mg/kg	<5	<5	0.00	No Limit
		EP074: Chloroethane	75-00-3	5	mg/kg	<5	<5	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	5	mg/kg	<5	<5	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 2677735)									
ES1936029-007	VC07_0.0-0.2	EP074: Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2.3-Trichlorobenzene	87-61-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP074G: Trihalomethanes (QC Lot: 2677735)									
ES1936029-007	VC07_0.0-0.2	EP074: Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Bromoform	75-25-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074H: Naphthalene (QC Lot: 2677735)									
ES1936029-007	VC07_0.0-0.2	EP074: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 2680331)									
ES1936029-001	VC09_0.0-0.2	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
ES1936029-071	VC01_1.0-1.1	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
EP075A: Phenolic Compounds (QC Lot: 2689777)									
ES1936029-011	VC07_0.0-0.5	EP075: Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 3- & 4-Methylphenol	1319-77-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075A: Phenolic Compounds (QC Lot: 2689777) - continued									
ES1936029-011	VC07_0.0-0.5	EP075: 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Pentachlorophenol	87-86-5	1	mg/kg	<1	<1	0.00	No Limit
EP075B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2689777)									
ES1936029-011	VC07_0.0-0.5	EP075: Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2-Methylnaphthalene	91-57-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2-Chloronaphthalene	91-58-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Phenanthrene	85-01-8	0.5	mg/kg	0.7	<0.5	37.7	No Limit
		EP075: Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Fluoranthene	206-44-0	0.5	mg/kg	1.5	0.9	50.0	No Limit
		EP075: Pyrene	129-00-0	0.5	mg/kg	1.5	1.0	40.6	No Limit
		EP075: N-2-Fluorenyl Acetamide	53-96-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Benz(a)anthracene	56-55-3	0.5	mg/kg	0.8	0.6	34.1	No Limit
		EP075: Chrysene	218-01-9	0.5	mg/kg	0.7	<0.5	30.0	No Limit
		EP075: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Benzo(a)pyrene	50-32-8	0.5	mg/kg	0.8	0.7	16.8	No Limit
		EP075: 3-Methylcholanthrene	56-49-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	0.5	<0.5	0.00	No Limit
		EP075: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	1	1	0.00	No Limit
EP075C: Phthalate Esters (QC Lot: 2689777)									
ES1936029-011	VC07_0.0-0.5	EP075: Dimethyl phthalate	131-11-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Diethyl phthalate	84-66-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Di-n-butyl phthalate	84-74-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Butyl benzyl phthalate	85-68-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Di-n-octylphthalate	117-84-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075D: Nitrosamines (QC Lot: 2689777)									
ES1936029-011	VC07_0.0-0.5	EP075: N-Nitrosomethylethylamine	10595-95-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: N-Nitrosodiethylamine	55-18-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: N-Nitrosopyrrolidine	930-55-2	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: N-Nitrosomorpholine	59-89-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: N-Nitrosodi-n-propylamine	621-64-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: N-Nitrosopiperidine	100-75-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: N-Nitrosodibutylamine	924-16-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075D: Nitrosamines (QC Lot: 2689777) - continued									
ES1936029-011	VC07_0.0-0.5	EP075: N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: Methapyrilene	91-80-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075E: Nitroaromatics and Ketones (QC Lot: 2689777)									
ES1936029-011	VC07_0.0-0.5	EP075: 2-Picoline	109-06-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Acetophenone	98-86-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Nitrobenzene	98-95-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Isophorone	78-59-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2.6-Dinitrotoluene	606-20-2	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: 2.4-Dinitrotoluene	121-14-2	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: 1-Naphthylamine	134-32-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4-Nitroquinoline-N-oxide	56-57-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 5-Nitro-o-toluidine	99-55-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 1.3.5-Trinitrobenzene	99-35-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Phenacetin	62-44-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4-Aminobiphenyl	92-67-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Pentachloronitrobenzene	82-68-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Pronamide	23950-58-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Dimethylaminoazobenzene	60-11-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Chlorobenzilate	510-15-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Azobenzene	103-33-3	1	mg/kg	<1	<1	0.00	No Limit
EP075F: Haloethers (QC Lot: 2689777)									
ES1936029-011	VC07_0.0-0.5	EP075: Bis(2-chloroethyl) ether	111-44-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Bis(2-chloroethoxy) methane	111-91-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4-Chlorophenyl phenyl ether	7005-72-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4-Bromophenyl phenyl ether	101-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075G: Chlorinated Hydrocarbons (QC Lot: 2689777)									
ES1936029-011	VC07_0.0-0.5	EP075: 1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Hexachloroethane	67-72-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Hexachloropropylene	1888-71-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Hexachlorobutadiene	87-68-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Pentachlorobenzene	608-93-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Hexachlorobenzene (HCB)	118-74-1	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: Hexachlorocyclopentadiene	77-47-4	2.5	mg/kg	<2.5	<2.5	0.00	No Limit
EP075H: Anilines and Benzidines (QC Lot: 2689777)									
ES1936029-011	VC07_0.0-0.5	EP075: Aniline	62-53-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075H: Anilines and Benzidines (QC Lot: 2689777) - continued									
ES1936029-011	VC07_0.0-0.5	EP075: 4-Chloroaniline	106-47-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2-Nitroaniline	88-74-4	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: 3-Nitroaniline	99-09-2	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: Dibenzofuran	132-64-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4-Nitroaniline	100-01-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Carbazole	86-74-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 3.3`-Dichlorobenzidine	91-94-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075I: Organochlorine Pesticides (QC Lot: 2689777)									
ES1936029-011	VC07_0.0-0.5	EP075: alpha-BHC	319-84-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: beta-BHC	319-85-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: gamma-BHC	58-89-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: delta-BHC	319-86-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Heptachlor	76-44-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Aldrin	309-00-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Heptachlor epoxide	1024-57-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: alpha-Endosulfan	959-98-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4.4`-DDE	72-55-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Dieldrin	60-57-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Endrin	72-20-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: beta-Endosulfan	33213-65-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4.4`-DDD	72-54-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Endosulfan sulfate	1031-07-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4.4`-DDT	50-29-3	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
EP075J: Organophosphorus Pesticides (QC Lot: 2689777)									
ES1936029-011	VC07_0.0-0.5	EP075: Dichlorvos	62-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Dimethoate	60-51-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Diazinon	333-41-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Chlorpyrifos-methyl	5598-13-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Malathion	121-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Fenthion	55-38-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Chlorpyrifos	2921-88-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Pirimphos-ethyl	23505-41-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Chlorfenvinphos	470-90-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Prothiofos	34643-46-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Ethion	563-12-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2680181)									
ES1936027-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1936111-004	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2680181)									

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2680181) - continued									
ES1936027-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1936111-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 2680181)									
ES1936027-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	0.4	<0.2	72.1	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1936111-004	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 2677697)									
ES1936029-001	VC09_0.0-0.2	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: C10 - C36 Fraction (sum)	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	<5	0.00	No Limit
ES1936029-071	VC01_1.0-1.1	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: C10 - C36 Fraction (sum)	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	<5	0.00	No Limit
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 2677734)									
ES1936029-071	VC01_1.0-1.1	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
ES1936029-007	VC07_0.0-0.2	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons (QC Lot: 2677697)									
ES1936029-001	VC09_0.0-0.2	EP071-SD: >C10 - C16 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: >C16 - C34 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: >C10 - C40 Fraction (sum)	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: >C34 - C40 Fraction	----	5	mg/kg	<5	<5	0.00	No Limit
ES1936029-071	VC01_1.0-1.1	EP071-SD: >C10 - C16 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: >C16 - C34 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: >C10 - C40 Fraction (sum)	----	3	mg/kg	<3	<3	0.00	No Limit
		EP071-SD: >C34 - C40 Fraction	----	5	mg/kg	<5	<5	0.00	No Limit
EP080-SD: BTEXN (QC Lot: 2677734)									

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP080-SD: BTEXN (QC Lot: 2677734) - continued									
ES1936029-071	VC01_1.0-1.1	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
ES1936029-007	VC07_0.0-0.2	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP090: Organotin Compounds (QC Lot: 2698344)									
EM1919013-021	Anonymous	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	4.8	3.5	30.2	No Limit
		EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	0.00	No Limit
		EP090: Dibutyltin	1002-53-5	1	µgSn/kg	2	<1	77.0	No Limit
ES1936183-029	Anonymous	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	6.9	5.3	26.4	0% - 50%
		EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	0.00	No Limit
		EP090: Dibutyltin	1002-53-5	1	µgSn/kg	3	3	0.00	No Limit
EP090: Organotin Compounds (QC Lot: 2745160)									
ES1936029-055	VC03_0.0-0.5	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.00	No Limit
		EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	<1	0.00	No Limit
		EP090: Dibutyltin	1002-53-5	1	µgSn/kg	<1	<1	0.00	No Limit
EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 2677727)									
ES1936029-001	VC09_0.0-0.2	EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Carbophenothion	786-19-6	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Chlorfenvinphos (E)	18708-86-6	10	µg/kg	<10.0	<10.0	0.00	No Limit
		EP130: Chlorfenvinphos (Z)	18708-87-7	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Diazinon	333-41-5	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Dichlorvos	62-73-7	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Dimethoate	60-51-5	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Ethion	563-12-2	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Fenthion	55-38-9	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Malathion	121-75-5	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	<10	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 2677727) - continued									
ES1936029-001	VC09_0.0-0.2	EP130: Parathion	56-38-2	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Prothiofos	34643-46-4	10	µg/kg	<10	<10	0.00	No Limit
ES1936029-071	VC01_1.0-1.1	EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Carbophenothion	786-19-6	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Chlorfenvinphos (E)	18708-86-6	10	µg/kg	<10.0	<10.0	0.00	No Limit
		EP130: Chlorfenvinphos (Z)	18708-87-7	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Diazinon	333-41-5	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Dichlorvos	62-73-7	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Dimethoate	60-51-5	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Ethion	563-12-2	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Fenthion	55-38-9	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Malathion	121-75-5	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Parathion	56-38-2	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Prothiofos	34643-46-4	10	µg/kg	<10	<10	0.00	No Limit
EP131A: Organochlorine Pesticides (QC Lot: 2677729)									
ES1936029-001	VC09_0.0-0.2	EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	0.00	No Limit
		EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	0.00	No Limit
		EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	0.00	No Limit
		EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	0.00	No Limit
		EP131A: Aldrin	309-00-2	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: alpha-BHC	319-84-6	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: beta-BHC	319-85-7	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: delta-BHC	319-86-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: 4.4`-DDD	72-54-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: 4.4`-DDE	72-55-9	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: 4.4`-DDT	50-29-3	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Dieldrin	60-57-1	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: alpha-Endosulfan	959-98-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP131A: Organochlorine Pesticides (QC Lot: 2677729) - continued									
ES1936029-001	VC09_0.0-0.2	EP131A: beta-Endosulfan	33213-65-9	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endosulfan sulfate	1031-07-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endosulfan (sum)	115-29-7	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endrin	72-20-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endrin aldehyde	7421-93-4	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endrin ketone	53494-70-5	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Heptachlor	76-44-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Heptachlor epoxide	1024-57-3	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Methoxychlor	72-43-5	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
ES1936029-071	VC01_1.0-1.1	EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	0.00	No Limit
		EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	0.00	No Limit
		EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	0.00	No Limit
		EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	0.00	No Limit
		EP131A: Aldrin	309-00-2	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: alpha-BHC	319-84-6	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: beta-BHC	319-85-7	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: delta-BHC	319-86-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: 4.4`-DDD	72-54-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: 4.4`-DDE	72-55-9	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: 4.4`-DDT	50-29-3	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Dieldrin	60-57-1	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: alpha-Endosulfan	959-98-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: beta-Endosulfan	33213-65-9	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endosulfan sulfate	1031-07-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endosulfan (sum)	115-29-7	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endrin	72-20-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endrin aldehyde	7421-93-4	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endrin ketone	53494-70-5	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Heptachlor	76-44-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Heptachlor epoxide	1024-57-3	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Methoxychlor	72-43-5	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
EP131B: Polychlorinated Biphenyls (as Aroclors) (QC Lot: 2677728)									
ES1936029-001	VC09_0.0-0.2	EP131B: Total Polychlorinated biphenyls	----	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1016	12674-11-2	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1221	11104-28-2	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1232	11141-16-5	5	µg/kg	<5.0	<5.0	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP131B: Polychlorinated Biphenyls (as Aroclors) (QC Lot: 2677728) - continued									
ES1936029-001	VC09_0.0-0.2	EP131B: Aroclor 1242	53469-21-9	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1248	12672-29-6	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1254	11097-69-1	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1260	11096-82-5	5	µg/kg	<5.0	<5.0	0.00	No Limit
ES1936029-071	VC01_1.0-1.1	EP131B: Total Polychlorinated biphenyls	----	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1016	12674-11-2	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1221	11104-28-2	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1232	11141-16-5	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1242	53469-21-9	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1248	12672-29-6	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1254	11097-69-1	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1260	11096-82-5	5	µg/kg	<5.0	<5.0	0.00	No Limit
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2677696)									
ES1936029-001	VC09_0.0-0.2	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.00	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.00	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.00	No Limit
ES1936029-071	VC01_1.0-1.1	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	<4	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2677696) - continued									
ES1936029-071	VC01_1.0-1.1	EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	<4	0.00	No Limit
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	<5	0.00	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.00	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EG020T: Total Metals by ICP-MS (QC Lot: 2686305)									
ES1936029-084	RIN_01	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2686717)									
WN1908881-036	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2681218)									
ES1936026-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1936051-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2681218)									
ES1936026-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1936051-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2681218)									
ES1936026-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP080: BTEXN (QC Lot: 2681218) - continued									
ES1936026-002	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1936051-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES (QCLot: 2682883)								
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	6134 mg/kg	108	88.2	136
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	8400 mg/kg	86.0	70.0	109
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 2682884)								
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.257 mg/kg	83.3	72.0	116
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2682877)								
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	4.6 mg/kg	81.4	70.0	130
EG020-SD: Arsenic	7440-38-2	1	mg/kg	<1.00	21.7 mg/kg	100	80.0	139
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	4.64 mg/kg	103	83.0	127
EG020-SD: Chromium	7440-47-3	1	mg/kg	<1.0	43.9 mg/kg	86.0	73.0	130
EG020-SD: Copper	7440-50-8	1	mg/kg	<1.0	32 mg/kg	96.6	76.0	130
EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	<0.5	16 mg/kg	105	81.0	130
EG020-SD: Lead	7439-92-1	1	mg/kg	<1.0	40 mg/kg	98.3	74.0	130
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	130 mg/kg	106	76.0	130
EG020-SD: Nickel	7440-02-0	1	mg/kg	<1.0	55 mg/kg	97.1	83.0	130
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	5.37 mg/kg	122	71.0	130
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	4 mg/kg	111	64.0	148
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	29.6 mg/kg	106	84.0	131
EG020-SD: Zinc	7440-66-6	1	mg/kg	<1.0	60.8 mg/kg	110	82.0	137
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2682885)								
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	4.6 mg/kg	74.5	70.0	130
EG020-SD: Arsenic	7440-38-2	1	mg/kg	<1.00	21.7 mg/kg	87.2	80.0	139
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	4.64 mg/kg	89.9	83.0	127
EG020-SD: Chromium	7440-47-3	1	mg/kg	<1.0	43.9 mg/kg	75.5	73.0	130
EG020-SD: Copper	7440-50-8	1	mg/kg	<1.0	32 mg/kg	85.2	76.0	130
EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	<0.5	16 mg/kg	90.1	81.0	130
EG020-SD: Lead	7439-92-1	1	mg/kg	<1.0	40 mg/kg	79.4	74.0	130
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	130 mg/kg	81.9	76.0	130
EG020-SD: Nickel	7440-02-0	1	mg/kg	<1.0	55 mg/kg	86.2	83.0	130
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	5.37 mg/kg	94.4	71.0	130
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	4 mg/kg	68.0	64.0	148
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	29.6 mg/kg	86.0	84.0	131
EG020-SD: Zinc	7440-66-6	1	mg/kg	<1.0	60.8 mg/kg	88.6	82.0	137
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2677335)								
EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	40 mg/kg	106	81.0	129

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2677336)								
EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	40 mg/kg	112	81.0	129
EK040T: Fluoride Total (QCLot: 2683332)								
EK040T: Fluoride	16984-48-8	40	mg/kg	<40	400 mg/kg	76.0	67.2	96.3
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 2687095)								
EP003: Total Organic Carbon	----	0.02	%	<0.02	1.03 %	101	70.0	130
				<0.02	0.48 %	105	70.0	130
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 2677735)								
EP074: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	88.3	71.0	121
EP074: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	86.6	65.0	131
EP074: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	85.8	72.0	114
EP074: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	84.8	70.0	116
EP074: Styrene	100-42-5	0.5	mg/kg	<0.5	1 mg/kg	82.1	67.0	113
EP074: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	86.5	75.0	115
EP074: Isopropylbenzene	98-82-8	0.5	mg/kg	<0.5	1 mg/kg	84.8	65.0	117
EP074: n-Propylbenzene	103-65-1	0.5	mg/kg	<0.5	1 mg/kg	82.5	66.0	122
EP074: 1.3.5-Trimethylbenzene	108-67-8	0.5	mg/kg	<0.5	1 mg/kg	82.4	68.0	118
EP074: sec-Butylbenzene	135-98-8	0.5	mg/kg	<0.5	1 mg/kg	83.8	69.0	119
EP074: 1.2.4-Trimethylbenzene	95-63-6	0.5	mg/kg	<0.5	1 mg/kg	83.8	69.0	117
EP074: tert-Butylbenzene	98-06-6	0.5	mg/kg	<0.5	1 mg/kg	83.7	69.0	115
EP074: p-Isopropyltoluene	99-87-6	0.5	mg/kg	<0.5	1 mg/kg	84.1	66.0	118
EP074: n-Butylbenzene	104-51-8	0.5	mg/kg	<0.5	1 mg/kg	82.7	59.0	125
EP074B: Oxygenated Compounds (QCLot: 2677735)								
EP074: Vinyl Acetate	108-05-4	5	mg/kg	<5	10 mg/kg	100	29.6	156
EP074: 2-Butanone (MEK)	78-93-3	5	mg/kg	<5	10 mg/kg	96.4	58.0	136
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	5	mg/kg	<5	10 mg/kg	92.6	62.0	132
EP074: 2-Hexanone (MBK)	591-78-6	5	mg/kg	<5	10 mg/kg	90.0	54.0	136
EP074C: Sulfonated Compounds (QCLot: 2677735)								
EP074: Carbon disulfide	75-15-0	0.5	mg/kg	<0.5	1 mg/kg	80.0	54.0	126
EP074D: Fumigants (QCLot: 2677735)								
EP074: 2.2-Dichloropropane	594-20-7	0.5	mg/kg	<0.5	1 mg/kg	87.8	60.0	126
EP074: 1.2-Dichloropropane	78-87-5	0.5	mg/kg	<0.5	1 mg/kg	87.8	68.0	124
EP074: cis-1.3-Dichloropropylene	10061-01-5	0.5	mg/kg	<0.5	1 mg/kg	83.2	51.0	119
EP074: trans-1.3-Dichloropropylene	10061-02-6	0.5	mg/kg	<0.5	1 mg/kg	81.5	52.0	114
EP074: 1.2-Dibromoethane (EDB)	106-93-4	0.5	mg/kg	<0.5	1 mg/kg	90.8	63.0	115
EP074E: Halogenated Aliphatic Compounds (QCLot: 2677735)								
EP074: Dichlorodifluoromethane	75-71-8	5	mg/kg	<5	10 mg/kg	75.6	30.0	148
EP074: Chloromethane	74-87-3	5	mg/kg	<5	10 mg/kg	86.4	41.0	141

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 2677735) - continued								
EP074: Vinyl chloride	75-01-4	5	mg/kg	<5	10 mg/kg	84.7	43.0	147
EP074: Bromomethane	74-83-9	5	mg/kg	<5	10 mg/kg	84.4	47.0	141
EP074: Chloroethane	75-00-3	5	mg/kg	<5	10 mg/kg	88.2	49.0	143
EP074: Trichlorofluoromethane	75-69-4	5	mg/kg	<5	10 mg/kg	86.1	49.0	135
EP074: 1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	1 mg/kg	87.4	54.0	126
EP074: Iodomethane	74-88-4	0.5	mg/kg	<0.5	1 mg/kg	54.6	43.0	129
EP074: trans-1.2-Dichloroethene	156-60-5	0.5	mg/kg	<0.5	1 mg/kg	84.8	64.0	120
EP074: 1.1-Dichloroethane	75-34-3	0.5	mg/kg	<0.5	1 mg/kg	84.9	67.0	125
EP074: cis-1.2-Dichloroethene	156-59-2	0.5	mg/kg	<0.5	1 mg/kg	88.2	69.0	121
EP074: 1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	1 mg/kg	83.6	65.0	117
EP074: 1.1-Dichloropropylene	563-58-6	0.5	mg/kg	<0.5	1 mg/kg	86.5	65.0	123
EP074: Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	1 mg/kg	81.5	59.0	125
EP074: 1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	1 mg/kg	92.7	65.0	125
EP074: Trichloroethene	79-01-6	0.5	mg/kg	<0.5	1 mg/kg	86.4	70.0	118
EP074: Dibromomethane	74-95-3	0.5	mg/kg	<0.5	1 mg/kg	89.7	68.0	118
EP074: 1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	1 mg/kg	89.0	64.0	126
EP074: 1.3-Dichloropropane	142-28-9	0.5	mg/kg	<0.5	1 mg/kg	90.2	68.0	122
EP074: Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	1 mg/kg	86.3	67.0	143
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	1 mg/kg	83.2	62.0	122
EP074: trans-1.4-Dichloro-2-butene	110-57-6	0.5	mg/kg	<0.5	1 mg/kg	78.7	54.0	128
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	0.5	mg/kg	<0.5	1 mg/kg	83.4	55.0	129
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	1 mg/kg	88.4	65.0	121
EP074: 1.2.3-Trichloropropane	96-18-4	0.5	mg/kg	<0.5	1 mg/kg	92.5	61.0	125
EP074: Pentachloroethane	76-01-7	0.5	mg/kg	<0.5	1 mg/kg	74.7	19.8	134
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	0.5	mg/kg	<0.5	1 mg/kg	86.9	53.0	129
EP074: Hexachlorobutadiene	87-68-3	0.5	mg/kg	<0.5	1 mg/kg	83.0	50.0	128
EP074F: Halogenated Aromatic Compounds (QCLot: 2677735)								
EP074: Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	1 mg/kg	86.5	68.0	116
EP074: Bromobenzene	108-86-1	0.5	mg/kg	<0.5	1 mg/kg	86.2	70.0	114
EP074: 2-Chlorotoluene	95-49-8	0.5	mg/kg	<0.5	1 mg/kg	85.2	68.0	122
EP074: 4-Chlorotoluene	106-43-4	0.5	mg/kg	<0.5	1 mg/kg	85.2	67.0	123
EP074: 1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	<0.5	1 mg/kg	85.6	70.0	116
EP074: 1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	<0.5	1 mg/kg	85.2	67.0	117
EP074: 1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	<0.5	1 mg/kg	87.0	70.0	114
EP074: 1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	<0.5	1 mg/kg	83.0	48.0	122
EP074: 1.2.3-Trichlorobenzene	87-61-6	0.5	mg/kg	<0.5	1 mg/kg	85.6	52.0	122
EP074G: Trihalomethanes (QCLot: 2677735)								
EP074: Chloroform	67-66-3	0.5	mg/kg	<0.5	1 mg/kg	84.7	66.0	124
EP074: Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5	1 mg/kg	84.7	61.0	121

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074G: Trihalomethanes (QCLot: 2677735) - continued								
EP074: Dibromochloromethane	124-48-1	0.5	mg/kg	<0.5	1 mg/kg	81.7	63.0	121
EP074: Bromoform	75-25-2	0.5	mg/kg	<0.5	1 mg/kg	79.7	60.0	126
EP074H: Naphthalene (QCLot: 2677735)								
EP074: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	87.2	67.0	129
EP075(SIM)A: Phenolic Compounds (QCLot: 2680331)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	6 mg/kg	99.9	71.0	125
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	6 mg/kg	106	72.0	124
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	6 mg/kg	109	71.0	123
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	12 mg/kg	117	67.0	127
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	6 mg/kg	97.4	54.0	114
EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	6 mg/kg	104	68.0	126
EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	6 mg/kg	107	66.0	120
EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	6 mg/kg	110	70.0	120
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	6 mg/kg	104	70.0	116
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	6 mg/kg	106	54.0	114
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	6 mg/kg	108	60.0	114
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	12 mg/kg	39.3	10.0	57.0
EP075A: Phenolic Compounds (QCLot: 2689777)								
EP075: Phenol	108-95-2	0.5	mg/kg	<0.5	1.5 mg/kg	102	64.0	114
EP075: 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	1.5 mg/kg	106	57.0	115
EP075: 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	1.5 mg/kg	98.0	55.0	117
EP075: 3- & 4-Methylphenol	1319-77-3	0.5	mg/kg	<0.5	1.5 mg/kg	98.9	46.0	122
EP075: 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	1.5 mg/kg	92.2	47.0	117
EP075: 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	1.5 mg/kg	96.3	13.7	108
EP075: 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	1.5 mg/kg	94.4	47.0	105
EP075: 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	1.5 mg/kg	80.6	48.0	110
EP075: 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	1.5 mg/kg	79.9	57.0	113
EP075: 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	1.5 mg/kg	66.7	49.0	109
EP075: 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	1.5 mg/kg	65.0	49.0	107
EP075: Pentachlorophenol	87-86-5	1	mg/kg	<1	3 mg/kg	16.0	12.0	76.0
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 2689777)								
EP075: Naphthalene	91-20-3	0.5	mg/kg	<0.5	1.5 mg/kg	96.4	62.0	118
EP075: 2-Methylnaphthalene	91-57-6	0.5	mg/kg	<0.5	1.5 mg/kg	79.1	58.0	116
EP075: 2-Chloronaphthalene	91-58-7	0.5	mg/kg	<0.5	1.5 mg/kg	75.4	54.0	112
EP075: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	1.5 mg/kg	80.7	56.0	114
EP075: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	1.5 mg/kg	98.9	62.0	112
EP075: Fluorene	86-73-7	0.5	mg/kg	<0.5	1.5 mg/kg	101	59.0	115
EP075: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	1.5 mg/kg	97.9	63.0	113

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 2689777) - continued								
EP075: Anthracene	120-12-7	0.5	mg/kg	<0.5	1.5 mg/kg	101	57.0	111
EP075: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	1.5 mg/kg	101	58.0	114
EP075: Pyrene	129-00-0	0.5	mg/kg	<0.5	1.5 mg/kg	103	57.0	117
EP075: N-2-Fluorenyl Acetamide	53-96-3	0.5	mg/kg	<0.5	1.5 mg/kg	110	58.0	114
EP075: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	1.5 mg/kg	108	59.0	115
EP075: Chrysene	218-01-9	0.5	mg/kg	<0.5	1.5 mg/kg	110	61.0	117
EP075: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1	3 mg/kg	101	57.0	119
EP075: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.5	mg/kg	<0.5	1.5 mg/kg	101	48.1	106
EP075: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	1.5 mg/kg	104	56.0	116
EP075: 3-Methylcholanthrene	56-49-5	0.5	mg/kg	<0.5	1.5 mg/kg	83.4	50.0	116
EP075: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	1.5 mg/kg	97.2	55.0	117
EP075: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	1.5 mg/kg	96.2	53.0	119
EP075: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	1.5 mg/kg	92.7	56.0	120
EP075C: Phthalate Esters (QCLot: 2689777)								
EP075: Dimethyl phthalate	131-11-3	0.5	mg/kg	<0.5	1.5 mg/kg	81.9	60.0	118
EP075: Diethyl phthalate	84-66-2	0.5	mg/kg	<0.5	1.5 mg/kg	96.6	65.0	115
EP075: Di-n-butyl phthalate	84-74-2	0.5	mg/kg	<0.5	1.5 mg/kg	98.9	65.0	121
EP075: Butyl benzyl phthalate	85-68-7	0.5	mg/kg	<0.5	1.5 mg/kg	104	62.0	116
EP075: bis(2-ethylhexyl) phthalate	117-81-7	----	mg/kg	----	1.5 mg/kg	93.7	69.0	133
EP075: Di-n-octylphthalate	117-84-0	0.5	mg/kg	<0.5	1.5 mg/kg	95.0	62.0	124
EP075D: Nitrosamines (QCLot: 2689777)								
EP075: N-Nitrosomethylethylamine	10595-95-6	0.5	mg/kg	<0.5	1.5 mg/kg	93.7	39.4	124
EP075: N-Nitrosodiethylamine	55-18-5	0.5	mg/kg	<0.5	1.5 mg/kg	83.4	59.0	117
EP075: N-Nitrosopyrrolidine	930-55-2	0.5	mg/kg	<0.5	1.5 mg/kg	103	53.0	125
EP075: N-Nitrosomorpholine	59-89-2	0.5	mg/kg	<0.5	1.5 mg/kg	99.4	65.0	121
EP075: N-Nitrosodi-n-propylamine	621-64-7	0.5	mg/kg	<0.5	1.5 mg/kg	102	59.0	123
EP075: N-Nitrosopiperidine	100-75-4	0.5	mg/kg	<0.5	1.5 mg/kg	109	57.0	115
EP075: N-Nitrosodibutylamine	924-16-3	0.5	mg/kg	<0.5	1.5 mg/kg	74.1	57.0	119
EP075: N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	0.5	mg/kg	<0.6	3 mg/kg	101	42.0	112
EP075: Methapyrilene	91-80-5	0.5	mg/kg	<0.5	1.5 mg/kg	64.7	16.3	123
EP075E: Nitroaromatics and Ketones (QCLot: 2689777)								
EP075: 2-Picoline	109-06-8	0.5	mg/kg	<0.5	1.5 mg/kg	91.1	27.3	129
EP075: Acetophenone	98-86-2	0.5	mg/kg	<0.5	1.5 mg/kg	102	60.0	116
EP075: Nitrobenzene	98-95-3	0.5	mg/kg	<0.5	1.5 mg/kg	106	65.0	119
EP075: Isophorone	78-59-1	0.5	mg/kg	<0.5	1.5 mg/kg	104	62.0	116
EP075: 2.6-Dinitrotoluene	606-20-2	0.5	mg/kg	<0.5	1.5 mg/kg	83.0	58.0	118

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075E: Nitroaromatics and Ketones (QCLot: 2689777) - continued								
EP075: 2.4-Dinitrotoluene	121-14-2	0.5	mg/kg	<0.5	1.5 mg/kg	102	59.0	115
EP075: 1-Naphthylamine	134-32-7	0.5	mg/kg	<0.5	1.5 mg/kg	25.3	18.0	112
EP075: 4-Nitroquinoline-N-oxide	56-57-5	0.5	mg/kg	<0.5	1.5 mg/kg	66.8	10.0	87.0
EP075: 5-Nitro-o-toluidine	99-55-8	0.5	mg/kg	<0.5	1.5 mg/kg	93.4	48.3	98.5
EP075: Azobenzene	103-33-3	1	mg/kg	<1	1.5 mg/kg	99.7	62.0	118
EP075: 1.3.5-Trinitrobenzene	99-35-4	0.5	mg/kg	<0.5	1.5 mg/kg	75.5	36.0	114
EP075: Phenacetin	62-44-2	0.5	mg/kg	<0.5	1.5 mg/kg	103	62.0	114
EP075: 4-Aminobiphenyl	92-67-1	0.5	mg/kg	<0.5	1.5 mg/kg	81.3	36.1	102
EP075: Pentachloronitrobenzene	82-68-8	0.5	mg/kg	<0.5	1.5 mg/kg	91.5	56.0	110
EP075: Pronamide	23950-58-5	0.5	mg/kg	<0.5	1.5 mg/kg	87.6	54.0	110
EP075: Dimethylaminoazobenzene	60-11-7	0.5	mg/kg	<0.5	1.5 mg/kg	101	48.0	108
EP075: Chlorobenzilate	510-15-6	0.5	mg/kg	<0.5	1.5 mg/kg	95.0	57.4	112
EP075F: Haloethers (QCLot: 2689777)								
EP075: Bis(2-chloroethyl) ether	111-44-4	0.5	mg/kg	<0.5	1.5 mg/kg	102	63.0	121
EP075: Bis(2-chloroethoxy) methane	111-91-1	0.5	mg/kg	<0.5	1.5 mg/kg	102	59.0	115
EP075: 4-Chlorophenyl phenyl ether	7005-72-3	0.5	mg/kg	<0.5	1.5 mg/kg	99.9	58.0	112
EP075: 4-Bromophenyl phenyl ether	101-55-3	0.5	mg/kg	<0.5	1.5 mg/kg	98.5	58.0	110
EP075G: Chlorinated Hydrocarbons (QCLot: 2689777)								
EP075: 1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	<0.5	1.5 mg/kg	101	58.0	112
EP075: 1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	<0.5	1.5 mg/kg	100	58.0	116
EP075: 1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	<0.5	1.5 mg/kg	99.8	57.0	115
EP075: Hexachloroethane	67-72-1	0.5	mg/kg	<0.5	1.5 mg/kg	95.4	54.0	116
EP075: 1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	<0.5	1.5 mg/kg	103	62.9	108
EP075: Hexachloropropylene	1888-71-7	0.5	mg/kg	<0.5	1.5 mg/kg	83.4	39.1	110
EP075: Hexachlorobutadiene	87-68-3	0.5	mg/kg	<0.5	1.5 mg/kg	78.2	59.0	117
EP075: Hexachlorocyclopentadiene	77-47-4	2.5	mg/kg	<2.5	1.5 mg/kg	# 21.7	24.3	108
EP075: Pentachlorobenzene	608-93-5	0.5	mg/kg	<0.5	1.5 mg/kg	93.2	57.0	109
EP075: Hexachlorobenzene (HCB)	118-74-1	0.5	mg/kg	<0.5	1.5 mg/kg	97.3	59.0	111
EP075H: Anilines and Benzidines (QCLot: 2689777)								
EP075: Aniline	62-53-3	0.5	mg/kg	<0.5	1.5 mg/kg	89.0	13.2	108
EP075: 4-Chloroaniline	106-47-8	0.5	mg/kg	<0.5	1.5 mg/kg	29.4	20.5	99.0
EP075: 2-Nitroaniline	88-74-4	0.5	mg/kg	<0.5	1.5 mg/kg	83.0	52.0	112
EP075: 3-Nitroaniline	99-09-2	0.5	mg/kg	<0.5	1.5 mg/kg	75.9	31.5	93.7
EP075: Dibenzofuran	132-64-9	0.5	mg/kg	<0.5	1.5 mg/kg	99.4	60.0	110
EP075: 4-Nitroaniline	100-01-6	0.5	mg/kg	<0.5	1.5 mg/kg	94.6	42.0	112
EP075: Carbazole	86-74-8	0.5	mg/kg	<0.5	1.5 mg/kg	100	59.0	111
EP075: 3.3`-Dichlorobenzidine	91-94-1	0.5	mg/kg	<0.5	1.5 mg/kg	82.6	23.1	113
EP075I: Organochlorine Pesticides (QCLot: 2689777)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP075I: Organochlorine Pesticides (QCLot: 2689777) - continued								
EP075: alpha-BHC	319-84-6	0.5	mg/kg	<0.5	1.5 mg/kg	96.8	63.0	113
EP075: beta-BHC	319-85-7	0.5	mg/kg	<0.5	1.5 mg/kg	102	57.0	113
EP075: gamma-BHC	58-89-9	0.5	mg/kg	<0.5	1.5 mg/kg	88.1	61.0	117
EP075: delta-BHC	319-86-8	0.5	mg/kg	<0.5	1.5 mg/kg	93.1	64.0	118
EP075: Heptachlor	76-44-8	0.5	mg/kg	<0.5	1.5 mg/kg	89.1	55.0	115
EP075: Aldrin	309-00-2	0.5	mg/kg	<0.5	1.5 mg/kg	90.5	61.0	115
EP075: Heptachlor epoxide	1024-57-3	0.5	mg/kg	<0.5	1.5 mg/kg	83.6	56.0	118
EP075: alpha-Endosulfan	959-98-8	0.5	mg/kg	<0.5	1.5 mg/kg	88.4	65.0	125
EP075: 4.4`-DDE	72-55-9	0.5	mg/kg	<0.5	1.5 mg/kg	97.7	60.0	116
EP075: Dieldrin	60-57-1	0.5	mg/kg	<0.5	1.5 mg/kg	94.3	64.0	118
EP075: Endrin	72-20-8	0.5	mg/kg	<0.5	1.5 mg/kg	89.6	53.0	117
EP075: beta-Endosulfan	33213-65-9	0.5	mg/kg	<0.5	1.5 mg/kg	99.7	65.0	115
EP075: 4.4`-DDD	72-54-8	0.5	mg/kg	<0.5	1.5 mg/kg	98.9	62.0	118
EP075: Endosulfan sulfate	1031-07-8	0.5	mg/kg	<0.5	1.5 mg/kg	119	63.0	129
EP075: 4.4`-DDT	50-29-3	0.5	mg/kg	<0.5	1.5 mg/kg	98.6	46.0	122
EP075: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.5	mg/kg	<0.5	----	----	----	----
EP075: Sum of Aldrin + Dieldrin	309-00-2/60- 57-1	0.5	mg/kg	<0.5	----	----	----	----
EP075J: Organophosphorus Pesticides (QCLot: 2689777)								
EP075: Dichlorvos	62-73-7	0.5	mg/kg	<0.5	1.5 mg/kg	67.5	46.0	112
EP075: Dimethoate	60-51-5	0.5	mg/kg	<0.5	1.5 mg/kg	106	63.0	119
EP075: Diazinon	333-41-5	0.5	mg/kg	<0.5	1.5 mg/kg	99.8	68.0	134
EP075: Chlorpyrifos-methyl	5598-13-0	0.5	mg/kg	<0.5	1.5 mg/kg	97.2	60.0	130
EP075: Malathion	121-75-5	0.5	mg/kg	<0.5	1.5 mg/kg	120	65.0	127
EP075: Fenthion	55-38-9	0.5	mg/kg	<0.5	1.5 mg/kg	99.7	60.0	116
EP075: Chlorpyrifos	2921-88-2	0.5	mg/kg	<0.5	1.5 mg/kg	93.6	63.0	113
EP075: Pirimphos-ethyl	23505-41-1	0.5	mg/kg	<0.5	1.5 mg/kg	99.7	65.0	115
EP075: Chlorfenvinphos	470-90-6	0.5	mg/kg	<0.5	1.5 mg/kg	87.6	59.0	103
EP075: Prothiofos	34643-46-4	0.5	mg/kg	<0.5	1.5 mg/kg	100	59.0	119
EP075: Ethion	563-12-2	0.5	mg/kg	<0.5	1.5 mg/kg	110	62.0	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2680181)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	91.8	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2680181)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	94.0	68.4	128
EP080: BTEXN (QCLot: 2680181)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	83.9	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	87.4	67.0	121

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 2680181) - continued								
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	88.7	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	88.9	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	91.6	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	92.4	63.0	119
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 2677697)								
EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	5 mg/kg	92.6	78.0	118
EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	7.5 mg/kg	96.3	84.0	118
EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	5 mg/kg	94.9	73.0	119
EP071-SD: C10 - C36 Fraction (sum)	----	3	mg/kg	<3	----	----	----	----
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 2677734)								
EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	6.2 mg/kg	91.5	61.0	133
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons (QCLot: 2677697)								
EP071-SD: >C10 - C16 Fraction	----	3	mg/kg	<3	6.25 mg/kg	96.1	70.0	130
EP071-SD: >C16 - C34 Fraction	----	3	mg/kg	<3	8.75 mg/kg	94.4	74.0	138
EP071-SD: >C34 - C40 Fraction	----	5	mg/kg	<5	3.75 mg/kg	95.8	63.0	131
EP071-SD: >C10 - C40 Fraction (sum)	----	3	mg/kg	<3	----	----	----	----
EP080-SD: BTEXN (QCLot: 2677734)								
EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	0.2 mg/kg	105	66.0	122
EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	0.2 mg/kg	109	70.0	130
EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	0.2 mg/kg	102	66.0	126
EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	0.4 mg/kg	102	59.0	129
EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	0.2 mg/kg	104	66.0	126
EP090: Organotin Compounds (QCLot: 2698344)								
EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	1.25 µgSn/kg	65.6	36.0	128
EP090: Dibutyltin	1002-53-5	1	µgSn/kg	<1	1.25 µgSn/kg	91.3	42.0	132
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	135	52.0	139
EP090: Organotin Compounds (QCLot: 2745160)								
EP090: Monobutyltin	78763-54-9	1	µgSn/kg	<1	1.25 µgSn/kg	37.1	36.0	128
EP090: Dibutyltin	1002-53-5	1	µgSn/kg	<1	1.25 µgSn/kg	103	42.0	132
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	109	52.0	139
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 2677727)								
EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	50 µg/kg	87.6	49.0	117
EP130: Carbophenothion	786-19-6	10	µg/kg	<10	50 µg/kg	92.7	54.0	104
EP130: Chlorfenvinphos (E)	18708-86-6	10	µg/kg	<10.0	5 µg/kg	88.5	48.0	156
EP130: Chlorfenvinphos (Z)	18708-87-7	10	µg/kg	<10	50 µg/kg	89.2	53.0	119
EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	50 µg/kg	91.2	54.0	112

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 2677727) - continued								
EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	50 µg/kg	90.8	52.0	108
EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	50 µg/kg	83.8	51.0	109
EP130: Diazinon	333-41-5	10	µg/kg	<10	50 µg/kg	87.4	57.0	121
EP130: Dichlorvos	62-73-7	10	µg/kg	<10	50 µg/kg	80.8	48.0	104
EP130: Dimethoate	60-51-5	10	µg/kg	<10	50 µg/kg	98.2	52.0	120
EP130: Ethion	563-12-2	10	µg/kg	<10	50 µg/kg	88.0	51.0	121
EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	50 µg/kg	82.8	50.0	120
EP130: Fenthion	55-38-9	10	µg/kg	<10	50 µg/kg	88.1	48.0	112
EP130: Malathion	121-75-5	10	µg/kg	<10	50 µg/kg	89.7	51.0	121
EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	50 µg/kg	92.4	45.0	127
EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	50 µg/kg	78.8	48.0	128
EP130: Parathion	56-38-2	10	µg/kg	<10	50 µg/kg	86.7	49.0	125
EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	50 µg/kg	86.9	51.0	119
EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	50 µg/kg	87.7	48.0	120
EP130: Prothiofos	34643-46-4	10	µg/kg	<10	50 µg/kg	84.9	51.0	117
EP131A: Organochlorine Pesticides (QCLot: 2677729)								
EP131A: Aldrin	309-00-2	0.5	µg/kg	<0.50	5 µg/kg	92.1	38.0	139
EP131A: alpha-BHC	319-84-6	0.5	µg/kg	<0.50	5 µg/kg	92.5	17.6	136
EP131A: beta-BHC	319-85-7	0.5	µg/kg	<0.50	5 µg/kg	110	30.5	131
EP131A: delta-BHC	319-86-8	0.5	µg/kg	<0.50	5 µg/kg	69.6	37.0	140
EP131A: 4.4`-DDD	72-54-8	0.5	µg/kg	<0.50	5 µg/kg	118	25.9	141
EP131A: 4.4`-DDE	72-55-9	0.5	µg/kg	<0.50	5 µg/kg	94.0	35.0	129
EP131A: 4.4`-DDT	50-29-3	0.5	µg/kg	<0.50	5 µg/kg	116	23.4	138
EP131A: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Dieldrin	60-57-1	0.5	µg/kg	<0.50	5 µg/kg	122	30.2	140
EP131A: alpha-Endosulfan	959-98-8	0.5	µg/kg	<0.50	5 µg/kg	102	38.0	140
EP131A: beta-Endosulfan	33213-65-9	0.5	µg/kg	<0.50	5 µg/kg	116	32.0	152
EP131A: Endosulfan sulfate	1031-07-8	0.5	µg/kg	<0.50	5 µg/kg	116	36.0	155
EP131A: Endosulfan (sum)	115-29-7	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Endrin	72-20-8	0.5	µg/kg	<0.50	5 µg/kg	100	25.8	158
EP131A: Endrin aldehyde	7421-93-4	0.5	µg/kg	<0.50	5 µg/kg	115	20.1	118
EP131A: Endrin ketone	53494-70-5	0.5	µg/kg	<0.50	5 µg/kg	100	13.4	135
EP131A: Heptachlor	76-44-8	0.5	µg/kg	<0.50	5 µg/kg	99.6	39.0	155
EP131A: Heptachlor epoxide	1024-57-3	0.5	µg/kg	<0.50	5 µg/kg	104	34.0	148
EP131A: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/kg	<0.50	5 µg/kg	92.5	26.1	152
EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	5 µg/kg	94.9	31.2	137
EP131A: Methoxychlor	72-43-5	0.5	µg/kg	<0.50	5 µg/kg	116	36.0	152
EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	5 µg/kg	113	36.0	142

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP131A: Organochlorine Pesticides (QCLot: 2677729) - continued								
EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	5 µg/kg	110	29.5	138
EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	----	----	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 2677728)								
EP131B: Total Polychlorinated biphenyls	----	5	µg/kg	<5.0	50 µg/kg	75.5	45.0	115
EP131B: Aroclor 1016	12674-11-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1221	11104-28-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1232	11141-16-5	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1242	53469-21-9	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1248	12672-29-6	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1254	11097-69-1	5	µg/kg	<5.0	50 µg/kg	75.5	45.0	115
EP131B: Aroclor 1260	11096-82-5	5	µg/kg	<5.0	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 2677696)								
EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	25 µg/kg	94.3	63.0	129
EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	25 µg/kg	80.0	64.0	128
EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	25 µg/kg	97.9	65.0	129
EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	25 µg/kg	90.6	68.0	132
EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	25 µg/kg	84.4	68.0	124
EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	25 µg/kg	93.1	64.0	134
EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	25 µg/kg	94.9	65.0	131
EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	25 µg/kg	96.1	64.0	130
EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	25 µg/kg	82.2	67.0	133
EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	25 µg/kg	105	62.0	130
EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	25 µg/kg	95.9	65.0	133
EP132B-SD: Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	25 µg/kg	110	68.0	120
EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	25 µg/kg	98.9	61.0	133
EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	25 µg/kg	96.7	63.0	127
EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	25 µg/kg	106	66.0	118
EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	25 µg/kg	88.0	69.0	119
EP132B-SD: Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	25 µg/kg	106	66.0	120
EP132B-SD: Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	25 µg/kg	98.9	64.0	122
EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	25 µg/kg	96.3	64.0	120
EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	25 µg/kg	82.4	68.0	136
EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EG020T: Total Metals by ICP-MS (QCLot: 2686305)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 2686305) - continued								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	104	82.0	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	106	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	110	86.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	105	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	104	85.0	115
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	107	84.0	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	79.0	117
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2686717)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	91.2	77.0	111
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2677025)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	76.4	50.0	94.0
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	77.3	63.6	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	71.2	62.2	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	76.4	63.9	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	71.8	62.6	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	73.3	64.3	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	88.3	63.6	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	99.4	63.1	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	88.0	64.1	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	88.9	62.5	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	97.3	61.7	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	81.6	63.0	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	98.7	63.3	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	94.7	59.9	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	99.7	61.2	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	98.2	59.1	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2677026)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	67.4	55.8	112
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	89.8	71.6	113
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	92.9	56.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2681218)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	91.2	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2677026)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	75.6	57.9	119
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	93.6	62.5	110
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	94.0	61.5	121
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2681218)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2681218) - continued								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	94.4	75.0	127
EP080: BTEXN (QCLot: 2681218)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	94.1	70.0	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	99.2	69.0	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	97.3	70.0	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	95.6	69.0	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	98.8	72.0	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	98.3	70.0	120

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 2682884)							
ES1936029-001	VC09_0.0-0.2	EG035T-LL: Mercury	7439-97-6	0.05 mg/kg	108	70.0	130
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2682877)							
EM1918213-003	Anonymous	EG020-SD: Arsenic	7440-38-2	50 mg/kg	90.8	70.0	130
		EG020-SD: Cadmium	7440-43-9	50 mg/kg	87.8	70.0	130
		EG020-SD: Chromium	7440-47-3	50 mg/kg	89.5	70.0	130
		EG020-SD: Copper	7440-50-8	250 mg/kg	94.9	70.0	130
		EG020-SD: Lead	7439-92-1	250 mg/kg	92.3	70.0	130
		EG020-SD: Nickel	7440-02-0	50 mg/kg	85.7	70.0	130
		EG020-SD: Zinc	7440-66-6	250 mg/kg	78.0	70.0	130
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2682885)							
ES1936029-063	VC04_0.5-1.0	EG020-SD: Arsenic	7440-38-2	50 mg/kg	91.6	70.0	130
		EG020-SD: Cadmium	7440-43-9	50 mg/kg	96.5	70.0	130
		EG020-SD: Chromium	7440-47-3	50 mg/kg	102	70.0	130
		EG020-SD: Copper	7440-50-8	250 mg/kg	93.9	70.0	130
		EG020-SD: Lead	7439-92-1	250 mg/kg	97.0	70.0	130
		EG020-SD: Nickel	7440-02-0	50 mg/kg	97.8	70.0	130
		EG020-SD: Zinc	7440-66-6	250 mg/kg	94.3	70.0	130
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2677335)							
ES1935865-002	Anonymous	EK026SF: Total Cyanide	57-12-5	40 mg/kg	128	70.0	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2677336)							
ES1936029-076	VC10_0.7-0.8	EK026SF: Total Cyanide	57-12-5	40 mg/kg	130	70.0	130
EK040T: Fluoride Total (QCLot: 2683332)							
EB1928984-011	Anonymous	EK040T: Fluoride	16984-48-8	400 mg/kg	107	70.0	130
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 2677735)							
ES1936029-007	VC07_0.0-0.2	EP074: Benzene	71-43-2	2.5 mg/kg	84.0	70.0	130
		EP074: Toluene	108-88-3	2.5 mg/kg	87.4	70.0	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 2677735)							
ES1936029-007	VC07_0.0-0.2	EP074: 1.1-Dichloroethene	75-35-4	2.5 mg/kg	# 61.0	70.0	130
		EP074: Trichloroethene	79-01-6	2.5 mg/kg	82.3	70.0	130
EP074F: Halogenated Aromatic Compounds (QCLot: 2677735)							
ES1936029-007	VC07_0.0-0.2	EP074: Chlorobenzene	108-90-7	2.5 mg/kg	90.2	70.0	130
EP075(SIM)A: Phenolic Compounds (QCLot: 2680331)							
ES1936029-001	VC09_0.0-0.2	EP075(SIM): Phenol	108-95-2	10 mg/kg	87.2	70.0	130
		EP075(SIM): 2-Chlorophenol	95-57-8	10 mg/kg	92.1	70.0	130
		EP075(SIM): 2-Nitrophenol	88-75-5	10 mg/kg	86.7	60.0	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	10 mg/kg	87.9	70.0	130
		EP075(SIM): Pentachlorophenol	87-86-5	10 mg/kg	66.8	20.0	130
EP075A: Phenolic Compounds (QCLot: 2689777)							
ES1936029-011	VC07_0.0-0.5	EP075: Phenol	108-95-2	10 mg/kg	99.4	60.0	130
		EP075: 2-Chlorophenol	95-57-8	10 mg/kg	95.8	60.0	130
		EP075: 2-Nitrophenol	88-75-5	10 mg/kg	98.4	50.0	130
		EP075: 4-Chloro-3-methylphenol	59-50-7	10 mg/kg	93.7	50.0	130
		EP075: Pentachlorophenol	87-86-5	10 mg/kg	30.1	10.0	130
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 2689777)							
ES1936029-011	VC07_0.0-0.5	EP075: Acenaphthene	83-32-9	10 mg/kg	81.7	50.0	130
		EP075: Pyrene	129-00-0	10 mg/kg	82.2	50.0	130
EP075D: Nitrosamines (QCLot: 2689777)							
ES1936029-011	VC07_0.0-0.5	EP075: N-Nitrosodi-n-propylamine	621-64-7	10 mg/kg	96.5	50.0	130
EP075E: Nitroaromatics and Ketones (QCLot: 2689777)							
ES1936029-011	VC07_0.0-0.5	EP075: 2.4-Dinitrotoluene	121-14-2	10 mg/kg	89.4	40.0	130
EP075G: Chlorinated Hydrocarbons (QCLot: 2689777)							
ES1936029-011	VC07_0.0-0.5	EP075: 1.4-Dichlorobenzene	106-46-7	10 mg/kg	87.8	60.0	130
		EP075: 1.2.4-Trichlorobenzene	120-82-1	10 mg/kg	85.5	50.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2680181)							
ES1936027-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	104	70.0	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2680181)							
ES1936027-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	105	70.0	130
EP080: BTEXN (QCLot: 2680181)							
ES1936027-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	85.5	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	96.7	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	98.0	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	98.6	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	101	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	88.6	70.0	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 2677697)							
ES1936029-001	VC09_0.0-0.2	EP071-SD: C10 - C14 Fraction	----	14 mg/kg	102	70.0	130
		EP071-SD: C15 - C28 Fraction	----	59 mg/kg	84.0	70.0	130
		EP071-SD: C29 - C36 Fraction	----	42 mg/kg	114	70.0	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 2677734)							
ES1936029-007	VC07_0.0-0.2	EP080-SD: C6 - C9 Fraction	----	6.5 mg/kg	108	70.0	130
EP080-SD: BTEXN (QCLot: 2677734)							
ES1936029-007	VC07_0.0-0.2	EP080-SD: Benzene	71-43-2	0.5 mg/kg	94.2	70.0	130
		EP080-SD: Toluene	108-88-3	0.5 mg/kg	103	70.0	130
		EP080-SD: Ethylbenzene	100-41-4	0.5 mg/kg	103	70.0	130
		EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.5 mg/kg	102	70.0	130
		EP080-SD: ortho-Xylene	95-47-6	0.5 mg/kg	104	70.0	130
EP090: Organotin Compounds (QCLot: 2698344)							
EM1919013-022	Anonymous	EP090: Monobutyltin	78763-54-9	1.25 µgSn/kg	84.0	20.0	130
		EP090: Dibutyltin	1002-53-5	1.25 µgSn/kg	# 201	20.0	130
		EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	# 866	20.0	130
EP090: Organotin Compounds (QCLot: 2745160)							
ES1939786-001	Anonymous	EP090: Monobutyltin	78763-54-9	1.25 µgSn/kg	# 7.69	20.0	130
		EP090: Dibutyltin	1002-53-5	1.25 µgSn/kg	58.6	20.0	130
		EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	52.7	20.0	130
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 2677727)							
ES1936029-001	VC09_0.0-0.2	EP130: Bromophos-ethyl	4824-78-6	50 µg/kg	57.1	36.0	144
		EP130: Carbophenothion	786-19-6	50 µg/kg	59.1	38.0	120
		EP130: Chlorfenvinphos (E)	18708-86-6	5 µg/kg	59.5	49.0	157
		EP130: Chlorfenvinphos (Z)	18708-87-7	50 µg/kg	59.9	53.0	145
		EP130: Chlorpyrifos	2921-88-2	50 µg/kg	71.0	60.0	140
		EP130: Chlorpyrifos-methyl	5598-13-0	50 µg/kg	71.5	56.0	126

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 2677727) - continued							
ES1936029-001	VC09_0.0-0.2	EP130: Demeton-S-methyl	919-86-8	50 µg/kg	60.3	9.70	148
		EP130: Diazinon	333-41-5	50 µg/kg	66.7	60.0	122
		EP130: Dichlorvos	62-73-7	50 µg/kg	56.4	33.0	123
		EP130: Dimethoate	60-51-5	50 µg/kg	64.2	36.0	142
		EP130: Ethion	563-12-2	50 µg/kg	59.4	48.0	136
		EP130: Fenamiphos	22224-92-6	50 µg/kg	52.3	42.0	136
		EP130: Fenthion	55-38-9	50 µg/kg	60.5	35.0	131
		EP130: Malathion	121-75-5	50 µg/kg	60.7	55.0	141
		EP130: Azinphos Methyl	86-50-0	50 µg/kg	54.6	23.5	132
		EP130: Monocrotophos	6923-22-4	50 µg/kg	60.1	35.0	153
		EP130: Parathion	56-38-2	50 µg/kg	63.3	57.0	147
		EP130: Parathion-methyl	298-00-0	50 µg/kg	54.9	48.0	140
		EP130: Pirimphos-ethyl	23505-41-1	50 µg/kg	60.2	45.0	137
		EP130: Prothiofos	34643-46-4	50 µg/kg	57.5	51.0	137
EP131A: Organochlorine Pesticides (QCLot: 2677729)							
ES1936029-001	VC09_0.0-0.2	EP131A: Aldrin	309-00-2	5 µg/kg	75.4	23.4	153
		EP131A: alpha-BHC	319-84-6	5 µg/kg	80.2	17.6	156
		EP131A: beta-BHC	319-85-7	5 µg/kg	107	24.9	153
		EP131A: delta-BHC	319-86-8	5 µg/kg	80.2	25.2	147
		EP131A: 4.4`-DDD	72-54-8	5 µg/kg	67.8	25.9	150
		EP131A: 4.4`-DDE	72-55-9	5 µg/kg	59.9	31.2	125
		EP131A: 4.4`-DDT	50-29-3	5 µg/kg	107	23.4	163
		EP131A: Dieldrin	60-57-1	5 µg/kg	92.6	30.2	140
		EP131A: alpha-Endosulfan	959-98-8	5 µg/kg	59.8	28.8	135
		EP131A: beta-Endosulfan	33213-65-9	5 µg/kg	80.3	22.6	141
		EP131A: Endosulfan sulfate	1031-07-8	5 µg/kg	86.1	16.1	156
		EP131A: Endrin	72-20-8	5 µg/kg	105	17.7	162
		EP131A: Endrin aldehyde	7421-93-4	5 µg/kg	105	20.1	116
		EP131A: Endrin ketone	53494-70-5	5 µg/kg	77.5	13.4	151
		EP131A: Heptachlor	76-44-8	5 µg/kg	89.1	23.8	170
		EP131A: Heptachlor epoxide	1024-57-3	5 µg/kg	80.1	28.3	140
		EP131A: Hexachlorobenzene (HCB)	118-74-1	5 µg/kg	82.7	17.7	144
		EP131A: gamma-BHC	58-89-9	5 µg/kg	84.0	21.8	158
		EP131A: Methoxychlor	72-43-5	5 µg/kg	112	24.4	158
		EP131A: cis-Chlordane	5103-71-9	5 µg/kg	85.2	27.3	139
		EP131A: trans-Chlordane	5103-74-2	5 µg/kg	83.5	29.5	138
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 2677728)							
ES1936029-007	VC07_0.0-0.2	EP131B: Total Polychlorinated biphenyls	----	50 µg/kg	101	44.0	136
		EP131B: Aroclor 1254	11097-69-1	50 µg/kg	101	44.0	136

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 2677696)							
ES1936029-001	VC09_0.0-0.2	EP132B-SD: Naphthalene	91-20-3	25 µg/kg	85.9	70.0	130
		EP132B-SD: 2-Methylnaphthalene	91-57-6	25 µg/kg	88.3	70.0	130
		EP132B-SD: Acenaphthylene	208-96-8	25 µg/kg	101	70.0	130
		EP132B-SD: Acenaphthene	83-32-9	25 µg/kg	92.5	70.0	130
		EP132B-SD: Fluorene	86-73-7	25 µg/kg	99.7	70.0	130
		EP132B-SD: Phenanthrene	85-01-8	25 µg/kg	94.9	70.0	130
		EP132B-SD: Anthracene	120-12-7	25 µg/kg	97.6	70.0	130
		EP132B-SD: Fluoranthene	206-44-0	25 µg/kg	98.1	70.0	130
		EP132B-SD: Pyrene	129-00-0	25 µg/kg	98.9	70.0	130
		EP132B-SD: Benz(a)anthracene	56-55-3	25 µg/kg	108	70.0	130
		EP132B-SD: Chrysene	218-01-9	25 µg/kg	95.4	70.0	130
		EP132B-SD: Benzo(b+j)fluoranthene	205-99-2 205-82-3	25 µg/kg	106	70.0	130
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	25 µg/kg	91.4	70.0	130
		EP132B-SD: Benzo(e)pyrene	192-97-2	25 µg/kg	91.4	70.0	130
		EP132B-SD: Benzo(a)pyrene	50-32-8	25 µg/kg	106	70.0	130
		EP132B-SD: Perylene	198-55-0	25 µg/kg	92.4	70.0	130
		EP132B-SD: Benzo(g.h.i)perylene	191-24-2	25 µg/kg	95.0	70.0	130
		EP132B-SD: Dibenz(a.h)anthracene	53-70-3	25 µg/kg	99.8	70.0	130
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	25 µg/kg	98.5	70.0	130
		EP132B-SD: Coronene	191-07-1	25 µg/kg	108	70.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2686717)							
EP1911175-003	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	78.2	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2681218)							
ES1936026-002	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	98.4	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2681218)							
ES1936026-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	97.8	70.0	130
EP080: BTEXN (QCLot: 2681218)							
ES1936026-002	Anonymous	EP080: Benzene	71-43-2	25 µg/L	92.7	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	91.7	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	92.1	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	92.0	70.0	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	94.7	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	96.2	70.0	130

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd

OFFICE: level 15, 133 Castlereagh St, Sydney

PROJECT: 12517046

ORDER NUMBER:

PROJECT MANAGER: Carmen Yi CONTACT PH: 0451 962 988

SAMPLER: Sarah Eccleshall SAMPLER MOBILE: 0459 546 332

COC emailed to ALS? (YES / NO) EDD FORMAT (or default):

Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com

Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☑ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: SY-522-19

COC SEQUENCE NUMBER (Circle)
COC: (1) 2 3 4 5 6 7
OF: 1 2 3 4 ~~5~~ (6) 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: 3.3 °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
S. Eccleshall	Sep-ALS Crows Nest		[illegible] AS
DATE/TIME: [illegible] 1/10/19 3:15	DATE/TIME: 01/11/19 1515	DATE/TIME:	DATE/TIME: 01/11/19 19[illegible]

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please inform GHD contacts of any possible holding time issues that are pecieved with these samples

SAMPLE DETAILS MATRIX: SOLID (S) WATER (W) — CONTAINER INFORMATION

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price)
Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (EA037)
1	VC08_0.0-0.1	31/10/2019 20:00	S	ASS	1	x
2	VC06_0.5-0.6	31/10/2019 20:00	S	ASS	1	x
3	VC12_0.0-0.1	31/10/2019 20:30	S	ASS	1	x
4	VC12_0.5-0.6	31/10/2019 20:30	S	ASS	1	x
5	VC12_1.0-1.1	31/10/2019 20:30	S	ASS	1	x
6	VC08_0.0-0.1	31/10/2019 20:45	S	ASS	1	x
7	VC08_0.5-0.6	31/10/2019 20:45	S	ASS	1	x
8	VC08_1.0-1.1	31/10/2019 20:45	S	ASS	1	x
9	VC08_1.5-1.6	31/10/2019 20:45	S	ASS	1	x
10	VC13_0.0-0.1	31/10/2019 21:45	S	ASS	1	x
11	VC13_0.5-0.6	30/10/2019 21:45	S	ASS	1	x
12	VC13_1.0-1.1	30/10/2019 21:45	S	ASS	1	x
				TOTAL		12

Further analysis columns (no entries): Phenols (EP075A); TRH/BTEXN (EP080-SD); TRH Ultra trace in sediments (EP071-SD); TOC (EP003); TCN (EK026SF); OC/OP/PCB/PAH (SD-02); CMPS Metals (15 metals + low level Hg) (SD03); Particle Size Distribution (EA150H); [illegible]/4 Short Suite; TBT (EP090); Dioxins/Furans (EP300); Hold

Sub / Analysis: Dioxins
Organised By / Date: Brisbane -> TOC + TBT
Relinquished By / Date: [illegible]
Connote / Courier: PSD + Total Fluoride
WO No: FD06, FD08 + FD10 -> Eurofins
Attach By PO / Internal Sheet:

Environmental Division
Sydney
Work Order Reference
ES1936183

Telephone : + 61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENTS: ☐ Standard TAT (List due date):
OFFICE: level 15, 133 Castlereagh St, Sydney	(Standard TAT may be longer for some tests e.g.. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):
PROJECT: 12517046	ALS QUOTE NO.: SY-522-19
ORDER NUMBER:	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
PROJECT MANAGER: Carmen YI	CONTACT PH: 0451 962 988
SAMPLER: Sarah Eccleshall	SAMPLER MOBILE: 0459 546 332
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):
Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com	
Email Invoice to (will default to PM if no other addresses are listed):	

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: 3.3 °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
S. Eccleshall			Ses
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME: 01/11/19 1900

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please inform GHD contacts of any possible holding time issues that are pecieved with these samples

ALS USE | SAMPLE DETAILS MATRIX: SOLID (S) WATER (W) | CONTAINER INFORMATION | ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required)

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (EA037)	Phenols (EP075A)	TRH/BTEXN (EP080-SD)	TRH Ultra trace in sediments (EP071-SD)	TOC (EP003)	TCN (EK026SF)	OC/OP/PCB/PAH (SD-02)	ICMPS Metals (15 metals + low level Hg)(SD03)	Particle Size distribution (EA150H)	P-7/4 Short Suite			TBT (EP090)	Dioxins/Furnas (EP300)		Hold
13	VC14_0.0-0.1	31/10/2019 22:15	S	ASS	1	x															
14	VC14_0.5-0.6	31/10/2019 22:15	S	ASS	1	x															
15	VC14_1.0-1.1	31/10/2019 22:15	S	ASS	1	x															
16	VC14_1.3-1.4	31/10/2019 22:15	S	ASS	1	x															
17	VC06_0.0-0.1	31/10/2019 20:00	S	Jar	1					x					x						
18	VC06_0.3-0.4	31/10/2019 20:00	S	Jar	1																x
19	VC06_0.5-0.6	31/10/2019 20:00	S	Jar	1																x
20	VC06_0.7-0.8	31/10/2019 20:00	S	Jar	1																x
21	VC06_0.8-0.9	31/10/2019 20:00	S	Jar	1																x
22	VC06_0.0-0.5	31/10/2019 20:00	S	Jar	3																x
23	VC06_0.5-1.0 VC06-0.5-0.9	31/10/2019 20:00	S	Jar	3																x
				TOTAL		4															

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved, VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENTS ☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: level 15, 133 Castlereagh St, Sydney	(Standard TAT may be longer for some tests e.g.. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: 12517046	ALS QUOTE NO.: SY-522-19 / COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Carmen Yi / CONTACT PH: 0451 962 988	OF: 1 2 3 4 5 6 7	Other comment: 3.3

SAMPLER: Sarah Eccleshall / SAMPLER MOBILE: 0459 546 332	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES / NO) / EDD FORMAT (or default):	S. Eccleshall			8:84 AS
Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com	DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME: 01/11/19 1900
Email Invoice to (will default to PM if no other addresses are listed):				

ALS USE | SAMPLE DETAILS MATRIX: SOLID (S) WATER (W) | CONTAINER INFORMATION | ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (EA037)	Phenols (EP075A)	TRH/BTEXN (EP080-SD)	TRH Ultra trace in sediments (EP071-SD)	TOC (EP003)	TCN (EK026SF)	OC/OP/PCB/PAH (SD-02)	ICMPS Metals (15 metals + low level Hg)SD03	Particle Size distribution (EA150H)	P-7/4 Short Suite			TBT (EP090)	Dioxins/Furnas (EP300)		Hold
24	VC12_0.0-0.1	31/10/2019 20:30	S	JAR	1																x
25	VC12_0.3-0.4	31/10/2019 20:30	S	Jar	1																x
26	VC12_0.5-0.6	31/10/2019 20:30		jar	1																x
27	VC12_0.8-0.9	31/10/2019 20:30	S	JAR	1																x
28	VC12_1.0-1.1	31/10/2019 20:30	S	JAR	1					x					x						
29	VC12_0.0-0.5	31/10/2019 20:30	S	JAR and Bag	4		x	x	x	x	x	x	x	x				x	x		
30	VC12_0.5-1.0	31/10/2019 20:30	S	Jar	3																
31	VC08_0.0-0.1	31/10/2019 20:45	s	jar	1					x					x						
32	VC08_0.3-0.4	31/10/2019 20:45	s	jar	1																x
33	VC08_0.5-0.6	31/10/2019 20:45	s	jar	1																
34	VC08_0.7-0.8	31/10/2019 20:45	s	jar	1																
35	VC08_1.0-1.1	31/10/2019 20:45	s	jar	1																
				TOTAL																	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENTS: ☐ Standard TAT (List due date):		FOR LABORATORY USE ONLY (Circle)
OFFICE: level 15, 133 Castlereagh St, Sydney	(Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):		Custody Seal Intact? Yes No N/A
PROJECT: 12517046	ALS QUOTE NO.: SY-522-19	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:		COC: 1 2 3 4 5 6 7 (20)	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Carmen Yi	CONTACT PH: 0451 962 988	OF: 1 2 3 4 5 6 7 (50)	Other comment: 3.3

SAMPLER: Sarah Eccleshall	SAMPLER MOBILE: 0459 546 332	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	S. Eccleshall			Sam ALS
Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com		DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME: 01/11/19 1900
Email Invoice to (will default to PM if no other addresses are listed):					

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE | SAMPLE DETAILS MATRIX: SOLID (S) WATER (W) | CONTAINER INFORMATION | ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (EA037)	Phenols (EP075A)	TRH/BTEXN (EP080-SD)	TRH Ultra trace in sediments (EP071-SD)	TOC (EP003)	TCN (EK026SF)	OC/OP/PCB/PAH (SD-02)	ICMPS Metals (15 metals + low level Hg) (SD03)	Particle Size distribution (EA150H)	P-7/4 Short Suite			TBT (EP090)	Dioxins/Furnas (EP300)		Hold
36	VC08_1.3-1.4	31/10/2019 20:45	S	Jar	1																x
37	VC08_1.5-1.6	31/10/2019 20:45	S	Jar	1																x
38	VC08_0.0-0.5	31/10/2019 20:45	S	Jar	3																x
39	VC08_0.5-1.0	31/10/2019 20:45	S	Jar and bag	4																x
40	VC08_1.0-1.5	31/10/2019 20:45	S	Jar and bag	4		x	x	x	x	x	x	x	x				x	x		
41	VC13_0.0-0.1	31/10/2019 21:45	S	Jar	1					x					x						
42	VC13_0.3-0.4	31/10/2019 21:45	S	Jar	1																x
43	VC13_0.5-0.6	31/10/2019 21:45	S	Jar	1																x
44	VC13_0.7-0.8	31/10/2019 21:45	S	Jar	1																x
45	VC13_1.0-1.1	31/10/2019 21:45	S	Jar	1																x
46	VC13_0.0-0.5	31/10/2019 21:45	S	jar	3																x
47	VC13_0.5-1.0	31/10/2019 21:45	S	jar and bag	4																x
				TOTAL																	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd

OFFICE: level 15, 133 Castlereagh St, Sydney

PROJECT: 12517046

ORDER NUMBER:

PROJECT MANAGER: Carmen Yi CONTACT PH: 0451 962 988

SAMPLER: Sarah Eccleshall SAMPLER MOBILE: 0459 546 332

COC emailed to ALS? (YES / NO) EDD FORMAT (or default):

Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com

Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENT (Standard TAT may be longer for some tests e.g. Ultra Trace
☐ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: SY-522-19

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: 2.3
Other comment:

RELINQUISHED BY: S. Eccleshall
DATE/TIME:

RECEIVED BY:
DATE/TIME:

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY: Sosilo ALS
DATE/TIME: 01/11/19 190C

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).														
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (EA037)	Phenols (EP075A)	TRH/BTEXN (EP080-SD)	TRH Ultra trace in sediments (EP071-SD)	TOC (EP003)	TCN (EK026SF)	OC/OP/PCB/PAH (SD-02)	ICMPS Metals (15 metals + low level Hg) (SD03	Particle Size distribution (EA150H)	P-7/4 Short Suite			TBT (EP090)	Dioxins/Furnas (EP300)	Hold
48	VC14_0.0-0.1	31/10/2019 22:15	S	Jar	1															x
49	VC14_0.3-0.4	31/10/2019 22:15	S	Jar	1															x
50	VC14-0.5-0.6	31/10/2019 22:15	S	Jar	1															x
51	VC14_0.7-0.8	31/10/2019 22:15	s	Jar	1															x
52	VC14_1.0-1.1	31/10/2019 22:15	S	Jar	1					x					x					
53	VC14_1.3-1.4	31/10/2019 22:15	S	Jar	1															x
54	VC14_0.0-0.5	31/10/2019 22:15	S	Jar and Bag	4															x
55	VC14_0.5-1.0	31/10/2019 22:15	S	jar	3															x
56	SW01	31/10/2019	w	P	1															X
57	SW02	31/10/2019	w	P	1															X
58	SW03	31/10/2019	w	P	1															X
59	SWB	31/10/2019	w	P	1															X
				TOTAL																

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic, ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic, F = Formaldehyde Preserved Glass
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd

OFFICE: level 15, 133 Castlereagh St, Sydney

PROJECT: 12517046

ORDER NUMBER:

PROJECT MANAGER: Carmen Yi — CONTACT PH: 0451 962 988

SAMPLER: Sarah Eccleshall — SAMPLER MOBILE: 0459 546 332

COC emailed to ALS? (YES / NO) — EDD FORMAT (or default):

Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com

Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☐ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: SY-552-19

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: 33 °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
S. Eccleshall			S-Stephs AJ
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME: 01/11/19 1900

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE | SAMPLE DETAILS MATRIX: SOLID (S) WATER (W) | CONTAINER INFORMATION | ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (EA037)	Phenols (EP075A)	TRH/BTEXN (EP080-SD)	TRH Ultra trace in sediments (EP071-SD)	TOC (EP003)	TCN (EK0265F)	OC/OP/PCB/PAH (SD-02)	ICMPS Metals (15 metals + low level Hg)(SD03)	Particle Size distribution (EA150H)	P-7/4 Short Suite	TRH	BTEXN	PAH	Trh C6-c10	BTEX	8 metals	Hold
-	FD06	30/10/2019	S	JAR	1		Please forward to eurofins															x
60	FD07	30/10/2019	S	JAR	1																	x
-	FD08	30/10/2019	S	JAR			Please forward to eurofins															x
61	FD09	31/10/2019	S	Jar	1																	x
-	FD10	31/10/2019	S	Jar	1		Please forward to eurofins															x
62	RIN_02	31/10/2019	W	bottles	4											x	x	x			x	
63	TS2	31/10/2019	S	jar	1												x					
64	TB2	30/10/2019	S	jar	1														x	x		
65	Trip Spike Control																					
66	VC12 0.9-1.0																					
Extra 67	VC14 1.0-1.4																					
				TOTAL																		

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Would you please let the lab know to hold off the TBT and Dioxins testing for these 3 samples? We're awaiting some approvals which haven't landed yet.
Apologies for any inconvenience caused.

Regards,
Carmen

From: Sarah Eccleshall <Sarah.Eccleshall@ghd.com>
Sent: Saturday, 2 November 2019 6:13 PM
To: Brenda Hong (InTouch) <brenda.hong@alsglobal.com>
Cc: Carmen Yi <Carmen.Yi@ghd.com>
Subject: Additional analysis requerst for: ES1936029:

Hi Brenda,

We'd like to request additional analysis on three sediment samples under work order ES1936029

Samples	Analyses
VC01_0.5-1.0	TBT, Dioxins
VC04_0.5-1.0	TBT, Dioxins
VC07_0.0-0.5	TBT, Dioxins

Many Thanks,

Sarah Eccleshall
PhD MSc BSc Hons
Graduate Environmental Scientist
Contamination & Environmental Management

GHD
Proudly employee owned
T: +61 2 9239 7715 | M: +61 459 546 332 | E: sarah.eccleshall@ghd.com
Level 15 133 Castlereagh Street Sydney NSW 2000 Australia | www.ghd.com

Environmental Division
Sydney
Work Order Reference
ES1936183

Telephone : + 61-2-8784 8555

Connect

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

21.11.19 - TBT

Kim Phan

From: Loren Schiavon
Sent: Thursday, 7 November 2019 10:26 AM
To: Kim Phan
Subject: FW: [EXTERNAL] - RE: Additional analysis requerst for: ES1936029:
Attachments: image001.png; image002.png; image003.png; image004.png

Environmental Division
Sydney
Work Order Reference
ES1936183

Telephone : +61-2-8784 8555

Hi Kim,

Can I get you to assist with this one?

We need to add in the testing requested below to two active work orders. Please leave the current due dates and email CS to send a prelim - we then need to create the separate batches for the dioxins. Vanessa has confirmed 10 days from receipt for the TBT.

Thanks.

Subcon / Forward Lab / Split WO
Lab / Analysis: Brisbane
Organised By / Date: TBT: 29, 40
Relinquished By / Date:
Connote / Courier:
WO No: ES1936183
Attach By PO / Internal Sheet:

Kind Regards
Loren Schiavon
Sample Administration Coordinator, Environmental

T +61 2 8784 8555
F +61 2 8784 8500
Loren.schiavon@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164
AUSTRALIA

Right Solutions • Right Partner
https://aus01.safelinks.protection.outlook.com/?url=www.alsglobal.com&data=02%7C01%7CKim.Phan%40alsglobal.com%7C822e6d0d1a2e415fdefc08d76310b269%7C485ca04e6f7440509764cdb4bfa89c25%7C0%7C0%7C637086795685299636&sdata=EyqawOcQknLkqagzwxAPSDeCzRtw1wXYtpWrHbo9C1E%3D&reserved=0

-----Original Message-----
From: Grace White
Sent: Thursday, 7 November 2019 8:52 AM
To: Loren Schiavon <loren.schiavon@alsglobal.com>
Subject: FW: [EXTERNAL] - RE: Additional analysis requerst for: ES1936029:

Hey Loren,

Can you please organise making the below amendments?

Thank you!

Grace White
Client Services Officer, Environmental
Sydney

T +61 2 8784 8555 D +61 2 8784 8531
F +61 2 8784 8500
grace.white@alsglobal.com
277-289 Woodpark Road
Smithfield, NSW, 2164

https://aus01.safelinks.protection.outlook.com/?url=www.alsglobal.com&data=02%7C01%7CKim.Phan%40alsglobal.com%7C822e6d0d1a2e415fdefc08d76310b269%7C485ca04e6f7440509764cdb4bfa89c25%7C0%7C0%7C637086795685299636&sdata=EyqawOcQknLkqagzwxAPSDeCzRtw1wXYtpWrHbo9C1E%3D&reserved=0

-----Original Message-----
From: Carmen Yi [mailto:Carmen.Yi@ghd.com]
Sent: Wednesday, 6 November 2019 11:07 PM
To: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Cc: Sarah.Eccleshall@ghd.com; Brenda Hong <Brenda.Hong@alsglobal.com>
Subject: [EXTERNAL] - RE: Additional analysis requerst for: ES1936029:

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi ALS team,

We have now received approval to go ahead with the TBT, dioxin and SVOC tests for ES1936183 and ES1936029. Would you please test the following samples on standard turnaround time please?

ES1936183

VC08_1.0-1.5 4c

VC12_0.0-0.5 2c

ES1936029

VC01_0.5-1.0

VC04_0.5-1.0

VC07_0.0-0.5

Kind regards

Carmen Yi

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1936183**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MS CARMEN YI	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: carmen.yi@ghd.com	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: +61 0451 962 988	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 12517046	Page	: 1 of 5
Order number	: ----	Quote number	: ES2019GHDSER0030 (SY/522/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: SARAH ECCLESHALL		

Dates

Date Samples Received	: 01-Nov-2019 15:15	Issue Date	: 07-Nov-2019
Client Requested Due Date	: 11-Nov-2019	Scheduled Reporting Date	: **11-Nov-2019**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 6	Temperature	: 3.3'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 66 / 27

General Comments

- This report contains the following information:
    - Sample Container(s)/Preservation Non-Compliances
    - Summary of Sample(s) and Requested Analysis
    - Proactive Holding Time Report
    - Requested Deliverables
- **Sample SW01 was not received by ALS Sydney.**
- **Sample VC06_0.5-1.0 was received as VC06_0.5-0.9.**
- **07/11/19: This is an updated SRA which indicates TBT and SVOC for the samples VC12_0.0-0.5 (#29), VC08_1.0-1.5 (#40).**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **PSD and Total Fluoride analysis will be conducted by ALS Newcastle.**
- TOC analysis to be conducted by ALS Brisbane.
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- **Samples FD06, FD08 and FD10 have been forwarded to Eurofins as per COC request.**
- Preliminary results will be available on the scheduled reporting date listed in this report. However the final report with TBT analysis will be complete on 21/11/19.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - EA037 ASS Field Screening Analysis	SOIL - EA055-103 Moisture Content	SOIL - EK026SF (Solids) Total Cyanide By Segmented Flow Analyser	SOIL - EP003 Total Organic Carbon (TOC) in Soil	SOIL - EP075 SIM Phenols only SIM - Phenols only	SOIL - P- 7/4 - Short Suite NSW DECCW Waste Classification (SCC) -
ES1936183-001	31-Oct-2019 20:00	VC06_0.0-0.1		✓					
ES1936183-002	31-Oct-2019 20:00	VC06_0.5-0.6		✓					
ES1936183-003	31-Oct-2019 20:30	VC12_0.0-0.1		✓					
ES1936183-004	31-Oct-2019 20:30	VC12_0.5-0.6		✓					
ES1936183-005	31-Oct-2019 20:30	VC12_1.0-1.1		✓					
ES1936183-006	31-Oct-2019 20:45	VC08_0.0-0.1		✓					
ES1936183-007	31-Oct-2019 20:45	VC08_0.5-0.6		✓					
ES1936183-008	31-Oct-2019 20:45	VC08_1.0-1.1		✓					
ES1936183-009	31-Oct-2019 20:45	VC08_1.5-1.6		✓					
ES1936183-010	31-Oct-2019 21:45	VC13_0.0-0.1		✓					
ES1936183-011	30-Oct-2019 21:45	VC13_0.5-0.6		✓					
ES1936183-012	30-Oct-2019 21:45	VC13_1.0-1.1		✓					
ES1936183-013	31-Oct-2019 22:15	VC14_0.0-0.1		✓					
ES1936183-014	31-Oct-2019 22:15	VC14_0.5-0.6		✓					
ES1936183-015	31-Oct-2019 22:15	VC14_1.0-1.1		✓					
ES1936183-016	31-Oct-2019 22:15	VC14_1.3-1.4		✓					
ES1936183-017	31-Oct-2019 20:00	VC06_0.0-0.1			✓		✓		✓
ES1936183-018	31-Oct-2019 20:00	VC06_0.3-0.4	✓						
ES1936183-019	31-Oct-2019 20:00	VC06_0.5-0.6	✓						
ES1936183-020	31-Oct-2019 20:00	VC06_0.7-0.8	✓						
ES1936183-021	31-Oct-2019 20:00	VC06_0.8-0.9	✓						
ES1936183-022	31-Oct-2019 20:00	VC06_0.0-0.5	✓						
ES1936183-023	31-Oct-2019 20:00	VC06_0.5-0.9	✓						
ES1936183-024	31-Oct-2019 20:30	VC12_0.0-0.1	✓						
ES1936183-025	31-Oct-2019 20:30	VC12_0.3-0.4	✓						
ES1936183-026	31-Oct-2019 20:30	VC12_0.5-0.6	✓						
ES1936183-027	31-Oct-2019 20:30	VC12_0.8-0.9	✓						
ES1936183-028	31-Oct-2019 20:30	VC12_1.0-1.1			✓		✓		✓
ES1936183-029	31-Oct-2019 20:30	VC12_0.0-0.5			✓	✓	✓	✓	
ES1936183-030	31-Oct-2019 20:30	VC12_0.5-1.0	✓						
ES1936183-031	31-Oct-2019 20:45	VC0S_0.0-0.1			✓		✓		✓
ES1936183-032	31-Oct-2019 20:45	VC08_0.3-0.4	✓						
ES1936183-033	31-Oct-2019 20:45	VC0B_0.5-0.6	✓						
ES1936183-034	31-Oct-2019 20:45	VC0B_0.7-0.8	✓						
ES1936183-035	31-Oct-2019 20:45	VC08_1.0-1.1	✓						

			(On Hold) SOIL No analysis requested	SOIL - EA037 ASS Field Screening Analysis	SOIL - EA055-103 Moisture Content	SOIL - EK026SF (Solids) Total Cyanide By Segmented Flow Analyser	SOIL - EP003 Total Organic Carbon (TOC) in Soil	SOIL - EP075 SIM Phenols only SIM - Phenols only	SOIL - P- 7/4 - Short Suite NSW DECCW Waste Classification (SCC) -
ES1936183-036	31-Oct-2019 20:45	VC08_1.3-1.4	✓						
ES1936183-037	31-Oct-2019 20:45	VC08_1.5-1.6	✓						
ES1936183-038	31-Oct-2019 20:45	VC08_0.0-0.5	✓						
ES1936183-039	31-Oct-2019 20:45	VC08_0.5-1.0	✓						
ES1936183-040	31-Oct-2019 20:45	VC08_1.0-1.5			✓	✓	✓	✓	
ES1936183-041	31-Oct-2019 21:45	VC13_0.0-0.1			✓		✓		✓
ES1936183-042	31-Oct-2019 21:45	VC13_0.3-0.4	✓						
ES1936183-043	31-Oct-2019 21:45	VC13_0.5-0.6	✓						
ES1936183-044	31-Oct-2019 21:45	VC13_0.7-0.8	✓						
ES1936183-045	31-Oct-2019 21:45	VC13_1.0-1.1	✓						
ES1936183-046	31-Oct-2019 21:45	VC13_0.0-0.5	✓						
ES1936183-047	31-Oct-2019 21:45	VC13_0.5-1.0	✓						
ES1936183-048	31-Oct-2019 22:15	VC14_0.0.0.1	✓						
ES1936183-049	31-Oct-2019 22:15	VC14_0.3.0.4	✓						
ES1936183-050	31-Oct-2019 22:15	VC14-0.5-0.6	✓						
ES1936183-051	31-Oct-2019 22:15	VC14_0.7.0.8	✓						
ES1936183-052	31-Oct-2019 22:15	VC14_1.0-1.1			✓		✓		✓
ES1936183-053	31-Oct-2019 22:15	VC14_1.3-1.4	✓						
ES1936183-054	31-Oct-2019 22:15	VC14_0.0-0.5	✓						
ES1936183-055	31-Oct-2019 22:15	VC14_0.5-1.0	✓						
ES1936183-060	30-Oct-2019 00:00	FD07	✓						
ES1936183-061	31-Oct-2019 00:00	FD09	✓						
ES1936183-066	31-Oct-2019 00:00	VC12 0.9-1.0	✓						
ES1936183-067	31-Oct-2019 00:00	VC14 1.0-1.4	✓						

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA150H Particle Size Analysis by Hydrometer: AS1289	SOIL - EP071 - SD TRH ultra trace in sediments	SOIL - EP075 (solids) Semivolatile Organic Compounds	SOIL - EP080-SD TRH(V)/BTEXN in Sediments	SOIL - EP090 (solids) Organotins	SOIL - SD-02 OC/OP/PCB/PAH ultra trace	SOIL - SD-03 Metals by ICPMS (15 metals + low level Hg)
ES1936183-029	31-Oct-2019 20:30	VC12_0.0-0.5	✓	✓	✓	✓	✓	✓	✓
ES1936183-040	31-Oct-2019 20:45	VC08_1.0-1.5	✓	✓	✓	✓	✓	✓	✓

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EP080 BTEXN	SOIL - S-18 (NO MOIST) TRH(C6-C9)/BTEXN with No Moisture for TBs
ES1936183-063	31-Oct-2019 00:00	TS2	✓	
ES1936183-064	31-Oct-2019 00:00	TB2		✓
ES1936183-065	31-Oct-2019 00:00	Trip Spike control	✓	

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	(On Hold) WATER No analysis requested	WATER - W-26T TRH/BTEXN/PAH/Total 8 Metals
ES1936183-057	31-Oct-2019 00:00	SW02	✓	
ES1936183-058	31-Oct-2019 00:00	SW03	✓	
ES1936183-059	31-Oct-2019 00:00	SWB	✓	
ES1936183-062	31-Oct-2019 00:00	RIN_02		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (Hobart)		
- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com
CARMEN YI		
- *AU Certificate of Analysis - NATA (COA)	Email	carmen.yi@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	carmen.yi@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	carmen.yi@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	carmen.yi@ghd.com
- Attachment - Report (SUBCO)	Email	carmen.yi@ghd.com
- Chain of Custody (CoC) (COC)	Email	carmen.yi@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	carmen.yi@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	carmen.yi@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	carmen.yi@ghd.com
GHD LAB REPORTS		
- *AU Certificate of Analysis - NATA (COA)	Email	ghdlabreports@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ghdlabreports@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ghdlabreports@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ghdlabreports@ghd.com
- Attachment - Report (SUBCO)	Email	ghdlabreports@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ghdlabreports@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ghdlabreports@ghd.com
SARAH ECCLESHALL		
- *AU Certificate of Analysis - NATA (COA)	Email	sarah.eccleshall@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sarah.eccleshall@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sarah.eccleshall@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sarah.eccleshall@ghd.com
- Attachment - Report (SUBCO)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	sarah.eccleshall@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	sarah.eccleshall@ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1936183**	Page	: 1 of 37
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MS CARMEN YI	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 0451 962 988	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 01-Nov-2019 15:15
Order number	: ----	Date Analysis Commenced	: 05-Nov-2019
C-O-C number	: ----	Issue Date	: 20-Nov-2019 19:48
Sampler	: SARAH ECCLESHALL		
Site	: ----		
Quote number	: SY/522/19		
No. of samples received	: 66		
No. of samples analysed	: 27		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alison Graham	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield West, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Diana Mesa	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Dianne Blane	Laboratory Coordinator (2IC)	Newcastle - Inorganics, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Evie Sidarta	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Minh Wills	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Satishkumar Trivedi	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EA150H: Soil Particle Density required for Hydrometer analysis according to AS 1289.3.5.1 2006 was not requested by the client. Typical sediment SPD values used for calculations and consequently NATA endorsement does not apply to hydrometer results.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EG048G:Poor spike recovery for Alkyl Hexavalent Chromium due to matrix interferences.
- EP131B : Positive PCB result is confirmed by re-extraction and re-analysis.
- EP080-SD: Poor matrix spike recovery due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- EP071: Particular samples required dilution due to the presence of high level contaminants. LOR values have been adjusted accordingly.
- EP080: The trip spike and its control have been analysed for volatile TPH and BTEX only. The trip spike and control were prepared in the lab using reagent grade sand spiked with petrol. The spike was dispatched from the lab and the control retained.
- EP090 Organotin: Particular sample shows poor matrix spike recovery due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.
- EP075: 'Sum of PAH' is the sum of the USEPA 16 priority PAHs
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

			Client sample ID	VC06_0.0-0.1	VC06_0.5-0.6	VC12_0.0-0.1	VC12_0.5-0.6	VC12_1.0-1.1
			Client sampling date / time	31-Oct-2019 20:00	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:30
Compound	CAS Number	LOR	Unit	ES1936183-001	ES1936183-002	ES1936183-003	ES1936183-004	ES1936183-005
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	8.7	8.1	8.7	8.2	7.3
ø pH (Fox)	----	0.1	pH Unit	5.2	5.7	6.1	5.9	5.6
ø Reaction Rate	----	1	-	3	3	3	3	3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC08_0.0-0.1	VC08_0.5-0.6	VC08_1.0-1.1	VC08_1.5-1.6	VC13_0.0-0.1
			Client sampling date / time	31-Oct-2019 20:45	31-Oct-2019 20:45	31-Oct-2019 20:45	31-Oct-2019 20:45	31-Oct-2019 21:45
Compound	CAS Number	LOR	Unit	ES1936183-006	ES1936183-007	ES1936183-008	ES1936183-009	ES1936183-010
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	8.2	8.5	7.9	8.1	8.3
ø pH (Fox)	----	0.1	pH Unit	6.3	6.4	5.9	6.3	6.4
ø Reaction Rate	----	1	-	3	3	3	3	3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC13_0.5-0.6	VC13_1.0-1.1	VC14_0.0-0.1	VC14_0.5-0.6	VC14_1.0-1.1
			Client sampling date / time	30-Oct-2019 21:45	30-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 22:15	31-Oct-2019 22:15
Compound	CAS Number	LOR	Unit	ES1936183-011	ES1936183-012	ES1936183-013	ES1936183-014	ES1936183-015
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	8.2	7.8	8.4	8.6	8.6
ø pH (Fox)	----	0.1	pH Unit	6.2	6.3	6.4	6.5	6.5
ø Reaction Rate	----	1	-	3	3	3	3	3

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	VC14_1.3-1.4	VC06_0.0-0.1	VC12_1.0-1.1	VC12_0.0-0.5	VC0S_0.0-0.1
Client sampling date / time				31-Oct-2019 22:15	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:45
				ES1936183-016	ES1936183-017	ES1936183-028	ES1936183-029	ES1936183-031
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	8.1	----	----	----	----
ø pH (Fox)	----	0.1	pH Unit	6.3	----	----	----	----
ø Reaction Rate	----	1	-	3	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	----	48.2	19.9	24.2	31.1
EA150: Particle Sizing								
+75µm	----	1	%	----	----	----	81	----
+150µm	----	1	%	----	----	----	75	----
+300µm	----	1	%	----	----	----	52	----
+425µm	----	1	%	----	----	----	29	----
+600µm	----	1	%	----	----	----	10	----
+1180µm	----	1	%	----	----	----	1	----
+2.36mm	----	1	%	----	----	----	<1	----
+4.75mm	----	1	%	----	----	----	<1	----
+9.5mm	----	1	%	----	----	----	<1	----
+19.0mm	----	1	%	----	----	----	<1	----
+37.5mm	----	1	%	----	----	----	<1	----
+75.0mm	----	1	%	----	----	----	<1	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	----	----	----	15	----
Silt (2-60 µm)	----	1	%	----	----	----	4	----
Sand (0.06-2.00 mm)	----	1	%	----	----	----	81	----
Gravel (>2mm)	----	1	%	----	----	----	<1	----
Cobbles (>6cm)	----	1	%	----	----	----	<1	----
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	----	----	----	4790	----
Iron	7439-89-6	50	mg/kg	----	----	----	4290	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	18	<5	----	14
Beryllium	7440-41-7	1	mg/kg	----	<1	<1	----	<1
Cadmium	7440-43-9	1	mg/kg	----	<1	<1	----	<1
Lead	7439-92-1	5	mg/kg	----	224	42	----	117
Molybdenum	7439-98-7	2	mg/kg	----	<2	<2	----	<2
Nickel	7440-02-0	2	mg/kg	----	10	4	----	6

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC14_1.3-1.4	VC06_0.0-0.1	VC12_1.0-1.1	VC12_0.0-0.5	VC0S_0.0-0.1
			Client sampling date / time	31-Oct-2019 22:15	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:45
Compound	CAS Number	LOR	Unit	ES1936183-016	ES1936183-017	ES1936183-028	ES1936183-029	ES1936183-031
				Result	Result	Result	Result	Result
EG005(ED093)T: Total Metals by ICP-AES - Continued								
Selenium	7782-49-2	5	mg/kg	----	<5	<5	----	<5
Silver	7440-22-4	2	mg/kg	----	<2	<2	----	<2
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	----	----	----	<0.50	----
Arsenic	7440-38-2	1.00	mg/kg	----	----	----	**2.20**	----
Cadmium	7440-43-9	0.1	mg/kg	----	----	----	<0.1	----
Chromium	7440-47-3	1.0	mg/kg	----	----	----	**6.0**	----
Copper	7440-50-8	1.0	mg/kg	----	----	----	**4.5**	----
Cobalt	7440-48-4	0.5	mg/kg	----	----	----	<0.5	----
Lead	7439-92-1	1.0	mg/kg	----	----	----	**10.6**	----
Manganese	7439-96-5	10	mg/kg	----	----	----	<10	----
Nickel	7440-02-0	1.0	mg/kg	----	----	----	<1.0	----
Selenium	7782-49-2	0.1	mg/kg	----	----	----	<0.1	----
Silver	7440-22-4	0.1	mg/kg	----	----	----	**0.2**	----
Vanadium	7440-62-2	2.0	mg/kg	----	----	----	**13.5**	----
Zinc	7440-66-6	1.0	mg/kg	----	----	----	**14.4**	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	----	----	----	**0.12**	----
Mercury	7439-97-6	0.1	mg/kg	----	**3.4**	<0.1	----	**1.8**
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	----	<1	<1	<1	<1
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser								
Weak Acid Dissociable Cyanide	----	1	mg/kg	----	<1	<1	----	<1
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	----	**90**	**80**	----	**120**
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	----	**2.05**	**0.13**	**0.34**	**1.20**
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	<0.1	<0.1	----	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	<0.05	<0.05	----	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC14_1.3-1.4	VC06_0.0-0.1	VC12_1.0-1.1	VC12_0.0-0.5	VC0S_0.0-0.1
			Client sampling date / time	31-Oct-2019 22:15	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:45
Compound	CAS Number	LOR	Unit	ES1936183-016	ES1936183-017	ES1936183-028	ES1936183-029	ES1936183-031
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-BHC	319-85-7	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
delta-BHC	319-86-8	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
Heptachlor	76-44-8	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
Aldrin	309-00-2	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
Dieldrin	60-57-1	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
Endrin	72-20-8	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	----	<0.2	<0.2	----	<0.2
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	<0.05	<0.05	----	<0.05
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	50	mg/kg	----	<50	<50	----	<50
>C16 - C34 Fraction	----	100	mg/kg	----	**610**	<100	----	**190**
>C34 - C40 Fraction	----	100	mg/kg	----	**190**	<100	----	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	**800**	<50	----	**190**
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup								
C10 - C14 Fraction	----	50	mg/kg	----	<50	<50	----	<50
C15 - C28 Fraction	----	100	mg/kg	----	**350**	<100	----	**110**
C29 - C36 Fraction	----	100	mg/kg	----	**370**	<100	----	**110**
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	**720**	<50	----	**220**
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	<0.2	----	<0.2
Toluene	108-88-3	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	<0.5	----	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC14_1.3-1.4	VC06_0.0-0.1	VC12_1.0-1.1	VC12_0.0-0.5	VC0S_0.0-0.1
			Client sampling date / time	31-Oct-2019 22:15	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:45
Compound	CAS Number	LOR	Unit	ES1936183-016	ES1936183-017	ES1936183-028	ES1936183-029	ES1936183-031
				Result	Result	Result	Result	Result
EP074A: Monocyclic Aromatic Hydrocarbons - Continued								
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
Styrene	100-42-5	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
EP074B: Oxygenated Compounds								
2-Butanone (MEK)	78-93-3	5	mg/kg	----	<5	<5	----	<5
EP074E: Halogenated Aliphatic Compounds								
Vinyl chloride	75-01-4	4	mg/kg	----	<4	<4	----	<4
1.1-Dichloroethene	75-35-4	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
Methylene chloride	75-09-2	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
Carbon Tetrachloride	56-23-5	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
1.2-Dichloroethane	107-06-2	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
Trichloroethene	79-01-6	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
Tetrachloroethene	127-18-4	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
EP074G: Trihalomethanes								
Chloroform	67-66-3	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	----	----	----	<0.5	----
2-Methylphenol	95-48-7	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	----	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	----	----	----	<0.5	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	----	----	----	<0.5	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	----	----	----	<0.5	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	----	----	----	<0.5	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	----	<2	<2	<2	<2

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**VC14_1.3-1.4**	**VC06_0.0-0.1**	**VC12_1.0-1.1**	**VC12_0.0-0.5**	**VC0S_0.0-0.1**
			Client sampling date / time	31-Oct-2019 22:15	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:45
Compound	CAS Number	LOR	Unit	**ES1936183-016**	**ES1936183-017**	**ES1936183-028**	**ES1936183-029**	**ES1936183-031**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
Fluorene	86-73-7	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	----	**0.7**	<0.5	----	<0.5
Anthracene	120-12-7	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	----	**2.3**	<0.5	----	**1.3**
Pyrene	129-00-0	0.5	mg/kg	----	**2.6**	<0.5	----	**1.5**
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	**1.0**	<0.5	----	**0.6**
Chrysene	218-01-9	0.5	mg/kg	----	**1.0**	<0.5	----	**0.6**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	**1.8**	<0.5	----	**1.0**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	**0.8**	<0.5	----	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	**1.8**	<0.5	----	**0.9**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	**0.9**	<0.5	----	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	<0.5	<0.5	----	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	**1.1**	<0.5	----	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	**14.0**	<0.5	----	**5.9**
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	**2.3**	<0.5	----	**1.1**
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	**2.5**	**0.6**	----	**1.4**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	**2.8**	**1.2**	----	**1.7**
EP075A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	----	----	----	<0.5	----
2-Chlorophenol	95-57-8	0.5	mg/kg	----	----	----	<0.5	----
2-Methylphenol	95-48-7	0.5	mg/kg	----	----	----	<0.5	----
3- & 4-Methylphenol	1319-77-3	0.5	mg/kg	----	----	----	<0.5	----
2-Nitrophenol	88-75-5	0.5	mg/kg	----	----	----	<0.5	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	----	----	----	<0.5	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	----	----	----	<0.5	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	----	----	----	<0.5	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	----	----	----	<0.5	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	----	----	----	<0.5	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	----	----	----	<0.5	----
Pentachlorophenol	87-86-5	1	mg/kg	----	----	----	<1	----
EP075B: Polynuclear Aromatic Hydrocarbons								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC14_1.3-1.4	VC06_0.0-0.1	VC12_1.0-1.1	VC12_0.0-0.5	VC0S_0.0-0.1
			Client sampling date / time	31-Oct-2019 22:15	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:45
Compound	CAS Number	LOR	Unit	ES1936183-016	ES1936183-017	ES1936183-028	ES1936183-029	ES1936183-031
				Result	Result	Result	Result	Result
EP075B: Polynuclear Aromatic Hydrocarbons - Continued								
Naphthalene	91-20-3	0.5	mg/kg	----	----	----	<0.5	----
2-Methylnaphthalene	91-57-6	0.5	mg/kg	----	----	----	<0.5	----
2-Chloronaphthalene	91-58-7	0.5	mg/kg	----	----	----	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	----	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg	----	----	----	<0.5	----
Fluorene	86-73-7	0.5	mg/kg	----	----	----	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg	----	----	----	<0.5	----
Anthracene	120-12-7	0.5	mg/kg	----	----	----	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg	----	----	----	<0.5	----
Pyrene	129-00-0	0.5	mg/kg	----	----	----	<0.5	----
N-2-Fluorenyl Acetamide	53-96-3	0.5	mg/kg	----	----	----	<0.5	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	----	<0.5	----
Chrysene	218-01-9	0.5	mg/kg	----	----	----	<0.5	----
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	----	----	----	<1	----
7.12-Dimethylbenz(a)anthracene	57-97-6	0.5	mg/kg	----	----	----	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	----	<0.5	----
3-Methylcholanthrene	56-49-5	0.5	mg/kg	----	----	----	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	----	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	----	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	----	----	<0.5	----
^ Sum of PAHs	----	0.5	mg/kg	----	----	----	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	----	----	<0.5	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	----	----	**0.6**	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	----	----	**1.2**	----
EP075C: Phthalate Esters								
Dimethyl phthalate	131-11-3	0.5	mg/kg	----	----	----	<0.5	----
Diethyl phthalate	84-66-2	0.5	mg/kg	----	----	----	<0.5	----
Di-n-butyl phthalate	84-74-2	0.5	mg/kg	----	----	----	<0.5	----
Butyl benzyl phthalate	85-68-7	0.5	mg/kg	----	----	----	<0.5	----
bis(2-ethylhexyl) phthalate	117-81-7	5.0	mg/kg	----	----	----	<5.0	----
Di-n-octylphthalate	117-84-0	0.5	mg/kg	----	----	----	<0.5	----
EP075D: Nitrosamines								
N-Nitrosomethylethylamine	10595-95-6	0.5	mg/kg	----	----	----	<0.5	----
N-Nitrosodiethylamine	55-18-5	0.5	mg/kg	----	----	----	<0.5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC14_1.3-1.4	VC06_0.0-0.1	VC12_1.0-1.1	VC12_0.0-0.5	VC0S_0.0-0.1
			Client sampling date / time	31-Oct-2019 22:15	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:45
Compound	CAS Number	LOR	Unit	ES1936183-016	ES1936183-017	ES1936183-028	ES1936183-029	ES1936183-031
				Result	Result	Result	Result	Result
EP075D: Nitrosamines - Continued								
N-Nitrosopyrrolidine	930-55-2	1.0	mg/kg	----	----	----	<1.0	----
N-Nitrosomorpholine	59-89-2	0.5	mg/kg	----	----	----	<0.5	----
N-Nitrosodi-n-propylamine	621-64-7	0.5	mg/kg	----	----	----	<0.5	----
N-Nitrosopiperidine	100-75-4	0.5	mg/kg	----	----	----	<0.5	----
N-Nitrosodibutylamine	924-16-3	0.5	mg/kg	----	----	----	<0.5	----
N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	1.0	mg/kg	----	----	----	<1.0	----
Methapyrilene	91-80-5	0.5	mg/kg	----	----	----	<0.5	----
EP075E: Nitroaromatics and Ketones								
2-Picoline	109-06-8	0.5	mg/kg	----	----	----	<0.5	----
Acetophenone	98-86-2	0.5	mg/kg	----	----	----	<0.5	----
Nitrobenzene	98-95-3	0.5	mg/kg	----	----	----	<0.5	----
Isophorone	78-59-1	0.5	mg/kg	----	----	----	<0.5	----
2.6-Dinitrotoluene	606-20-2	1.0	mg/kg	----	----	----	<1.0	----
2.4-Dinitrotoluene	121-14-2	1.0	mg/kg	----	----	----	<1.0	----
1-Naphthylamine	134-32-7	0.5	mg/kg	----	----	----	<0.5	----
4-Nitroquinoline-N-oxide	56-57-5	0.5	mg/kg	----	----	----	<0.5	----
5-Nitro-o-toluidine	99-55-8	0.5	mg/kg	----	----	----	<0.5	----
Azobenzene	103-33-3	1	mg/kg	----	----	----	<1	----
1.3.5-Trinitrobenzene	99-35-4	0.5	mg/kg	----	----	----	<0.5	----
Phenacetin	62-44-2	0.5	mg/kg	----	----	----	<0.5	----
4-Aminobiphenyl	92-67-1	0.5	mg/kg	----	----	----	<0.5	----
Pentachloronitrobenzene	82-68-8	0.5	mg/kg	----	----	----	<0.5	----
Pronamide	23950-58-5	0.5	mg/kg	----	----	----	<0.5	----
Dimethylaminoazobenzene	60-11-7	0.5	mg/kg	----	----	----	<0.5	----
Chlorobenzilate	510-15-6	0.5	mg/kg	----	----	----	<0.5	----
EP075F: Haloethers								
Bis(2-chloroethyl) ether	111-44-4	0.5	mg/kg	----	----	----	<0.5	----
Bis(2-chloroethoxy) methane	111-91-1	0.5	mg/kg	----	----	----	<0.5	----
4-Chlorophenyl phenyl ether	7005-72-3	0.5	mg/kg	----	----	----	<0.5	----
4-Bromophenyl phenyl ether	101-55-3	0.5	mg/kg	----	----	----	<0.5	----
EP075G: Chlorinated Hydrocarbons								
1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	----	----	----	<0.5	----
1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	----	----	----	<0.5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC14_1.3-1.4	VC06_0.0-0.1	VC12_1.0-1.1	VC12_0.0-0.5	VC0S_0.0-0.1
			Client sampling date / time	31-Oct-2019 22:15	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:45
Compound	CAS Number	LOR	Unit	ES1936183-016	ES1936183-017	ES1936183-028	ES1936183-029	ES1936183-031
				Result	Result	Result	Result	Result
EP075G: Chlorinated Hydrocarbons - Continued								
1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	----	----	----	<0.5	----
Hexachloroethane	67-72-1	0.5	mg/kg	----	----	----	<0.5	----
1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	----	----	----	<0.5	----
Hexachloropropylene	1888-71-7	0.5	mg/kg	----	----	----	<0.5	----
Hexachlorobutadiene	87-68-3	0.5	mg/kg	----	----	----	<0.5	----
Hexachlorocyclopentadiene	77-47-4	2.5	mg/kg	----	----	----	<2.5	----
Pentachlorobenzene	608-93-5	0.5	mg/kg	----	----	----	<0.5	----
Hexachlorobenzene (HCB)	118-74-1	1.0	mg/kg	----	----	----	<1.0	----
EP075H: Anilines and Benzidines								
Aniline	62-53-3	0.5	mg/kg	----	----	----	<0.5	----
4-Chloroaniline	106-47-8	0.5	mg/kg	----	----	----	<0.5	----
2-Nitroaniline	88-74-4	1.0	mg/kg	----	----	----	<1.0	----
3-Nitroaniline	99-09-2	1.0	mg/kg	----	----	----	<1.0	----
Dibenzofuran	132-64-9	0.5	mg/kg	----	----	----	<0.5	----
4-Nitroaniline	100-01-6	0.5	mg/kg	----	----	----	<0.5	----
Carbazole	86-74-8	0.5	mg/kg	----	----	----	<0.5	----
3.3`-Dichlorobenzidine	91-94-1	0.5	mg/kg	----	----	----	<0.5	----
EP075I: Organochlorine Pesticides								
alpha-BHC	319-84-6	0.5	mg/kg	----	----	----	<0.5	----
beta-BHC	319-85-7	0.5	mg/kg	----	----	----	<0.5	----
gamma-BHC	58-89-9	0.5	mg/kg	----	----	----	<0.5	----
delta-BHC	319-86-8	0.5	mg/kg	----	----	----	<0.5	----
Heptachlor	76-44-8	0.5	mg/kg	----	----	----	<0.5	----
Aldrin	309-00-2	0.5	mg/kg	----	----	----	<0.5	----
Heptachlor epoxide	1024-57-3	0.5	mg/kg	----	----	----	<0.5	----
alpha-Endosulfan	959-98-8	0.5	mg/kg	----	----	----	<0.5	----
4.4`-DDE	72-55-9	0.5	mg/kg	----	----	----	<0.5	----
Dieldrin	60-57-1	0.5	mg/kg	----	----	----	<0.5	----
Endrin	72-20-8	0.5	mg/kg	----	----	----	<0.5	----
beta-Endosulfan	33213-65-9	0.5	mg/kg	----	----	----	<0.5	----
4.4`-DDD	72-54-8	0.5	mg/kg	----	----	----	<0.5	----
Endosulfan sulfate	1031-07-8	0.5	mg/kg	----	----	----	<0.5	----
4.4`-DDT	50-29-3	1.0	mg/kg	----	----	----	<1.0	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	mg/kg	----	----	----	<0.5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC14_1.3-1.4	VC06_0.0-0.1	VC12_1.0-1.1	VC12_0.0-0.5	VC0S_0.0-0.1
			Client sampling date / time	31-Oct-2019 22:15	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:45
Compound	CAS Number	LOR	Unit	ES1936183-016	ES1936183-017	ES1936183-028	ES1936183-029	ES1936183-031
				Result	Result	Result	Result	Result
EP075I: Organochlorine Pesticides - Continued								
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	mg/kg	----	----	----	<0.5	----
EP075J: Organophosphorus Pesticides								
Dichlorvos	62-73-7	0.5	mg/kg	----	----	----	<0.5	----
Dimethoate	60-51-5	0.5	mg/kg	----	----	----	<0.5	----
Diazinon	333-41-5	0.5	mg/kg	----	----	----	<0.5	----
Chlorpyrifos-methyl	5598-13-0	0.5	mg/kg	----	----	----	<0.5	----
Malathion	121-75-5	0.5	mg/kg	----	----	----	<0.5	----
Fenthion	55-38-9	0.5	mg/kg	----	----	----	<0.5	----
Chlorpyrifos	2921-88-2	0.5	mg/kg	----	----	----	<0.5	----
Pirimphos-ethyl	23505-41-1	0.5	mg/kg	----	----	----	<0.5	----
Chlorfenvinphos	470-90-6	0.5	mg/kg	----	----	----	<0.5	----
Prothiofos	34643-46-4	0.5	mg/kg	----	----	----	<0.5	----
Ethion	563-12-2	0.5	mg/kg	----	----	----	<0.5	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	<10	<10	----	<10
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	<10	----	<10
>C10 - C16 Fraction	----	3	mg/kg	----	----	----	<12	----
>C16 - C34 Fraction	----	3	mg/kg	----	----	----	**185**	----
>C34 - C40 Fraction	----	5	mg/kg	----	----	----	**72**	----
>C10 - C40 Fraction (sum)	----	3	mg/kg	----	----	----	**257**	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	3	mg/kg	----	----	----	<12	----
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	3	mg/kg	----	----	----	<3	----
C10 - C14 Fraction	----	3	mg/kg	----	----	----	<6	----
C15 - C28 Fraction	----	3	mg/kg	----	----	----	**109**	----
C29 - C36 Fraction	----	5	mg/kg	----	----	----	**112**	----
^ C10 - C36 Fraction (sum)	----	3	mg/kg	----	----	----	**221**	----
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons								
C6 - C10 Fraction	C6_C10	3	mg/kg	----	----	----	<3	----
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	3.0	mg/kg	----	----	----	<3.0	----
EP080-SD: BTEXN								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC14_1.3-1.4	VC06_0.0-0.1	VC12_1.0-1.1	VC12_0.0-0.5	VC0S_0.0-0.1
			Client sampling date / time	31-Oct-2019 22:15	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:45
Compound	CAS Number	LOR	Unit	ES1936183-016	ES1936183-017	ES1936183-028	ES1936183-029	ES1936183-031
				Result	Result	Result	Result	Result
EP080-SD: BTEXN - Continued								
Benzene	71-43-2	0.2	mg/kg	----	----	----	<0.2	----
Toluene	108-88-3	0.2	mg/kg	----	----	----	<0.2	----
Ethylbenzene	100-41-4	0.2	mg/kg	----	----	----	<0.2	----
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	----	----	----	<0.2	----
ortho-Xylene	95-47-6	0.2	mg/kg	----	----	----	<0.2	----
^ Total Xylenes	----	0.5	mg/kg	----	----	----	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	<0.2	----
Naphthalene	91-20-3	0.2	mg/kg	----	----	----	<0.2	----
EP090: Organotin Compounds								
Tributyltin	56573-85-4	0.5	µgSn/kg	----	----	----	**6.9**	----
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	10	µg/kg	----	----	----	<10	----
Carbophenothion	786-19-6	10	µg/kg	----	----	----	<10	----
Chlorfenvinphos (E)	18708-86-6	10.0	µg/kg	----	----	----	<10.0	----
Chlorfenvinphos (Z)	18708-87-7	10	µg/kg	----	----	----	<10	----
Chlorpyrifos	2921-88-2	10	µg/kg	----	----	----	<10	----
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	----	----	----	<10	----
Demeton-S-methyl	919-86-8	10	µg/kg	----	----	----	<10	----
Diazinon	333-41-5	10	µg/kg	----	----	----	<10	----
Dichlorvos	62-73-7	10	µg/kg	----	----	----	<10	----
Dimethoate	60-51-5	10	µg/kg	----	----	----	<10	----
Ethion	563-12-2	10	µg/kg	----	----	----	<10	----
Fenamiphos	22224-92-6	10	µg/kg	----	----	----	<10	----
Fenthion	55-38-9	10	µg/kg	----	----	----	<10	----
Malathion	121-75-5	10	µg/kg	----	----	----	<10	----
Azinphos Methyl	86-50-0	10	µg/kg	----	----	----	<10	----
Monocrotophos	6923-22-4	10	µg/kg	----	----	----	<10	----
Parathion	56-38-2	10	µg/kg	----	----	----	<10	----
Parathion-methyl	298-00-0	10	µg/kg	----	----	----	<10	----
Pirimphos-ethyl	23505-41-1	10	µg/kg	----	----	----	<10	----
Prothiofos	34643-46-4	10	µg/kg	----	----	----	<10	----
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.50	µg/kg	----	----	----	<0.50	----
alpha-BHC	319-84-6	0.50	µg/kg	----	----	----	<0.50	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC14_1.3-1.4	VC06_0.0-0.1	VC12_1.0-1.1	VC12_0.0-0.5	VC0S_0.0-0.1
			Client sampling date / time	31-Oct-2019 22:15	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:45
Compound	CAS Number	LOR	Unit	ES1936183-016	ES1936183-017	ES1936183-028	ES1936183-029	ES1936183-031
				Result	Result	Result	Result	Result
EP131A: Organochlorine Pesticides - Continued								
beta-BHC	319-85-7	0.50	µg/kg	----	----	----	<0.50	----
delta-BHC	319-86-8	0.50	µg/kg	----	----	----	<0.50	----
4.4`-DDD	72-54-8	0.50	µg/kg	----	----	----	<0.50	----
4.4`-DDE	72-55-9	0.50	µg/kg	----	----	----	<0.50	----
4.4`-DDT	50-29-3	0.50	µg/kg	----	----	----	<0.50	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.50	µg/kg	----	----	----	<0.50	----
Dieldrin	60-57-1	0.50	µg/kg	----	----	----	<0.50	----
alpha-Endosulfan	959-98-8	0.50	µg/kg	----	----	----	<0.50	----
beta-Endosulfan	33213-65-9	0.50	µg/kg	----	----	----	<0.50	----
Endosulfan sulfate	1031-07-8	0.50	µg/kg	----	----	----	<0.50	----
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	----	----	----	<0.50	----
Endrin	72-20-8	0.50	µg/kg	----	----	----	<0.50	----
Endrin aldehyde	7421-93-4	0.50	µg/kg	----	----	----	<0.50	----
Endrin ketone	53494-70-5	0.50	µg/kg	----	----	----	<0.50	----
Heptachlor	76-44-8	0.50	µg/kg	----	----	----	<0.50	----
Heptachlor epoxide	1024-57-3	0.50	µg/kg	----	----	----	<0.50	----
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	----	----	----	<0.50	----
gamma-BHC	58-89-9	0.25	µg/kg	----	----	----	<0.25	----
Methoxychlor	72-43-5	0.50	µg/kg	----	----	----	<0.50	----
cis-Chlordane	5103-71-9	0.25	µg/kg	----	----	----	<0.25	----
trans-Chlordane	5103-74-2	0.25	µg/kg	----	----	----	<0.25	----
^ Total Chlordane (sum)	----	0.25	µg/kg	----	----	----	<0.25	----
Oxychlordane	27304-13-8	0.50	µg/kg	----	----	----	<0.50	----
EP131B: Polychlorinated Biphenyls (as Aroclors)								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	----	----	----	**34.6**	----
Aroclor 1016	12674-11-2	5.0	µg/kg	----	----	----	<5.0	----
Aroclor 1221	11104-28-2	5.0	µg/kg	----	----	----	<5.0	----
Aroclor 1232	11141-16-5	5.0	µg/kg	----	----	----	<5.0	----
Aroclor 1242	53469-21-9	5.0	µg/kg	----	----	----	<5.0	----
Aroclor 1248	12672-29-6	5.0	µg/kg	----	----	----	<5.0	----
Aroclor 1254	11097-69-1	5.0	µg/kg	----	----	----	**34.6**	----
Aroclor 1260	11096-82-5	5.0	µg/kg	----	----	----	<5.0	----
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	5	µg/kg	----	----	----	**10**	----

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC14_1.3-1.4	VC06_0.0-0.1	VC12_1.0-1.1	VC12_0.0-0.5	VC0S_0.0-0.1
Client sampling date / time				31-Oct-2019 22:15	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:45
				ES1936183-016	ES1936183-017	ES1936183-028	ES1936183-029	ES1936183-031
				Result	Result	Result	Result	Result
EP132B: Polynuclear Aromatic Hydrocarbons - Continued								
2-Methylnaphthalene	91-57-6	5	µg/kg	----	----	----	<5	----
Acenaphthylene	208-96-8	4	µg/kg	----	----	----	60	----
Acenaphthene	83-32-9	4	µg/kg	----	----	----	<4	----
Fluorene	86-73-7	4	µg/kg	----	----	----	8	----
Phenanthrene	85-01-8	4	µg/kg	----	----	----	96	----
Anthracene	120-12-7	4	µg/kg	----	----	----	37	----
Fluoranthene	206-44-0	4	µg/kg	----	----	----	201	----
Pyrene	129-00-0	4	µg/kg	----	----	----	217	----
Benz(a)anthracene	56-55-3	4	µg/kg	----	----	----	147	----
Chrysene	218-01-9	4	µg/kg	----	----	----	122	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	----	----	----	226	----
Benzo(k)fluoranthene	207-08-9	4	µg/kg	----	----	----	116	----
Benzo(e)pyrene	192-97-2	4	µg/kg	----	----	----	117	----
Benzo(a)pyrene	50-32-8	4	µg/kg	----	----	----	255	----
Perylene	198-55-0	4	µg/kg	----	----	----	55	----
Benzo(g.h.i)perylene	191-24-2	4	µg/kg	----	----	----	197	----
Dibenz(a.h)anthracene	53-70-3	4	µg/kg	----	----	----	40	----
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	----	----	----	155	----
Coronene	191-07-1	5	µg/kg	----	----	----	126	----
^ Sum of PAHs	----	4	µg/kg	----	----	----	2180	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	----	78.6	83.8	----	71.4
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	----	95.3	91.6	----	94.5
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	----	96.1	73.3	----	86.7
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.5	%	----	85.4	82.9	----	84.6
Toluene-D8	2037-26-5	0.5	%	----	112	106	----	105
4-Bromofluorobenzene	460-00-4	0.5	%	----	112	105	----	101
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	72.0	76.1	79.2	76.2
2-Chlorophenol-D4	93951-73-6	0.5	%	----	80.3	85.6	79.6	85.9
2.4.6-Tribromophenol	118-79-6	0.5	%	----	67.8	66.5	64.0	71.0

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC14_1.3-1.4	VC06_0.0-0.1	VC12_1.0-1.1	VC12_0.0-0.5	VC0S_0.0-0.1
			Client sampling date / time	31-Oct-2019 22:15	31-Oct-2019 20:00	31-Oct-2019 20:30	31-Oct-2019 20:30	31-Oct-2019 20:45
Compound	CAS Number	LOR	Unit	ES1936183-016	ES1936183-017	ES1936183-028	ES1936183-029	ES1936183-031
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	94.4	102	90.9	101
Anthracene-d10	1719-06-8	0.5	%	----	88.2	96.0	87.0	92.4
4-Terphenyl-d14	1718-51-0	0.5	%	----	78.9	86.0	95.7	83.6
EP075S: Acid Extractable Surrogates								
2-Fluorophenol	367-12-4	0.5	%	----	----	----	94.3	----
Phenol-d6	13127-88-3	0.5	%	----	----	----	88.5	----
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	----	93.0	----
2.4.6-Tribromophenol	118-79-6	0.5	%	----	----	----	60.2	----
EP075T: Base/Neutral Extractable Surrogates								
Nitrobenzene-D5	4165-60-0	0.5	%	----	----	----	88.1	----
1.2-Dichlorobenzene-D4	2199-69-1	0.5	%	----	----	----	82.6	----
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	----	103	----
Anthracene-d10	1719-06-8	0.5	%	----	----	----	84.0	----
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	----	93.2	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	82.3	80.4	----	81.3
Toluene-D8	2037-26-5	0.2	%	----	101	95.5	----	94.8
4-Bromofluorobenzene	460-00-4	0.2	%	----	106	97.1	----	94.7
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	----	124	----
Toluene-D8	2037-26-5	0.2	%	----	----	----	131	----
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	----	137	----
EP090S: Organotin Surrogate								
Tripropyltin	----	0.5	%	----	----	----	82.0	----
EP130S: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	10	%	----	----	----	69.2	----
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.50	%	----	----	----	44.1	----
EP131T: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.5	%	----	----	----	57.5	----
EP132T: Base/Neutral Extractable Surrogates								
2-Fluorobiphenyl	321-60-8	10	%	----	----	----	79.8	----
Anthracene-d10	1719-06-8	10	%	----	----	----	80.7	----
4-Terphenyl-d14	1718-51-0	10	%	----	----	----	94.9	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
			Client sampling date / time	31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	17.5	32.2	24.9	----	----
EA150: Particle Sizing								
+75µm	----	1	%	44	----	----	----	----
+150µm	----	1	%	35	----	----	----	----
+300µm	----	1	%	18	----	----	----	----
+425µm	----	1	%	10	----	----	----	----
+600µm	----	1	%	3	----	----	----	----
+1180µm	----	1	%	<1	----	----	----	----
+2.36mm	----	1	%	<1	----	----	----	----
+4.75mm	----	1	%	<1	----	----	----	----
+9.5mm	----	1	%	<1	----	----	----	----
+19.0mm	----	1	%	<1	----	----	----	----
+37.5mm	----	1	%	<1	----	----	----	----
+75.0mm	----	1	%	<1	----	----	----	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	33	----	----	----	----
Silt (2-60 µm)	----	1	%	19	----	----	----	----
Sand (0.06-2.00 mm)	----	1	%	48	----	----	----	----
Gravel (>2mm)	----	1	%	<1	----	----	----	----
Cobbles (>6cm)	----	1	%	<1	----	----	----	----
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	7220	----	----	----	----
Iron	7439-89-6	50	mg/kg	3460	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	13	9	----	----
Beryllium	7440-41-7	1	mg/kg	----	<1	<1	----	----
Cadmium	7440-43-9	1	mg/kg	----	<1	<1	----	----
Lead	7439-92-1	5	mg/kg	----	154	<5	----	----
Molybdenum	7439-98-7	2	mg/kg	----	<2	<2	----	----
Nickel	7440-02-0	2	mg/kg	----	7	3	----	----
Selenium	7782-49-2	5	mg/kg	----	<5	<5	----	----
Silver	7440-22-4	2	mg/kg	----	<2	<2	----	----
EG020-SD: Total Metals in Sediments by ICPMS								
Antimony	7440-36-0	0.50	mg/kg	<0.50	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
Client sampling date / time				31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
				ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EG020-SD: Total Metals in Sediments by ICPMS - Continued								
Arsenic	7440-38-2	1.00	mg/kg	**3.11**	----	----	----	----
Cadmium	7440-43-9	0.1	mg/kg	<0.1	----	----	----	----
Chromium	7440-47-3	1.0	mg/kg	**10.8**	----	----	----	----
Copper	7440-50-8	1.0	mg/kg	<1.0	----	----	----	----
Cobalt	7440-48-4	0.5	mg/kg	<0.5	----	----	----	----
Lead	7439-92-1	1.0	mg/kg	**14.6**	----	----	----	----
Manganese	7439-96-5	10	mg/kg	<10	----	----	----	----
Nickel	7440-02-0	1.0	mg/kg	**1.2**	----	----	----	----
Selenium	7782-49-2	0.1	mg/kg	**0.3**	----	----	----	----
Silver	7440-22-4	0.1	mg/kg	**0.2**	----	----	----	----
Vanadium	7440-62-2	2.0	mg/kg	**21.3**	----	----	----	----
Zinc	7440-66-6	1.0	mg/kg	**3.2**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.01	mg/kg	**0.05**	----	----	----	----
Mercury	7439-97-6	0.1	mg/kg	----	**2.2**	<0.1	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	----	<0.5	<0.5	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	<1	----	----
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser								
Weak Acid Dissociable Cyanide	----	1	mg/kg	----	<1	<1	----	----
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	----	**180**	**70**	----	----
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**0.15**	**1.45**	**0.29**	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	<0.1	<0.1	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	<0.05	<0.05	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	<0.05	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg	----	<0.05	<0.05	----	----
gamma-BHC	58-89-9	0.05	mg/kg	----	<0.05	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg	----	<0.05	<0.05	----	----
Heptachlor	76-44-8	0.05	mg/kg	----	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
Client sampling date / time				31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
				ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Aldrin	309-00-2	0.05	mg/kg	----	<0.05	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	<0.05	<0.05	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	----	<0.05	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	----	<0.05	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	<0.05	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	----	<0.05	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg	----	<0.05	<0.05	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	----	<0.05	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg	----	<0.05	<0.05	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	<0.05	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	----	<0.05	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	<0.05	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	<0.05	<0.05	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	----	<0.2	<0.2	----	----
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	<0.05	<0.05	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	50	mg/kg	----	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg	----	**160**	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg	----	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	**160**	<50	----	----
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup								
C10 - C14 Fraction	----	50	mg/kg	----	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg	----	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg	----	**100**	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	**100**	<50	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Styrene	100-42-5	0.5	mg/kg	----	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	<0.5	----	----
EP074B: Oxygenated Compounds								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
Client sampling date / time				31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
				ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EP074B: Oxygenated Compounds - Continued								
2-Butanone (MEK)	78-93-3	5	mg/kg	----	<5	<5	----	----
EP074E: Halogenated Aliphatic Compounds								
Vinyl chloride	75-01-4	4	mg/kg	----	<4	<4	----	----
1.1-Dichloroethene	75-35-4	0.5	mg/kg	----	<0.5	<0.5	----	----
Methylene chloride	75-09-2	0.5	mg/kg	----	<0.5	<0.5	----	----
1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	----	<0.5	<0.5	----	----
Carbon Tetrachloride	56-23-5	0.5	mg/kg	----	<0.5	<0.5	----	----
1.2-Dichloroethane	107-06-2	0.5	mg/kg	----	<0.5	<0.5	----	----
Trichloroethene	79-01-6	0.5	mg/kg	----	<0.5	<0.5	----	----
1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	----	<0.5	<0.5	----	----
Tetrachloroethene	127-18-4	0.5	mg/kg	----	<0.5	<0.5	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	----	<0.5	<0.5	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	----	<0.5	<0.5	----	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	0.5	mg/kg	----	<0.5	<0.5	----	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	0.5	mg/kg	----	<0.5	<0.5	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	----	----	----	----
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	----	----	----	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	----	----	----	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	----	----	----	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	----	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	----	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
Client sampling date / time				31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
				ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Fluorene	86-73-7	0.5	mg/kg	----	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	----	<0.5	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	----	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	----	**1.4**	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg	----	**1.5**	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	**0.7**	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg	----	**0.6**	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	**1.1**	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	**1.0**	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	<0.5	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	**0.6**	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	**6.9**	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	**1.2**	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	**1.5**	**0.6**	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	**1.8**	**1.2**	----	----
EP075A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	----	----	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	----	----	----	----
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	----	----	----	----
3- & 4-Methylphenol	1319-77-3	0.5	mg/kg	<0.5	----	----	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	----	----	----	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	----	----	----	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	----	----	----	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	----	----	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	----	----	----	----
Pentachlorophenol	87-86-5	1	mg/kg	<1	----	----	----	----
EP075B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----
2-Methylnaphthalene	91-57-6	0.5	mg/kg	<0.5	----	----	----	----
2-Chloronaphthalene	91-58-7	0.5	mg/kg	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
Client sampling date / time				31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
				ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EP075B: Polynuclear Aromatic Hydrocarbons - Continued								
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	----	----	----
N-2-Fluorenyl Acetamide	53-96-3	0.5	mg/kg	<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1	----	----	----	----
7.12-Dimethylbenz(a)anthracene	57-97-6	0.5	mg/kg	<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	----	----	----
3-Methylcholanthrene	56-49-5	0.5	mg/kg	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	----	----	----
^ Sum of PAHs	----	0.5	mg/kg	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	----	----	----	----
EP075C: Phthalate Esters								
Dimethyl phthalate	131-11-3	0.5	mg/kg	<0.5	----	----	----	----
Diethyl phthalate	84-66-2	0.5	mg/kg	<0.5	----	----	----	----
Di-n-butyl phthalate	84-74-2	0.5	mg/kg	<0.5	----	----	----	----
Butyl benzyl phthalate	85-68-7	0.5	mg/kg	<0.5	----	----	----	----
bis(2-ethylhexyl) phthalate	117-81-7	5.0	mg/kg	<5.0	----	----	----	----
Di-n-octylphthalate	117-84-0	0.5	mg/kg	<0.5	----	----	----	----
EP075D: Nitrosamines								
N-Nitrosomethylethylamine	10595-95-6	0.5	mg/kg	<0.5	----	----	----	----
N-Nitrosodiethylamine	55-18-5	0.5	mg/kg	<0.5	----	----	----	----
N-Nitrosopyrrolidine	930-55-2	1.0	mg/kg	<1.0	----	----	----	----
N-Nitrosomorpholine	59-89-2	0.5	mg/kg	<0.5	----	----	----	----
N-Nitrosodi-n-propylamine	621-64-7	0.5	mg/kg	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
			Client sampling date / time	31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
				ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EP075D: Nitrosamines - Continued								
N-Nitrosopiperidine	100-75-4	0.5	mg/kg	<0.5	----	----	----	----
N-Nitrosodibutylamine	924-16-3	0.5	mg/kg	<0.5	----	----	----	----
N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	1.0	mg/kg	<1.0	----	----	----	----
Methapyrilene	91-80-5	0.5	mg/kg	<0.5	----	----	----	----
EP075E: Nitroaromatics and Ketones								
2-Picoline	109-06-8	0.5	mg/kg	<0.5	----	----	----	----
Acetophenone	98-86-2	0.5	mg/kg	<0.5	----	----	----	----
Nitrobenzene	98-95-3	0.5	mg/kg	<0.5	----	----	----	----
Isophorone	78-59-1	0.5	mg/kg	<0.5	----	----	----	----
2.6-Dinitrotoluene	606-20-2	1.0	mg/kg	<1.0	----	----	----	----
2.4-Dinitrotoluene	121-14-2	1.0	mg/kg	<1.0	----	----	----	----
1-Naphthylamine	134-32-7	0.5	mg/kg	<0.5	----	----	----	----
4-Nitroquinoline-N-oxide	56-57-5	0.5	mg/kg	<0.5	----	----	----	----
5-Nitro-o-toluidine	99-55-8	0.5	mg/kg	<0.5	----	----	----	----
Azobenzene	103-33-3	1	mg/kg	<1	----	----	----	----
1.3.5-Trinitrobenzene	99-35-4	0.5	mg/kg	<0.5	----	----	----	----
Phenacetin	62-44-2	0.5	mg/kg	<0.5	----	----	----	----
4-Aminobiphenyl	92-67-1	0.5	mg/kg	<0.5	----	----	----	----
Pentachloronitrobenzene	82-68-8	0.5	mg/kg	<0.5	----	----	----	----
Pronamide	23950-58-5	0.5	mg/kg	<0.5	----	----	----	----
Dimethylaminoazobenzene	60-11-7	0.5	mg/kg	<0.5	----	----	----	----
Chlorobenzilate	510-15-6	0.5	mg/kg	<0.5	----	----	----	----
EP075F: Haloethers								
Bis(2-chloroethyl) ether	111-44-4	0.5	mg/kg	<0.5	----	----	----	----
Bis(2-chloroethoxy) methane	111-91-1	0.5	mg/kg	<0.5	----	----	----	----
4-Chlorophenyl phenyl ether	7005-72-3	0.5	mg/kg	<0.5	----	----	----	----
4-Bromophenyl phenyl ether	101-55-3	0.5	mg/kg	<0.5	----	----	----	----
EP075G: Chlorinated Hydrocarbons								
1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	<0.5	----	----	----	----
1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	<0.5	----	----	----	----
1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	<0.5	----	----	----	----
Hexachloroethane	67-72-1	0.5	mg/kg	<0.5	----	----	----	----
1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
			Client sampling date / time	31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EP075G: Chlorinated Hydrocarbons - Continued								
Hexachloropropylene	1888-71-7	0.5	mg/kg	<0.5	----	----	----	----
Hexachlorobutadiene	87-68-3	0.5	mg/kg	<0.5	----	----	----	----
Hexachlorocyclopentadiene	77-47-4	2.5	mg/kg	<2.5	----	----	----	----
Pentachlorobenzene	608-93-5	0.5	mg/kg	<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	1.0	mg/kg	<1.0	----	----	----	----
EP075H: Anilines and Benzidines								
Aniline	62-53-3	0.5	mg/kg	<0.5	----	----	----	----
4-Chloroaniline	106-47-8	0.5	mg/kg	<0.5	----	----	----	----
2-Nitroaniline	88-74-4	1.0	mg/kg	<1.0	----	----	----	----
3-Nitroaniline	99-09-2	1.0	mg/kg	<1.0	----	----	----	----
Dibenzofuran	132-64-9	0.5	mg/kg	<0.5	----	----	----	----
4-Nitroaniline	100-01-6	0.5	mg/kg	<0.5	----	----	----	----
Carbazole	86-74-8	0.5	mg/kg	<0.5	----	----	----	----
3.3`-Dichlorobenzidine	91-94-1	0.5	mg/kg	<0.5	----	----	----	----
EP075I: Organochlorine Pesticides								
alpha-BHC	319-84-6	0.5	mg/kg	<0.5	----	----	----	----
beta-BHC	319-85-7	0.5	mg/kg	<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	mg/kg	<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	mg/kg	<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	mg/kg	<0.5	----	----	----	----
Aldrin	309-00-2	0.5	mg/kg	<0.5	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	mg/kg	<0.5	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	mg/kg	<0.5	----	----	----	----
4.4`-DDE	72-55-9	0.5	mg/kg	<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	mg/kg	<0.5	----	----	----	----
Endrin	72-20-8	0.5	mg/kg	<0.5	----	----	----	----
beta-Endosulfan	33213-65-9	0.5	mg/kg	<0.5	----	----	----	----
4.4`-DDD	72-54-8	0.5	mg/kg	<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	mg/kg	<0.5	----	----	----	----
4.4`-DDT	50-29-3	1.0	mg/kg	<1.0	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	mg/kg	<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	mg/kg	<0.5	----	----	----	----
EP075J: Organophosphorus Pesticides								

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1936183**	Page	: 1 of 35
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MS CARMEN YI	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 0451 962 988	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 01-Nov-2019
Order number	: ----	Date Analysis Commenced	: 05-Nov-2019
C-O-C number	: ----	Issue Date	: 20-Nov-2019
Sampler	: SARAH ECCLESHALL		
Site	: ----		
Quote number	: SY/522/19		
No. of samples received	: 66		
No. of samples analysed	: 27		

NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alison Graham	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield West, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Diana Mesa	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Dianne Blane	Laboratory Coordinator (2IC)	Newcastle - Inorganics, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Evie Sidarta	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Minh Wills	2IC Organic Chemist	Brisbane Organics, Stafford, QLD
Satishkumar Trivedi	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES (QC Lot: 2691340)									
ES1936183-029	VC12_0.0-0.5	EG005-SD: Aluminium	7429-90-5	50	mg/kg	4790	4620	3.72	0% - 20%
		EG005-SD: Iron	7439-89-6	50	mg/kg	4290	3780	12.7	0% - 20%
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2691120)									
ES1936183-017	VC06_0.0-0.1	EG005T: Nickel	7440-02-0	2	mg/kg	10	10	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	18	20	8.11	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	224	245	8.82	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	5	0.00	No Limit
ES1935800-002	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	3	3	0.00	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	14	14	0.00	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	5	<5	0.00	No Limit
ES1936183-017	VC06_0.0-0.1	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QC Lot: 2691342)									
ES1936183-029	VC12_0.0-0.5	EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	0.12	0.13	0.00	0% - 50%
EA037: Ass Field Screening Analysis (QC Lot: 2684166)									
ES1936029-033	Anonymous	EA037: pH (F)	----	0.1	pH Unit	7.9	7.9	0.00	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.9	5.9	0.00	0% - 20%

Sub-Matrix: **SOIL**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA037: Ass Field Screening Analysis (QC Lot: 2684166) - continued									
ES1936183-005	VC12_1.0-1.1	EA037: pH (F)	----	0.1	pH Unit	7.3	7.1	1.67	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.6	5.6	0.00	0% - 20%
EA037: Ass Field Screening Analysis (QC Lot: 2684167)									
ES1936183-015	VC14_1.0-1.1	EA037: pH (F)	----	0.1	pH Unit	8.6	8.5	0.00	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.5	6.4	0.00	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2682542)									
ES1935800-025	Anonymous	EA055: Moisture Content	----	0.1	%	25.2	24.1	4.51	0% - 20%
ES1936179-009	Anonymous	EA055: Moisture Content	----	0.1	%	18.7	18.2	2.88	0% - 50%
EG020-SD: Total Metals in Sediments by ICPMS (QC Lot: 2691341)									
ES1936183-029	VC12_0.0-0.5	EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
		EG020-SD: Silver	7440-22-4	0.1	mg/kg	0.2	0.1	0.00	No Limit
		EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	<0.50	0.00	No Limit
		EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EG020-SD: Arsenic	7440-38-2	1	mg/kg	2.20	2.01	9.07	No Limit
		EG020-SD: Chromium	7440-47-3	1	mg/kg	6.0	5.9	2.22	No Limit
		EG020-SD: Copper	7440-50-8	1	mg/kg	4.5	5.4	17.7	No Limit
		EG020-SD: Lead	7439-92-1	1	mg/kg	10.6	12.1	12.7	0% - 50%
		EG020-SD: Nickel	7440-02-0	1	mg/kg	<1.0	<1.0	0.00	No Limit
		EG020-SD: Zinc	7440-66-6	1	mg/kg	14.4	17.5	19.1	0% - 50%
		EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	<10	0.00	No Limit
		EG020-SD: Vanadium	7440-62-2	2	mg/kg	13.5	11.0	19.9	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2691119)									
ES1935800-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1936183-017	VC06_0.0-0.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	3.4	3.2	5.79	0% - 20%
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 2684699)									
ES1935800-011	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1936425-002	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	3.0	3.0	0.00	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 2682540)									
ES1936183-028	VC12_1.0-1.1	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
ES1935800-011	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser (QC Lot: 2682539)									
ES1935800-011	Anonymous	EK028SF: Weak Acid Dissociable Cyanide	----	1	mg/kg	<1	<1	0.00	No Limit
EK040T: Fluoride Total (QC Lot: 2685561)									
EB1928345-001	Anonymous	EK040T: Fluoride	16984-48-8	40	mg/kg	180	150	12.8	No Limit
ES1935800-011	Anonymous	EK040T: Fluoride	16984-48-8	40	mg/kg	60	50	0.00	No Limit
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 2690237)									
EM1918482-001	Anonymous	EP003: Total Organic Carbon	----	0.02	%	0.07	0.07	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 2690237) - continued									
ES1936183-041	VC13_0.0-0.1	EP003: Total Organic Carbon	----	0.02	%	1.45	1.40	3.22	0% - 20%
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 2693466)									
ES1936183-040	VC08_1.0-1.5	EP003: Total Organic Carbon	----	0.02	%	0.15	0.15	0.00	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 2682735)									
ES1935800-011	Anonymous	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2682733)									
ES1935800-011	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 2682733)									
ES1935800-011	Anonymous	EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QC Lot: 2682734)									
ES1935800-011	Anonymous	EP071SG-S: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071SG-S: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071SG-S: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071SG-S: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QC Lot: 2682734)									
ES1935800-011	Anonymous	EP071SG-S: >C16 - C34 Fraction	----	100	mg/kg	150	150	0.00	No Limit
		EP071SG-S: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071SG-S: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 2684260)									
ES1935800-011	Anonymous	EP074: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP074: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 2684260) - continued									
ES1935800-011	Anonymous	EP074: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EW1904707-002	Anonymous	EP074: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP074: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 2684260)									
ES1935800-011	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5	0.00	No Limit
EW1904707-002	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 2684260)									
ES1935800-011	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Methylene chloride	75-09-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	5	mg/kg	<4	<4	0.00	No Limit
EW1904707-002	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Methylene chloride	75-09-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	5	mg/kg	<4	<4	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 2684260)									
ES1935800-011	Anonymous	EP074: Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074F: Halogenated Aromatic Compounds (QC Lot: 2684260) - continued									
EW1904707-002	Anonymous	EP074: Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 2684260)									
ES1935800-011	Anonymous	EP074: Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EW1904707-002	Anonymous	EP074: Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 2682732)									
ES1935800-011	Anonymous	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 2682755)									
ES1936232-001	Anonymous	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
ES1935800-001	Anonymous	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)A: Phenolic Compounds (QC Lot: 2682755) - continued									
ES1935800-001	Anonymous	EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2682732)									
ES1935800-011	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2682755)									
ES1936232-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	0.9	0.9	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	1.6	1.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	1.5	1.4	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	0.8	0.7	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	0.7	0.7	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	0.8	0.9	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	0.8	0.8	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2682755) - continued									
ES1936232-001	Anonymous	EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	0.5	0.6	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	7.6	7.5	1.32	0% - 50%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	1.0	1.0	0.00	No Limit
ES1935800-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075A: Phenolic Compounds (QC Lot: 2690636)									
ES1936183-029	VC12_0.0-0.5	EP075: Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 3- & 4-Methylphenol	1319-77-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Pentachlorophenol	87-86-5	1	mg/kg	<1	<1	0.00	No Limit
EP075B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2690636)									
ES1936183-029	VC12_0.0-0.5	EP075: Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2-Methylnaphthalene	91-57-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2690636) - continued									
ES1936183-029	VC12_0.0-0.5	EP075: 2-Chloronaphthalene	91-58-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: N-2-Fluorenyl Acetamide	53-96-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 3-Methylcholanthrene	56-49-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1	<1	0.00	No Limit
EP075C: Phthalate Esters (QC Lot: 2690636)									
ES1936183-029	VC12_0.0-0.5	EP075: Dimethyl phthalate	131-11-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Diethyl phthalate	84-66-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Di-n-butyl phthalate	84-74-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Butyl benzyl phthalate	85-68-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Di-n-octylphthalate	117-84-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075D: Nitrosamines (QC Lot: 2690636)									
ES1936183-029	VC12_0.0-0.5	EP075: N-Nitrosomethylethylamine	10595-95-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: N-Nitrosodiethylamine	55-18-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: N-Nitrosopyrrolidine	930-55-2	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: N-Nitrosomorpholine	59-89-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: N-Nitrosodi-n-propylamine	621-64-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: N-Nitrosopiperidine	100-75-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: N-Nitrosodibutylamine	924-16-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: Methapyrilene	91-80-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075E: Nitroaromatics and Ketones (QC Lot: 2690636)									
ES1936183-029	VC12_0.0-0.5	EP075: 2-Picoline	109-06-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Acetophenone	98-86-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Nitrobenzene	98-95-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075E: Nitroaromatics and Ketones (QC Lot: 2690636) - continued									
ES1936183-029	VC12_0.0-0.5	EP075: Isophorone	78-59-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2.6-Dinitrotoluene	606-20-2	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: 2.4-Dinitrotoluene	121-14-2	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: 1-Naphthylamine	134-32-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4-Nitroquinoline-N-oxide	56-57-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 5-Nitro-o-toluidine	99-55-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 1.3.5-Trinitrobenzene	99-35-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Phenacetin	62-44-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4-Aminobiphenyl	92-67-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Pentachloronitrobenzene	82-68-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Pronamide	23950-58-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Dimethylaminoazobenzene	60-11-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Chlorobenzilate	510-15-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Azobenzene	103-33-3	1	mg/kg	<1	<1	0.00	No Limit
EP075F: Haloethers (QC Lot: 2690636)									
ES1936183-029	VC12_0.0-0.5	EP075: Bis(2-chloroethyl) ether	111-44-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Bis(2-chloroethoxy) methane	111-91-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4-Chlorophenyl phenyl ether	7005-72-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4-Bromophenyl phenyl ether	101-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075G: Chlorinated Hydrocarbons (QC Lot: 2690636)									
ES1936183-029	VC12_0.0-0.5	EP075: 1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Hexachloroethane	67-72-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Hexachloropropylene	1888-71-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Hexachlorobutadiene	87-68-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Pentachlorobenzene	608-93-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Hexachlorobenzene (HCB)	118-74-1	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: Hexachlorocyclopentadiene	77-47-4	2.5	mg/kg	<2.5	<2.5	0.00	No Limit
EP075H: Anilines and Benzidines (QC Lot: 2690636)									
ES1936183-029	VC12_0.0-0.5	EP075: Aniline	62-53-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4-Chloroaniline	106-47-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 2-Nitroaniline	88-74-4	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: 3-Nitroaniline	99-09-2	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
		EP075: Dibenzofuran	132-64-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4-Nitroaniline	100-01-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Carbazole	86-74-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 3.3`-Dichlorobenzidine	91-94-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075I: Organochlorine Pesticides (QC Lot: 2690636)									
ES1936183-029	VC12_0.0-0.5	EP075: alpha-BHC	319-84-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: beta-BHC	319-85-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: gamma-BHC	58-89-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: delta-BHC	319-86-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Heptachlor	76-44-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Aldrin	309-00-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Heptachlor epoxide	1024-57-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: alpha-Endosulfan	959-98-8	0.5	mg/kg	<0.5	0.6	22.1	No Limit
		EP075: 4.4`-DDE	72-55-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Dieldrin	60-57-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Endrin	72-20-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: beta-Endosulfan	33213-65-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4.4`-DDD	72-54-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Endosulfan sulfate	1031-07-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: 4.4`-DDT	50-29-3	0.5	mg/kg	<1.0	<1.0	0.00	No Limit
EP075J: Organophosphorus Pesticides (QC Lot: 2690636)									
ES1936183-029	VC12_0.0-0.5	EP075: Dichlorvos	62-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Dimethoate	60-51-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Diazinon	333-41-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Chlorpyrifos-methyl	5598-13-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Malathion	121-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Fenthion	55-38-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Chlorpyrifos	2921-88-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Pirimphos-ethyl	23505-41-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Chlorfenvinphos	470-90-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Prothiofos	34643-46-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Ethion	563-12-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2684261)									
ES1935800-011	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EW1904707-002	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2687451)									
ES1936325-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1936325-005	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2684261)									
ES1935800-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EW1904707-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2687451)									
ES1936325-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1936325-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP080: BTEXN (QC Lot: 2684261)									
ES1935800-011	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EW1904707-002	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 2687451)									
ES1936325-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1936325-005	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 2685373)									
ES1936183-029	VC12_0.0-0.5	EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<6	<6	0.00	No Limit
		EP071-SD: C15 - C28 Fraction	----	3	mg/kg	109	109	0.00	No Limit
		EP071-SD: C10 - C36 Fraction (sum)	----	3	mg/kg	221	222	0.451	0% - 50%
		EP071-SD: C29 - C36 Fraction	----	5	mg/kg	112	113	0.00	No Limit
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QC Lot: 2687455)									
ES1936183-029	VC12_0.0-0.5	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
ES1936700-012	Anonymous	EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	<3	0.00	No Limit
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons (QC Lot: 2685373)									
ES1936183-029	VC12_0.0-0.5	EP071-SD: >C10 - C16 Fraction	----	3	mg/kg	<12	<12	0.00	No Limit
		EP071-SD: >C16 - C34 Fraction	----	3	mg/kg	185	184	0.00	0% - 50%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons (QC Lot: 2685373) - continued									
ES1936183-029	VC12_0.0-0.5	EP071-SD: >C10 - C40 Fraction (sum)	----	3	mg/kg	257	257	0.00	0% - 20%
		EP071-SD: >C34 - C40 Fraction	----	5	mg/kg	72	73	2.28	No Limit
EP080-SD: BTEXN (QC Lot: 2687455)									
ES1936183-029	VC12_0.0-0.5	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
ES1936700-012	Anonymous	EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP090: Organotin Compounds (QC Lot: 2689830)									
ES1936183-040	VC08_1.0-1.5	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.00	No Limit
EP090: Organotin Compounds (QC Lot: 2698344)									
EM1919013-021	Anonymous	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	4.8	3.5	30.2	No Limit
ES1936183-029	VC12_0.0-0.5	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	6.9	5.3	26.4	0% - 50%
EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 2685368)									
ES1936183-029	VC12_0.0-0.5	EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Carbophenothion	786-19-6	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Chlorfenvinphos (E)	18708-86-6	10	µg/kg	<10.0	<10.0	0.00	No Limit
		EP130: Chlorfenvinphos (Z)	18708-87-7	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Diazinon	333-41-5	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Dichlorvos	62-73-7	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Dimethoate	60-51-5	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Ethion	563-12-2	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Fenthion	55-38-9	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Malathion	121-75-5	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Parathion	56-38-2	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	<10	0.00	No Limit
		EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	<10	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP130A: Organophosphorus Pesticides (Ultra-trace) (QC Lot: 2685368) - continued									
ES1936183-029	VC12_0.0-0.5	EP130: Prothiofos	34643-46-4	10	µg/kg	<10	<10	0.00	No Limit
EP131A: Organochlorine Pesticides (QC Lot: 2685370)									
ES1936183-029	VC12_0.0-0.5	EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	<0.25	0.00	No Limit
		EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	<0.25	0.00	No Limit
		EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	<0.25	0.00	No Limit
		EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	<0.25	0.00	No Limit
		EP131A: Aldrin	309-00-2	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: alpha-BHC	319-84-6	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: beta-BHC	319-85-7	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: delta-BHC	319-86-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: 4.4`-DDD	72-54-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: 4.4`-DDE	72-55-9	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: 4.4`-DDT	50-29-3	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Dieldrin	60-57-1	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: alpha-Endosulfan	959-98-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: beta-Endosulfan	33213-65-9	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endosulfan sulfate	1031-07-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endosulfan (sum)	115-29-7	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endrin	72-20-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endrin aldehyde	7421-93-4	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Endrin ketone	53494-70-5	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Heptachlor	76-44-8	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Heptachlor epoxide	1024-57-3	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
		EP131A: Methoxychlor	72-43-5	0.5	µg/kg	<0.50	<0.50	0.00	No Limit
EP131B: Polychlorinated Biphenyls (as Aroclors) (QC Lot: 2685369)									
ES1936183-029	VC12_0.0-0.5	EP131B: Total Polychlorinated biphenyls	----	5	µg/kg	34.6	37.1	6.96	No Limit
		EP131B: Aroclor 1016	12674-11-2	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1221	11104-28-2	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1232	11141-16-5	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1242	53469-21-9	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1248	12672-29-6	5	µg/kg	<5.0	<5.0	0.00	No Limit
		EP131B: Aroclor 1254	11097-69-1	5	µg/kg	34.6	37.1	6.90	No Limit
		EP131B: Aroclor 1260	11096-82-5	5	µg/kg	<5.0	<5.0	0.00	No Limit
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2685372)									
ES1936183-029	VC12_0.0-0.5	EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	60	73	19.2	0% - 50%
		EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	5	0.00	No Limit
		EP132B-SD: Fluorene	86-73-7	4	µg/kg	8	13	45.8	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2685372) - continued									
ES1936183-029	VC12_0.0-0.5	EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	96	102	6.92	0% - 20%
		EP132B-SD: Anthracene	120-12-7	4	µg/kg	37	49	28.0	0% - 50%
		EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	201	231	13.9	0% - 20%
		EP132B-SD: Pyrene	129-00-0	4	µg/kg	217	244	12.1	0% - 20%
		EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	147	171	15.3	0% - 20%
		EP132B-SD: Chrysene	218-01-9	4	µg/kg	122	133	8.70	0% - 20%
		EP132B-SD: Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	226	268	16.9	0% - 20%
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	116	129	10.3	0% - 20%
		EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	117	132	12.6	0% - 20%
		EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	255	291	13.3	0% - 20%
		EP132B-SD: Perylene	198-55-0	4	µg/kg	55	63	12.8	0% - 50%
		EP132B-SD: Benzo(g.h.i)perylene	191-24-2	4	µg/kg	197	213	7.57	0% - 20%
		EP132B-SD: Dibenz(a.h)anthracene	53-70-3	4	µg/kg	40	44	10.2	0% - 50%
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	155	168	8.27	0% - 20%
		EP132B-SD: Sum of PAHs	----	4	µg/kg	2180	2460	11.7	0% - 20%
		EP132B-SD: Naphthalene	91-20-3	5	µg/kg	10	11	14.0	No Limit
		EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	<5	0.00	No Limit
		EP132B-SD: Coronene	191-07-1	5	µg/kg	126	117	6.80	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 2682925)									
EP1911242-021	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.026	132	No Limit
ES1936242-004	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	1.47	1.49	1.35	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.027	0.026	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2687534)									
ES1936219-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2683791)									
EP1911242-021	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2683791) - continued									
EP1911368-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2683791)									
EP1911242-021	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1911368-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2683791)									
EP1911242-021	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1911368-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES (QCLot: 2691340)								
EG005-SD: Aluminium	7429-90-5	50	mg/kg	<50	6134 mg/kg	102	88.2	136
EG005-SD: Iron	7439-89-6	50	mg/kg	<50	8400 mg/kg	71.8	70.0	109
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2691120)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	101	86.0	126
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	104	90.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	85.7	83.0	113
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	96.3	80.0	114
EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	----	----	----	----
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	100	87.0	123
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	131	75.0	131
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.1 mg/kg	94.2	77.0	117
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 2691342)								
EG035T-LL: Mercury	7439-97-6	0.01	mg/kg	<0.01	0.257 mg/kg	91.2	72.0	116
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2691341)								
EG020-SD: Antimony	7440-36-0	0.5	mg/kg	<0.50	4.6 mg/kg	82.6	70.0	130
EG020-SD: Arsenic	7440-38-2	1	mg/kg	<1.00	21.7 mg/kg	90.5	80.0	139
EG020-SD: Cadmium	7440-43-9	0.1	mg/kg	<0.1	4.64 mg/kg	88.4	83.0	127
EG020-SD: Chromium	7440-47-3	1	mg/kg	<1.0	43.9 mg/kg	73.9	73.0	130
EG020-SD: Copper	7440-50-8	1	mg/kg	<1.0	32 mg/kg	89.7	76.0	130
EG020-SD: Cobalt	7440-48-4	0.5	mg/kg	<0.5	16 mg/kg	94.4	81.0	130
EG020-SD: Lead	7439-92-1	1	mg/kg	<1.0	40 mg/kg	91.0	74.0	130
EG020-SD: Manganese	7439-96-5	10	mg/kg	<10	130 mg/kg	92.9	76.0	130
EG020-SD: Nickel	7440-02-0	1	mg/kg	<1.0	55 mg/kg	86.3	83.0	130
EG020-SD: Selenium	7782-49-2	0.1	mg/kg	<0.1	5.37 mg/kg	118	71.0	130
EG020-SD: Silver	7440-22-4	0.1	mg/kg	<0.1	4 mg/kg	81.8	64.0	148
EG020-SD: Vanadium	7440-62-2	2	mg/kg	<2.0	29.6 mg/kg	94.6	84.0	131
EG020-SD: Zinc	7440-66-6	1	mg/kg	<1.0	60.8 mg/kg	93.4	82.0	137
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2691119)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	82.0	70.0	105
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 2684699)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	20 mg/kg	101	68.0	114
				<0.5	40 mg/kg	82.8	68.0	114
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2682540)								
EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	40 mg/kg	107	81.0	129

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser (QCLot: 2682539)								
EK028SF: Weak Acid Dissociable Cyanide	----	1	mg/kg	<1	40 mg/kg	107	70.0	130
EK040T: Fluoride Total (QCLot: 2685561)								
EK040T: Fluoride	16984-48-8	40	mg/kg	<40	400 mg/kg	85.2	67.2	96.3
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 2690237)								
EP003: Total Organic Carbon	----	0.02	%	<0.02	8.4 %	101	70.0	130
				<0.02	0.48 %	111	70.0	130
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 2693466)								
EP003: Total Organic Carbon	----	0.02	%	<0.02	0.44 %	97.8	70.0	130
				<0.02	0.48 %	91.3	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2682735)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	108	62.0	126
EP068A: Organochlorine Pesticides (OC) (QCLot: 2682733)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	86.3	69.0	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	88.6	65.0	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	88.3	67.0	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	86.1	68.0	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	85.6	65.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	84.4	67.0	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	86.3	69.0	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	87.6	62.0	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	84.9	63.0	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	84.6	66.0	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	84.9	64.0	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	78.9	66.0	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	85.9	67.0	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	83.5	67.0	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	86.2	69.0	115
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	85.0	69.0	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	77.3	56.0	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	86.0	62.0	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	86.2	66.0	120
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2682733)								
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	81.0	76.0	118
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2682734)								
EP071SG-S: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	93.3	80.0	116
EP071SG-S: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	93.5	85.0	115
EP071SG-S: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	99.9	75.0	123
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2682734)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2682734) - continued								
EP071SG-S: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	96.2	89.0	109
EP071SG-S: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	93.3	84.0	112
EP071SG-S: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	110	71.0	119
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 2684260)								
EP074: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	96.2	71.0	121
EP074: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	90.1	65.0	131
EP074: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	89.1	72.0	114
EP074: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	89.6	70.0	116
EP074: Styrene	100-42-5	0.5	mg/kg	<0.5	1 mg/kg	91.5	67.0	113
EP074: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	88.9	75.0	115
EP074B: Oxygenated Compounds (QCLot: 2684260)								
EP074: 2-Butanone (MEK)	78-93-3	5	mg/kg	<5	10 mg/kg	96.8	58.0	136
EP074E: Halogenated Aliphatic Compounds (QCLot: 2684260)								
EP074: Vinyl chloride	75-01-4	5	mg/kg	<5	10 mg/kg	56.9	43.0	147
EP074: 1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	1 mg/kg	89.0	54.0	126
EP074: Methylene chloride	75-09-2	0.5	mg/kg	<0.5	1 mg/kg	106	58.0	148
EP074: 1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	1 mg/kg	80.2	65.0	117
EP074: Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	1 mg/kg	76.9	59.0	125
EP074: 1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	1 mg/kg	76.3	65.0	125
EP074: Trichloroethene	79-01-6	0.5	mg/kg	<0.5	1 mg/kg	86.3	70.0	118
EP074: 1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	1 mg/kg	95.2	64.0	126
EP074: Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	1 mg/kg	81.8	67.0	143
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	1 mg/kg	86.3	62.0	122
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	1 mg/kg	91.0	65.0	121
EP074F: Halogenated Aromatic Compounds (QCLot: 2684260)								
EP074: Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	1 mg/kg	89.2	68.0	116
EP074G: Trihalomethanes (QCLot: 2684260)								
EP074: Chloroform	67-66-3	0.5	mg/kg	<0.5	1 mg/kg	83.1	66.0	124
EP075(SIM)A: Phenolic Compounds (QCLot: 2682732)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	6 mg/kg	88.9	71.0	125
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	6 mg/kg	94.2	72.0	124
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	6 mg/kg	94.3	71.0	123
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	12 mg/kg	103	67.0	127
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	6 mg/kg	76.0	54.0	114
EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	6 mg/kg	73.6	68.0	126
EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	6 mg/kg	91.8	66.0	120
EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	6 mg/kg	97.3	70.0	120

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 2682732) - continued								
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	6 mg/kg	90.3	70.0	116
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	6 mg/kg	86.1	54.0	114
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	6 mg/kg	86.2	60.0	114
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	12 mg/kg	11.8	10.0	57.0
EP075(SIM)A: Phenolic Compounds (QCLot: 2682755)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	6 mg/kg	98.7	71.0	125
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	6 mg/kg	99.5	72.0	124
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	6 mg/kg	95.8	71.0	123
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	12 mg/kg	98.1	67.0	127
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	6 mg/kg	77.6	54.0	114
EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	6 mg/kg	79.0	68.0	126
EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	6 mg/kg	94.4	66.0	120
EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	6 mg/kg	98.6	70.0	120
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	6 mg/kg	95.1	70.0	116
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	6 mg/kg	87.3	54.0	114
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	6 mg/kg	81.6	60.0	114
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	12 mg/kg	28.3	10.0	57.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2682732)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	103	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	110	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	101	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	109	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	103	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	103	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	111	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	110	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	96.0	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	94.0	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	86.4	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	101	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	102	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	88.0	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	87.6	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	81.3	63.0	121
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2682755)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	103	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	104	72.0	124

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2682755) - continued								
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	103	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	104	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	108	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	108	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	106	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	105	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	103	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	106	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	90.0	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	106	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	106	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	92.5	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	86.6	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	102	63.0	121
EP075A: Phenolic Compounds (QCLot: 2690636)								
EP075: Phenol	108-95-2	0.5	mg/kg	<0.5	1.5 mg/kg	93.2	64.0	114
EP075: 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	1.5 mg/kg	93.0	57.0	115
EP075: 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	1.5 mg/kg	90.7	55.0	117
EP075: 3- & 4-Methylphenol	1319-77-3	0.5	mg/kg	<0.5	1.5 mg/kg	89.1	46.0	122
EP075: 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	1.5 mg/kg	82.4	47.0	117
EP075: 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	1.5 mg/kg	86.8	13.7	108
EP075: 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	1.5 mg/kg	84.4	47.0	105
EP075: 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	1.5 mg/kg	81.4	48.0	110
EP075: 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	1.5 mg/kg	95.1	57.0	113
EP075: 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	1.5 mg/kg	80.8	49.0	109
EP075: 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	1.5 mg/kg	82.3	49.0	107
EP075: Pentachlorophenol	87-86-5	1	mg/kg	<1	3 mg/kg	18.4	12.0	76.0
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 2690636)								
EP075: Naphthalene	91-20-3	0.5	mg/kg	<0.5	1.5 mg/kg	92.5	62.0	118
EP075: 2-Methylnaphthalene	91-57-6	0.5	mg/kg	<0.5	1.5 mg/kg	92.9	58.0	116
EP075: 2-Chloronaphthalene	91-58-7	0.5	mg/kg	<0.5	1.5 mg/kg	92.0	54.0	112
EP075: Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	1.5 mg/kg	96.8	56.0	114
EP075: Acenaphthene	83-32-9	0.5	mg/kg	<0.5	1.5 mg/kg	94.9	62.0	112
EP075: Fluorene	86-73-7	0.5	mg/kg	<0.5	1.5 mg/kg	96.9	59.0	115
EP075: Phenanthrene	85-01-8	0.5	mg/kg	<0.5	1.5 mg/kg	89.1	63.0	113
EP075: Anthracene	120-12-7	0.5	mg/kg	<0.5	1.5 mg/kg	94.8	57.0	111
EP075: Fluoranthene	206-44-0	0.5	mg/kg	<0.5	1.5 mg/kg	92.8	58.0	114
EP075: Pyrene	129-00-0	0.5	mg/kg	<0.5	1.5 mg/kg	94.9	57.0	117

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 2690636) - continued								
EP075: N-2-Fluorenyl Acetamide	53-96-3	0.5	mg/kg	<0.5	1.5 mg/kg	81.2	58.0	114
EP075: Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	1.5 mg/kg	92.4	59.0	115
EP075: Chrysene	218-01-9	0.5	mg/kg	<0.5	1.5 mg/kg	97.9	61.0	117
EP075: Benzo(b+j) & Benzo(k)fluoranthene	205-99-2 207-08-9	1	mg/kg	<1	3 mg/kg	79.0	57.0	119
EP075: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.5	mg/kg	<0.5	1.5 mg/kg	81.8	48.1	106
EP075: Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	1.5 mg/kg	75.6	56.0	116
EP075: 3-Methylcholanthrene	56-49-5	0.5	mg/kg	<0.5	1.5 mg/kg	62.4	50.0	116
EP075: Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	1.5 mg/kg	68.7	55.0	117
EP075: Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	1.5 mg/kg	69.9	53.0	119
EP075: Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	1.5 mg/kg	69.1	56.0	120
EP075C: Phthalate Esters (QCLot: 2690636)								
EP075: Dimethyl phthalate	131-11-3	0.5	mg/kg	<0.5	1.5 mg/kg	99.4	60.0	118
EP075: Diethyl phthalate	84-66-2	0.5	mg/kg	<0.5	1.5 mg/kg	96.0	65.0	115
EP075: Di-n-butyl phthalate	84-74-2	0.5	mg/kg	<0.5	1.5 mg/kg	93.4	65.0	121
EP075: Butyl benzyl phthalate	85-68-7	0.5	mg/kg	<0.5	1.5 mg/kg	93.8	62.0	116
EP075: bis(2-ethylhexyl) phthalate	117-81-7	----	mg/kg	----	1.5 mg/kg	83.9	69.0	133
EP075: Di-n-octylphthalate	117-84-0	0.5	mg/kg	<0.5	1.5 mg/kg	80.7	62.0	124
EP075D: Nitrosamines (QCLot: 2690636)								
EP075: N-Nitrosomethylethylamine	10595-95-6	0.5	mg/kg	<0.5	1.5 mg/kg	106	39.4	124
EP075: N-Nitrosodiethylamine	55-18-5	0.5	mg/kg	<0.5	1.5 mg/kg	90.9	59.0	117
EP075: N-Nitrosopyrrolidine	930-55-2	0.5	mg/kg	<0.5	1.5 mg/kg	94.5	53.0	125
EP075: N-Nitrosomorpholine	59-89-2	0.5	mg/kg	<0.5	1.5 mg/kg	95.0	65.0	121
EP075: N-Nitrosodi-n-propylamine	621-64-7	0.5	mg/kg	<0.5	1.5 mg/kg	97.1	59.0	123
EP075: N-Nitrosopiperidine	100-75-4	0.5	mg/kg	<0.5	1.5 mg/kg	89.8	57.0	115
EP075: N-Nitrosodibutylamine	924-16-3	0.5	mg/kg	<0.5	1.5 mg/kg	88.5	57.0	119
EP075: N-Nitrosodiphenyl & Diphenylamine	86-30-6 122-39-4	0.5	mg/kg	<0.6	3 mg/kg	95.4	42.0	112
EP075: Methapyrilene	91-80-5	0.5	mg/kg	<0.5	1.5 mg/kg	66.5	16.3	123
EP075E: Nitroaromatics and Ketones (QCLot: 2690636)								
EP075: 2-Picoline	109-06-8	0.5	mg/kg	<0.5	1.5 mg/kg	106	27.3	129
EP075: Acetophenone	98-86-2	0.5	mg/kg	<0.5	1.5 mg/kg	94.3	60.0	116
EP075: Nitrobenzene	98-95-3	0.5	mg/kg	<0.5	1.5 mg/kg	89.9	65.0	119
EP075: Isophorone	78-59-1	0.5	mg/kg	<0.5	1.5 mg/kg	87.5	62.0	116
EP075: 2.6-Dinitrotoluene	606-20-2	0.5	mg/kg	<0.5	1.5 mg/kg	96.6	58.0	118
EP075: 2.4-Dinitrotoluene	121-14-2	0.5	mg/kg	<0.5	1.5 mg/kg	93.4	59.0	115
EP075: 1-Naphthylamine	134-32-7	0.5	mg/kg	<0.5	1.5 mg/kg	33.2	18.0	112
EP075: 4-Nitroquinoline-N-oxide	56-57-5	0.5	mg/kg	<0.5	1.5 mg/kg	65.0	10.0	87.0

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075E: Nitroaromatics and Ketones (QCLot: 2690636) - continued								
EP075: 5-Nitro-o-toluidine	99-55-8	0.5	mg/kg	<0.5	1.5 mg/kg	93.1	48.3	98.5
EP075: Azobenzene	103-33-3	1	mg/kg	<1	1.5 mg/kg	94.0	62.0	118
EP075: 1.3.5-Trinitrobenzene	99-35-4	0.5	mg/kg	<0.5	1.5 mg/kg	63.6	36.0	114
EP075: Phenacetin	62-44-2	0.5	mg/kg	<0.5	1.5 mg/kg	94.0	62.0	114
EP075: 4-Aminobiphenyl	92-67-1	0.5	mg/kg	<0.5	1.5 mg/kg	82.3	36.1	102
EP075: Pentachloronitrobenzene	82-68-8	0.5	mg/kg	<0.5	1.5 mg/kg	93.4	56.0	110
EP075: Pronamide	23950-58-5	0.5	mg/kg	<0.5	1.5 mg/kg	87.2	54.0	110
EP075: Dimethylaminoazobenzene	60-11-7	0.5	mg/kg	<0.5	1.5 mg/kg	86.8	48.0	108
EP075: Chlorobenzilate	510-15-6	0.5	mg/kg	<0.5	1.5 mg/kg	87.7	57.4	112
EP075F: Haloethers (QCLot: 2690636)								
EP075: Bis(2-chloroethyl) ether	111-44-4	0.5	mg/kg	<0.5	1.5 mg/kg	75.2	63.0	121
EP075: Bis(2-chloroethoxy) methane	111-91-1	0.5	mg/kg	<0.5	1.5 mg/kg	87.6	59.0	115
EP075: 4-Chlorophenyl phenyl ether	7005-72-3	0.5	mg/kg	<0.5	1.5 mg/kg	96.1	58.0	112
EP075: 4-Bromophenyl phenyl ether	101-55-3	0.5	mg/kg	<0.5	1.5 mg/kg	98.1	58.0	110
EP075G: Chlorinated Hydrocarbons (QCLot: 2690636)								
EP075: 1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	<0.5	1.5 mg/kg	91.3	58.0	112
EP075: 1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	<0.5	1.5 mg/kg	94.5	58.0	116
EP075: 1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	<0.5	1.5 mg/kg	94.4	57.0	115
EP075: Hexachloroethane	67-72-1	0.5	mg/kg	<0.5	1.5 mg/kg	91.3	54.0	116
EP075: 1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	<0.5	1.5 mg/kg	92.9	62.9	108
EP075: Hexachloropropylene	1888-71-7	0.5	mg/kg	<0.5	1.5 mg/kg	72.2	39.1	110
EP075: Hexachlorobutadiene	87-68-3	0.5	mg/kg	<0.5	1.5 mg/kg	94.7	59.0	117
EP075: Hexachlorocyclopentadiene	77-47-4	2.5	mg/kg	<2.5	1.5 mg/kg	35.9	24.3	108
EP075: Pentachlorobenzene	608-93-5	0.5	mg/kg	<0.5	1.5 mg/kg	91.0	57.0	109
EP075: Hexachlorobenzene (HCB)	118-74-1	0.5	mg/kg	<0.5	1.5 mg/kg	94.3	59.0	111
EP075H: Anilines and Benzidines (QCLot: 2690636)								
EP075: Aniline	62-53-3	0.5	mg/kg	<0.5	1.5 mg/kg	82.8	13.2	108
EP075: 4-Chloroaniline	106-47-8	0.5	mg/kg	<0.5	1.5 mg/kg	40.9	20.5	99.0
EP075: 2-Nitroaniline	88-74-4	0.5	mg/kg	<0.5	1.5 mg/kg	95.8	52.0	112
EP075: 3-Nitroaniline	99-09-2	0.5	mg/kg	<0.5	1.5 mg/kg	78.5	31.5	93.7
EP075: Dibenzofuran	132-64-9	0.5	mg/kg	<0.5	1.5 mg/kg	94.6	60.0	110
EP075: 4-Nitroaniline	100-01-6	0.5	mg/kg	<0.5	1.5 mg/kg	84.6	42.0	112
EP075: Carbazole	86-74-8	0.5	mg/kg	<0.5	1.5 mg/kg	90.7	59.0	111
EP075: 3.3`-Dichlorobenzidine	91-94-1	0.5	mg/kg	<0.5	1.5 mg/kg	71.9	23.1	113
EP075I: Organochlorine Pesticides (QCLot: 2690636)								
EP075: alpha-BHC	319-84-6	0.5	mg/kg	<0.5	1.5 mg/kg	96.3	63.0	113
EP075: beta-BHC	319-85-7	0.5	mg/kg	<0.5	1.5 mg/kg	91.6	57.0	113
EP075: gamma-BHC	58-89-9	0.5	mg/kg	<0.5	1.5 mg/kg	84.3	61.0	117

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075I: Organochlorine Pesticides (QCLot: 2690636) - continued								
EP075: delta-BHC	319-86-8	0.5	mg/kg	<0.5	1.5 mg/kg	87.5	64.0	118
EP075: Heptachlor	76-44-8	0.5	mg/kg	<0.5	1.5 mg/kg	83.3	55.0	115
EP075: Aldrin	309-00-2	0.5	mg/kg	<0.5	1.5 mg/kg	89.2	61.0	115
EP075: Heptachlor epoxide	1024-57-3	0.5	mg/kg	<0.5	1.5 mg/kg	81.9	56.0	118
EP075: alpha-Endosulfan	959-98-8	0.5	mg/kg	<0.5	1.5 mg/kg	90.7	65.0	125
EP075: 4.4`-DDE	72-55-9	0.5	mg/kg	<0.5	1.5 mg/kg	96.1	60.0	116
EP075: Dieldrin	60-57-1	0.5	mg/kg	<0.5	1.5 mg/kg	90.6	64.0	118
EP075: Endrin	72-20-8	0.5	mg/kg	<0.5	1.5 mg/kg	85.9	53.0	117
EP075: beta-Endosulfan	33213-65-9	0.5	mg/kg	<0.5	1.5 mg/kg	95.7	65.0	115
EP075: 4.4`-DDD	72-54-8	0.5	mg/kg	<0.5	1.5 mg/kg	104	62.0	118
EP075: Endosulfan sulfate	1031-07-8	0.5	mg/kg	<0.5	1.5 mg/kg	97.4	63.0	129
EP075: 4.4`-DDT	50-29-3	0.5	mg/kg	<0.5	1.5 mg/kg	64.4	46.0	122
EP075: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.5	mg/kg	<0.5	----	----	----	----
EP075: Sum of Aldrin + Dieldrin	309-00-2/60- 57-1	0.5	mg/kg	<0.5	----	----	----	----
EP075J: Organophosphorus Pesticides (QCLot: 2690636)								
EP075: Dichlorvos	62-73-7	0.5	mg/kg	<0.5	1.5 mg/kg	83.0	46.0	112
EP075: Dimethoate	60-51-5	0.5	mg/kg	<0.5	1.5 mg/kg	92.4	63.0	119
EP075: Diazinon	333-41-5	0.5	mg/kg	<0.5	1.5 mg/kg	98.2	68.0	134
EP075: Chlorpyrifos-methyl	5598-13-0	0.5	mg/kg	<0.5	1.5 mg/kg	93.6	60.0	130
EP075: Malathion	121-75-5	0.5	mg/kg	<0.5	1.5 mg/kg	105	65.0	127
EP075: Fenthion	55-38-9	0.5	mg/kg	<0.5	1.5 mg/kg	95.4	60.0	116
EP075: Chlorpyrifos	2921-88-2	0.5	mg/kg	<0.5	1.5 mg/kg	88.2	63.0	113
EP075: Pirimphos-ethyl	23505-41-1	0.5	mg/kg	<0.5	1.5 mg/kg	92.1	65.0	115
EP075: Chlorfenvinphos	470-90-6	0.5	mg/kg	<0.5	1.5 mg/kg	85.1	59.0	103
EP075: Prothiofos	34643-46-4	0.5	mg/kg	<0.5	1.5 mg/kg	91.6	59.0	119
EP075: Ethion	563-12-2	0.5	mg/kg	<0.5	1.5 mg/kg	97.3	62.0	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2684261)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	74.2	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2687451)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	86.8	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2684261)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	74.1	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2687451)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	86.0	68.4	128
EP080: BTEXN (QCLot: 2684261)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	97.0	62.0	116

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 2684261) - continued								
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	93.1	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	92.2	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	91.7	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	95.5	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	99.6	63.0	119
EP080: BTEXN (QCLot: 2687451)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	92.4	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	87.1	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	83.4	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	82.4	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	90.7	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	82.0	63.0	119
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 2685373)								
EP071-SD: C10 - C14 Fraction	----	3	mg/kg	<3	5 mg/kg	90.0	78.0	118
EP071-SD: C15 - C28 Fraction	----	3	mg/kg	<3	7.5 mg/kg	94.6	84.0	118
EP071-SD: C29 - C36 Fraction	----	5	mg/kg	<5	5 mg/kg	99.8	73.0	119
EP071-SD: C10 - C36 Fraction (sum)	----	3	mg/kg	<3	----	----	----	----
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 2687455)								
EP080-SD: C6 - C9 Fraction	----	3	mg/kg	<3	6.2 mg/kg	73.8	61.0	133
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons (QCLot: 2685373)								
EP071-SD: >C10 - C16 Fraction	----	3	mg/kg	<3	6.25 mg/kg	98.8	70.0	130
EP071-SD: >C16 - C34 Fraction	----	3	mg/kg	<3	8.75 mg/kg	98.1	74.0	138
EP071-SD: >C34 - C40 Fraction	----	5	mg/kg	<5	3.75 mg/kg	76.5	63.0	131
EP071-SD: >C10 - C40 Fraction (sum)	----	3	mg/kg	<3	----	----	----	----
EP080-SD: BTEXN (QCLot: 2687455)								
EP080-SD: Benzene	71-43-2	0.2	mg/kg	<0.2	0.2 mg/kg	99.6	66.0	122
EP080-SD: Toluene	108-88-3	0.2	mg/kg	<0.2	0.2 mg/kg	95.8	70.0	130
EP080-SD: Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	0.2 mg/kg	96.6	66.0	126
EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	0.4 mg/kg	98.3	59.0	129
EP080-SD: ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	0.2 mg/kg	96.1	66.0	126
EP090: Organotin Compounds (QCLot: 2689830)								
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	89.4	52.0	139
EP090: Organotin Compounds (QCLot: 2698344)								
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	135	52.0	139
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 2685368)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 2685368) - continued								
EP130: Bromophos-ethyl	4824-78-6	10	µg/kg	<10	50 µg/kg	82.6	49.0	117
EP130: Carbophenothion	786-19-6	10	µg/kg	<10	50 µg/kg	79.3	54.0	104
EP130: Chlorfenvinphos (E)	18708-86-6	10	µg/kg	<10.0	5 µg/kg	78.1	48.0	156
EP130: Chlorfenvinphos (Z)	18708-87-7	10	µg/kg	<10	50 µg/kg	84.7	53.0	119
EP130: Chlorpyrifos	2921-88-2	10	µg/kg	<10	50 µg/kg	92.8	54.0	112
EP130: Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	50 µg/kg	97.2	52.0	108
EP130: Demeton-S-methyl	919-86-8	10	µg/kg	<10	50 µg/kg	88.3	51.0	109
EP130: Diazinon	333-41-5	10	µg/kg	<10	50 µg/kg	95.8	57.0	121
EP130: Dichlorvos	62-73-7	10	µg/kg	<10	50 µg/kg	80.8	48.0	104
EP130: Dimethoate	60-51-5	10	µg/kg	<10	50 µg/kg	90.0	52.0	120
EP130: Ethion	563-12-2	10	µg/kg	<10	50 µg/kg	92.9	51.0	121
EP130: Fenamiphos	22224-92-6	10	µg/kg	<10	50 µg/kg	89.1	50.0	120
EP130: Fenthion	55-38-9	10	µg/kg	<10	50 µg/kg	97.4	48.0	112
EP130: Malathion	121-75-5	10	µg/kg	<10	50 µg/kg	86.8	51.0	121
EP130: Azinphos Methyl	86-50-0	10	µg/kg	<10	50 µg/kg	94.6	45.0	127
EP130: Monocrotophos	6923-22-4	10	µg/kg	<10	50 µg/kg	84.2	48.0	128
EP130: Parathion	56-38-2	10	µg/kg	<10	50 µg/kg	95.6	49.0	125
EP130: Parathion-methyl	298-00-0	10	µg/kg	<10	50 µg/kg	98.8	51.0	119
EP130: Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	50 µg/kg	81.7	48.0	120
EP130: Prothiofos	34643-46-4	10	µg/kg	<10	50 µg/kg	90.7	51.0	117
EP131A: Organochlorine Pesticides (QCLot: 2685370)								
EP131A: Aldrin	309-00-2	0.5	µg/kg	<0.50	5 µg/kg	78.1	38.0	139
EP131A: alpha-BHC	319-84-6	0.5	µg/kg	<0.50	5 µg/kg	78.4	17.6	136
EP131A: beta-BHC	319-85-7	0.5	µg/kg	<0.50	5 µg/kg	91.2	30.5	131
EP131A: delta-BHC	319-86-8	0.5	µg/kg	<0.50	5 µg/kg	59.0	37.0	140
EP131A: 4.4`-DDD	72-54-8	0.5	µg/kg	<0.50	5 µg/kg	73.9	25.9	141
EP131A: 4.4`-DDE	72-55-9	0.5	µg/kg	<0.50	5 µg/kg	74.5	35.0	129
EP131A: 4.4`-DDT	50-29-3	0.5	µg/kg	<0.50	5 µg/kg	68.3	23.4	138
EP131A: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Dieldrin	60-57-1	0.5	µg/kg	<0.50	5 µg/kg	88.9	30.2	140
EP131A: alpha-Endosulfan	959-98-8	0.5	µg/kg	<0.50	5 µg/kg	74.7	38.0	140
EP131A: beta-Endosulfan	33213-65-9	0.5	µg/kg	<0.50	5 µg/kg	92.5	32.0	152
EP131A: Endosulfan sulfate	1031-07-8	0.5	µg/kg	<0.50	5 µg/kg	67.0	36.0	155
EP131A: Endosulfan (sum)	115-29-7	0.5	µg/kg	<0.50	----	----	----	----
EP131A: Endrin	72-20-8	0.5	µg/kg	<0.50	5 µg/kg	118	25.8	158
EP131A: Endrin aldehyde	7421-93-4	0.5	µg/kg	<0.50	5 µg/kg	78.2	20.1	118
EP131A: Endrin ketone	53494-70-5	0.5	µg/kg	<0.50	5 µg/kg	67.1	13.4	135
EP131A: Heptachlor	76-44-8	0.5	µg/kg	<0.50	5 µg/kg	62.9	39.0	155

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP131A: Organochlorine Pesticides (QCLot: 2685370) - continued								
EP131A: Heptachlor epoxide	1024-57-3	0.5	µg/kg	<0.50	5 µg/kg	90.6	34.0	148
EP131A: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/kg	<0.50	5 µg/kg	85.9	26.1	152
EP131A: gamma-BHC	58-89-9	0.25	µg/kg	<0.25	5 µg/kg	78.5	31.2	137
EP131A: Methoxychlor	72-43-5	0.5	µg/kg	<0.50	5 µg/kg	54.3	36.0	152
EP131A: cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	5 µg/kg	76.2	36.0	142
EP131A: trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	5 µg/kg	82.4	29.5	138
EP131A: Total Chlordane (sum)	----	0.25	µg/kg	<0.25	----	----	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 2685369)								
EP131B: Total Polychlorinated biphenyls	----	5	µg/kg	<5.0	50 µg/kg	64.1	45.0	115
EP131B: Aroclor 1016	12674-11-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1221	11104-28-2	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1232	11141-16-5	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1242	53469-21-9	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1248	12672-29-6	5	µg/kg	<5.0	----	----	----	----
EP131B: Aroclor 1254	11097-69-1	5	µg/kg	<5.0	50 µg/kg	64.1	45.0	115
EP131B: Aroclor 1260	11096-82-5	5	µg/kg	<5.0	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 2685372)								
EP132B-SD: Naphthalene	91-20-3	5	µg/kg	<5	25 µg/kg	92.9	63.0	129
EP132B-SD: 2-Methylnaphthalene	91-57-6	5	µg/kg	<5	25 µg/kg	80.8	64.0	128
EP132B-SD: Acenaphthylene	208-96-8	4	µg/kg	<4	25 µg/kg	81.5	65.0	129
EP132B-SD: Acenaphthene	83-32-9	4	µg/kg	<4	25 µg/kg	84.4	68.0	132
EP132B-SD: Fluorene	86-73-7	4	µg/kg	<4	25 µg/kg	86.4	68.0	124
EP132B-SD: Phenanthrene	85-01-8	4	µg/kg	<4	25 µg/kg	80.1	64.0	134
EP132B-SD: Anthracene	120-12-7	4	µg/kg	<4	25 µg/kg	84.0	65.0	131
EP132B-SD: Fluoranthene	206-44-0	4	µg/kg	<4	25 µg/kg	80.0	64.0	130
EP132B-SD: Pyrene	129-00-0	4	µg/kg	<4	25 µg/kg	88.3	67.0	133
EP132B-SD: Benz(a)anthracene	56-55-3	4	µg/kg	<4	25 µg/kg	78.4	62.0	130
EP132B-SD: Chrysene	218-01-9	4	µg/kg	<4	25 µg/kg	80.6	65.0	133
EP132B-SD: Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	<4	25 µg/kg	96.3	68.0	120
EP132B-SD: Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	25 µg/kg	89.7	61.0	133
EP132B-SD: Benzo(e)pyrene	192-97-2	4	µg/kg	<4	25 µg/kg	96.1	63.0	127
EP132B-SD: Benzo(a)pyrene	50-32-8	4	µg/kg	<4	25 µg/kg	91.6	66.0	118
EP132B-SD: Perylene	198-55-0	4	µg/kg	<4	25 µg/kg	93.3	69.0	119
EP132B-SD: Benzo(g.h.i)perylene	191-24-2	4	µg/kg	<4	25 µg/kg	94.8	66.0	120
EP132B-SD: Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	25 µg/kg	93.2	64.0	122
EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	<4	25 µg/kg	93.7	64.0	120
EP132B-SD: Coronene	191-07-1	5	µg/kg	<5	25 µg/kg	112	68.0	136
EP132B-SD: Sum of PAHs	----	4	µg/kg	<4	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 2682925)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.1	82.0	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.8	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.8	86.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.5	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.6	85.0	115
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.6	84.0	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.8	79.0	117
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2687534)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	97.3	77.0	111
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2681721)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	68.4	50.0	94.0
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	75.1	63.6	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	69.1	62.2	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	75.8	63.9	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	82.0	62.6	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	76.8	64.3	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	97.6	63.6	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	100	63.1	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	82.4	64.1	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	82.2	62.5	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	77.7	61.7	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	74.7	63.0	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	95.9	63.3	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	100	59.9	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	93.3	61.2	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	96.4	59.1	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2681720)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	101	55.8	112
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	91.2	71.6	113
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	96.3	56.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2683791)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	80.6	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2681720)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	66.5	57.9	119
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	95.2	62.5	110
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	81.7	61.5	121
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2683791)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2683791) - continued								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	82.6	75.0	127
EP080: BTEXN (QCLot: 2683791)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	93.5	70.0	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	95.5	69.0	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	99.2	70.0	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	100	69.0	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	101	72.0	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	105	70.0	120

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2691120)							
ES1935800-002	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	94.3	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	101	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	99.1	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	101	70.0	130
EG035T: Total Recoverable Mercury by FIMS (Low Level) (QCLot: 2691342)							
ES1936183-029	VC12_0.0-0.5	EG035T-LL: Mercury	7439-97-6	0.05 mg/kg	128	70.0	130
EG020-SD: Total Metals in Sediments by ICPMS (QCLot: 2691341)							
ES1936183-040	VC08_1.0-1.5	EG020-SD: Arsenic	7440-38-2	50 mg/kg	93.5	70.0	130
		EG020-SD: Cadmium	7440-43-9	50 mg/kg	90.8	70.0	130
		EG020-SD: Chromium	7440-47-3	50 mg/kg	92.3	70.0	130
		EG020-SD: Copper	7440-50-8	250 mg/kg	94.8	70.0	130
		EG020-SD: Lead	7439-92-1	250 mg/kg	99.3	70.0	130
		EG020-SD: Nickel	7440-02-0	50 mg/kg	90.1	70.0	130
		EG020-SD: Zinc	7440-66-6	250 mg/kg	91.8	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2691119)							
ES1935800-002	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	100	70.0	130
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 2684699)							
ES1935800-022	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	# 2.00	70.0	130
ES1935800-022	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	# 2.00	70.0	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2682540)							
ES1935800-011	Anonymous	EK026SF: Total Cyanide	57-12-5	40 mg/kg	115	70.0	130
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser (QCLot: 2682539)							
ES1935800-011	Anonymous	EK028SF: Weak Acid Dissociable Cyanide	----	40 mg/kg	109	70.0	130
EK040T: Fluoride Total (QCLot: 2685561)							
EB1928345-001	Anonymous	EK040T: Fluoride	16984-48-8	400 mg/kg	106	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2682735)							
ES1935800-011	Anonymous	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	121	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 2682733)							
ES1935800-011	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	92.1	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	82.7	70.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	97.0	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	86.4	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	81.2	70.0	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	89.1	70.0	130
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2682734)							
ES1935800-011	Anonymous	EP071SG-S: C10 - C14 Fraction	----	523 mg/kg	108	43.0	139
		EP071SG-S: C15 - C28 Fraction	----	2319 mg/kg	116	49.0	131
		EP071SG-S: C29 - C36 Fraction	----	1714 mg/kg	128	64.0	158
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2682734)							
ES1935800-011	Anonymous	EP071SG-S: >C10 - C16 Fraction	----	860 mg/kg	108	33.0	137
		EP071SG-S: >C16 - C34 Fraction	----	3223 mg/kg	124	40.0	137
		EP071SG-S: >C34 - C40 Fraction	----	1058 mg/kg	110	30.0	190
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 2684260)							
ES1935800-011	Anonymous	EP074: Benzene	71-43-2	2.5 mg/kg	101	70.0	130
		EP074: Toluene	108-88-3	2.5 mg/kg	99.5	70.0	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 2684260)							
ES1935800-011	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	2.5 mg/kg	97.9	70.0	130
		EP074: Trichloroethene	79-01-6	2.5 mg/kg	93.0	70.0	130
EP074F: Halogenated Aromatic Compounds (QCLot: 2684260)							
ES1935800-011	Anonymous	EP074: Chlorobenzene	108-90-7	2.5 mg/kg	96.0	70.0	130
EP075(SIM)A: Phenolic Compounds (QCLot: 2682732)							
ES1935800-011	Anonymous	EP075(SIM): Phenol	108-95-2	10 mg/kg	88.4	70.0	130
		EP075(SIM): 2-Chlorophenol	95-57-8	10 mg/kg	94.4	70.0	130
		EP075(SIM): 2-Nitrophenol	88-75-5	10 mg/kg	79.7	60.0	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	10 mg/kg	91.6	70.0	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EP075(SIM)A: Phenolic Compounds (QCLot: 2682732) - continued							
ES1935800-011	Anonymous	EP075(SIM): Pentachlorophenol	87-86-5	10 mg/kg	21.4	20.0	130
EP075(SIM)A: Phenolic Compounds (QCLot: 2682755)							
ES1935800-001	Anonymous	EP075(SIM): Phenol	108-95-2	10 mg/kg	89.4	70.0	130
		EP075(SIM): 2-Chlorophenol	95-57-8	10 mg/kg	96.5	70.0	130
		EP075(SIM): 2-Nitrophenol	88-75-5	10 mg/kg	98.1	60.0	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	10 mg/kg	93.1	70.0	130
		EP075(SIM): Pentachlorophenol	87-86-5	10 mg/kg	94.9	20.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2682732)							
ES1935800-011	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	98.8	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	110	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2682755)							
ES1935800-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	99.0	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	114	70.0	130
EP075A: Phenolic Compounds (QCLot: 2690636)							
ES1936183-029	VC12_0.0-0.5	EP075: Phenol	108-95-2	10 mg/kg	104	60.0	130
		EP075: 2-Chlorophenol	95-57-8	10 mg/kg	108	60.0	130
		EP075: 2-Nitrophenol	88-75-5	10 mg/kg	106	50.0	130
		EP075: 4-Chloro-3-methylphenol	59-50-7	10 mg/kg	113	50.0	130
		EP075: Pentachlorophenol	87-86-5	10 mg/kg	60.2	10.0	130
EP075B: Polynuclear Aromatic Hydrocarbons (QCLot: 2690636)							
ES1936183-029	VC12_0.0-0.5	EP075: Acenaphthene	83-32-9	10 mg/kg	101	50.0	130
		EP075: Pyrene	129-00-0	10 mg/kg	106	50.0	130
EP075D: Nitrosamines (QCLot: 2690636)							
ES1936183-029	VC12_0.0-0.5	EP075: N-Nitrosodi-n-propylamine	621-64-7	10 mg/kg	107	50.0	130
EP075E: Nitroaromatics and Ketones (QCLot: 2690636)							
ES1936183-029	VC12_0.0-0.5	EP075: 2.4-Dinitrotoluene	121-14-2	10 mg/kg	105	40.0	130
EP075G: Chlorinated Hydrocarbons (QCLot: 2690636)							
ES1936183-029	VC12_0.0-0.5	EP075: 1.4-Dichlorobenzene	106-46-7	10 mg/kg	107	60.0	130
		EP075: 1.2.4-Trichlorobenzene	120-82-1	10 mg/kg	108	50.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2684261)							
ES1935800-011	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	92.3	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2687451)							
ES1936325-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	93.2	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2684261)							
ES1935800-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	89.0	70.0	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2687451)							
ES1936325-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	93.1	70.0	130
EP080: BTEXN (QCLot: 2684261)							
ES1935800-011	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	105	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	98.5	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	101	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	100	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	101	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	88.6	70.0	130
EP080: BTEXN (QCLot: 2687451)							
ES1936325-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	93.0	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	92.5	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	101	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	100	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	102	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	104	70.0	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 2685373)							
ES1936183-029	VC12_0.0-0.5	EP071-SD: C10 - C14 Fraction	----	14 mg/kg	80.6	70.0	130
		EP071-SD: C15 - C28 Fraction	----	59 mg/kg	110	70.0	130
		EP071-SD: C29 - C36 Fraction	----	42 mg/kg	100	70.0	130
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons (QCLot: 2687455)							
ES1936183-029	VC12_0.0-0.5	EP080-SD: C6 - C9 Fraction	----	6.5 mg/kg	86.6	70.0	130
EP080-SD: BTEXN (QCLot: 2687455)							
ES1936183-029	VC12_0.0-0.5	EP080-SD: Benzene	71-43-2	0.5 mg/kg	87.2	70.0	130
		EP080-SD: Toluene	108-88-3	0.5 mg/kg	87.9	70.0	130
		EP080-SD: Ethylbenzene	100-41-4	0.5 mg/kg	90.9	70.0	130
		EP080-SD: meta- & para-Xylene	108-38-3 106-42-3	0.5 mg/kg	89.5	70.0	130
		EP080-SD: ortho-Xylene	95-47-6	0.5 mg/kg	91.2	70.0	130
EP090: Organotin Compounds (QCLot: 2698344)							
EM1919013-022	Anonymous	EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	# 866	20.0	130
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 2685368)							
ES1936183-029	VC12_0.0-0.5	EP130: Bromophos-ethyl	4824-78-6	50 µg/kg	66.1	36.0	144
		EP130: Carbophenothion	786-19-6	50 µg/kg	54.0	38.0	120
		EP130: Chlorfenvinphos (E)	18708-86-6	5 µg/kg	63.6	49.0	157
		EP130: Chlorfenvinphos (Z)	18708-87-7	50 µg/kg	58.3	53.0	145

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 2685368) - continued							
ES1936183-029	VC12_0.0-0.5	EP130: Chlorpyrifos	2921-88-2	50 µg/kg	65.0	60.0	140
		EP130: Chlorpyrifos-methyl	5598-13-0	50 µg/kg	73.1	56.0	126
		EP130: Demeton-S-methyl	919-86-8	50 µg/kg	64.8	9.70	148
		EP130: Diazinon	333-41-5	50 µg/kg	67.7	60.0	122
		EP130: Dichlorvos	62-73-7	50 µg/kg	61.1	33.0	123
		EP130: Dimethoate	60-51-5	50 µg/kg	66.1	36.0	142
		EP130: Ethion	563-12-2	50 µg/kg	52.4	48.0	136
		EP130: Fenamiphos	22224-92-6	50 µg/kg	55.2	42.0	136
		EP130: Fenthion	55-38-9	50 µg/kg	65.4	35.0	131
		EP130: Malathion	121-75-5	50 µg/kg	59.5	55.0	141
		EP130: Azinphos Methyl	86-50-0	50 µg/kg	57.2	23.5	132
		EP130: Monocrotophos	6923-22-4	50 µg/kg	55.0	35.0	153
		EP130: Parathion	56-38-2	50 µg/kg	60.5	57.0	147
		EP130: Parathion-methyl	298-00-0	50 µg/kg	63.4	48.0	140
		EP130: Pirimphos-ethyl	23505-41-1	50 µg/kg	53.0	45.0	137
		EP130: Prothiofos	34643-46-4	50 µg/kg	57.0	51.0	137
EP131A: Organochlorine Pesticides (QCLot: 2685370)							
ES1936183-029	VC12_0.0-0.5	EP131A: Aldrin	309-00-2	5 µg/kg	66.5	23.4	153
		EP131A: alpha-BHC	319-84-6	5 µg/kg	52.8	17.6	156
		EP131A: beta-BHC	319-85-7	5 µg/kg	70.6	24.9	153
		EP131A: delta-BHC	319-86-8	5 µg/kg	63.4	25.2	147
		EP131A: 4.4`-DDD	72-54-8	5 µg/kg	55.5	25.9	150
		EP131A: 4.4`-DDE	72-55-9	5 µg/kg	65.4	31.2	125
		EP131A: 4.4`-DDT	50-29-3	5 µg/kg	89.0	23.4	163
		EP131A: Dieldrin	60-57-1	5 µg/kg	54.6	30.2	140
		EP131A: alpha-Endosulfan	959-98-8	5 µg/kg	49.8	28.8	135
		EP131A: beta-Endosulfan	33213-65-9	5 µg/kg	58.4	22.6	141
		EP131A: Endosulfan sulfate	1031-07-8	5 µg/kg	50.7	16.1	156
		EP131A: Endrin	72-20-8	5 µg/kg	86.4	17.7	162
		EP131A: Endrin aldehyde	7421-93-4	5 µg/kg	56.8	20.1	116
		EP131A: Endrin ketone	53494-70-5	5 µg/kg	45.1	13.4	151
		EP131A: Heptachlor	76-44-8	5 µg/kg	49.7	23.8	170
		EP131A: Heptachlor epoxide	1024-57-3	5 µg/kg	57.3	28.3	140
		EP131A: Hexachlorobenzene (HCB)	118-74-1	5 µg/kg	61.0	17.7	144
		EP131A: gamma-BHC	58-89-9	5 µg/kg	52.6	21.8	158
		EP131A: Methoxychlor	72-43-5	5 µg/kg	62.6	24.4	158
		EP131A: cis-Chlordane	5103-71-9	5 µg/kg	65.7	27.3	139
		EP131A: trans-Chlordane	5103-74-2	5 µg/kg	54.5	29.5	138
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 2685369)							

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 2685369) - continued							
ES1936183-040	VC08_1.0-1.5	EP131B: Total Polychlorinated biphenyls	----	50 µg/kg	66.4	44.0	136
		EP131B: Aroclor 1254	11097-69-1	50 µg/kg	66.4	44.0	136
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 2685372)							
ES1936183-029	VC12_0.0-0.5	EP132B-SD: Naphthalene	91-20-3	25 µg/kg	116	70.0	130
		EP132B-SD: 2-Methylnaphthalene	91-57-6	25 µg/kg	95.3	70.0	130
		EP132B-SD: Acenaphthylene	208-96-8	25 µg/kg	105	70.0	130
		EP132B-SD: Acenaphthene	83-32-9	25 µg/kg	98.6	70.0	130
		EP132B-SD: Fluorene	86-73-7	25 µg/kg	117	70.0	130
		EP132B-SD: Phenanthrene	85-01-8	25 µg/kg	81.9	70.0	130
		EP132B-SD: Anthracene	120-12-7	25 µg/kg	88.1	70.0	130
		EP132B-SD: Fluoranthene	206-44-0	25 µg/kg	# Not Determined	70.0	130
		EP132B-SD: Pyrene	129-00-0	25 µg/kg	# Not Determined	70.0	130
		EP132B-SD: Benz(a)anthracene	56-55-3	25 µg/kg	# Not Determined	70.0	130
		EP132B-SD: Chrysene	218-01-9	25 µg/kg	71.3	70.0	130
		EP132B-SD: Benzo(b+j)fluoranthene	205-99-2 205-82-3	25 µg/kg	# Not Determined	70.0	130
		EP132B-SD: Benzo(k)fluoranthene	207-08-9	25 µg/kg	82.7	70.0	130
		EP132B-SD: Benzo(e)pyrene	192-97-2	25 µg/kg	93.0	70.0	130
		EP132B-SD: Benzo(a)pyrene	50-32-8	25 µg/kg	# Not Determined	70.0	130
		EP132B-SD: Perylene	198-55-0	25 µg/kg	101	70.0	130
		EP132B-SD: Benzo(g.h.i)perylene	191-24-2	25 µg/kg	# Not Determined	70.0	130
		EP132B-SD: Dibenz(a.h)anthracene	53-70-3	25 µg/kg	89.6	70.0	130
		EP132B-SD: Indeno(1.2.3.cd)pyrene	193-39-5	25 µg/kg	# Not Determined	70.0	130
		EP132B-SD: Coronene	191-07-1	25 µg/kg	123	70.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EG020T: Total Metals by ICP-MS (QCLot: 2682925)							
ES1936183-062	RIN_02	EG020A-T: Arsenic	7440-38-2	1 mg/L	96.7	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	99.1	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	102	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	95.3	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	99.4	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 2682925) - continued							
ES1936183-062	RIN_02	EG020A-T: Nickel	7440-02-0	1 mg/L	95.8	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	96.1	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2687534)							
EP1911242-021	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	90.3	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2683791)							
EP1911242-021	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	97.4	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2683791)							
EP1911242-021	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	96.5	70.0	130
EP080: BTEXN (QCLot: 2683791)							
EP1911242-021	Anonymous	EP080: Benzene	71-43-2	25 µg/L	101	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	96.1	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	99.5	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	99.3	70.0	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	102	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	84.0	70.0	130

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
			Client sampling date / time	31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EP075J: Organophosphorus Pesticides - Continued								
Dichlorvos	62-73-7	0.5	mg/kg	<0.5	----	----	----	----
Dimethoate	60-51-5	0.5	mg/kg	<0.5	----	----	----	----
Diazinon	333-41-5	0.5	mg/kg	<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	mg/kg	<0.5	----	----	----	----
Malathion	121-75-5	0.5	mg/kg	<0.5	----	----	----	----
Fenthion	55-38-9	0.5	mg/kg	<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	mg/kg	<0.5	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	mg/kg	<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	mg/kg	<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	mg/kg	<0.5	----	----	----	----
Ethion	563-12-2	0.5	mg/kg	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	<10	<10	----	<10
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	<10	----	<10
>C10 - C16 Fraction	----	3	mg/kg	<3	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	----	----	----	<10
>C16 - C34 Fraction	----	3	mg/kg	**66**	----	----	----	----
>C34 - C40 Fraction	----	5	mg/kg	**48**	----	----	----	----
>C10 - C40 Fraction (sum)	----	3	mg/kg	**114**	----	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	3	mg/kg	<3	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	----	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	----	----	----	**8.3**	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	**1.5**	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	**8.3**	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	**3.6**	<0.5
^ Total Xylenes	----	0.5	mg/kg	----	----	----	**11.9**	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	**21.7**	<0.2
Naphthalene	91-20-3	1	mg/kg	----	----	----	<1	<1
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	3	mg/kg	<3	----	----	----	----

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

			Client sample ID	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
			Client sampling date / time	31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	3	mg/kg	<3	----	----	----	----
C15 - C28 Fraction	----	3	mg/kg	**18**	----	----	----	----
C29 - C36 Fraction	----	5	mg/kg	**70**	----	----	----	----
^ C10 - C36 Fraction (sum)	----	3	mg/kg	**88**	----	----	----	----
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons								
C6 - C10 Fraction	C6_C10	3	mg/kg	<3	----	----	----	----
C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	3.0	mg/kg	<3.0	----	----	----	----
EP080-SD: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.2	mg/kg	<0.2	----	----	----	----
Ethylbenzene	100-41-4	0.2	mg/kg	<0.2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.2	mg/kg	<0.2	----	----	----	----
ortho-Xylene	95-47-6	0.2	mg/kg	<0.2	----	----	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	----	----	----
Naphthalene	91-20-3	0.2	mg/kg	<0.2	----	----	----	----
EP090: Organotin Compounds								
Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	----	----	----	----
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	10	µg/kg	<10	----	----	----	----
Carbophenothion	786-19-6	10	µg/kg	<10	----	----	----	----
Chlorfenvinphos (E)	18708-86-6	10.0	µg/kg	<10.0	----	----	----	----
Chlorfenvinphos (Z)	18708-87-7	10	µg/kg	<10	----	----	----	----
Chlorpyrifos	2921-88-2	10	µg/kg	<10	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	10	µg/kg	<10	----	----	----	----
Demeton-S-methyl	919-86-8	10	µg/kg	<10	----	----	----	----
Diazinon	333-41-5	10	µg/kg	<10	----	----	----	----
Dichlorvos	62-73-7	10	µg/kg	<10	----	----	----	----
Dimethoate	60-51-5	10	µg/kg	<10	----	----	----	----
Ethion	563-12-2	10	µg/kg	<10	----	----	----	----
Fenamiphos	22224-92-6	10	µg/kg	<10	----	----	----	----
Fenthion	55-38-9	10	µg/kg	<10	----	----	----	----
Malathion	121-75-5	10	µg/kg	<10	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
			Client sampling date / time	31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EP130A: Organophosphorus Pesticides (Ultra-trace) - Continued								
Azinphos Methyl	86-50-0	10	µg/kg	<10	----	----	----	----
Monocrotophos	6923-22-4	10	µg/kg	<10	----	----	----	----
Parathion	56-38-2	10	µg/kg	<10	----	----	----	----
Parathion-methyl	298-00-0	10	µg/kg	<10	----	----	----	----
Pirimphos-ethyl	23505-41-1	10	µg/kg	<10	----	----	----	----
Prothiofos	34643-46-4	10	µg/kg	<10	----	----	----	----
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.50	µg/kg	<0.50	----	----	----	----
alpha-BHC	319-84-6	0.50	µg/kg	<0.50	----	----	----	----
beta-BHC	319-85-7	0.50	µg/kg	<0.50	----	----	----	----
delta-BHC	319-86-8	0.50	µg/kg	<0.50	----	----	----	----
4.4`-DDD	72-54-8	0.50	µg/kg	<0.50	----	----	----	----
4.4`-DDE	72-55-9	0.50	µg/kg	<0.50	----	----	----	----
4.4`-DDT	50-29-3	0.50	µg/kg	<0.50	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.50	µg/kg	<0.50	----	----	----	----
Dieldrin	60-57-1	0.50	µg/kg	<0.50	----	----	----	----
alpha-Endosulfan	959-98-8	0.50	µg/kg	<0.50	----	----	----	----
beta-Endosulfan	33213-65-9	0.50	µg/kg	<0.50	----	----	----	----
Endosulfan sulfate	1031-07-8	0.50	µg/kg	<0.50	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.50	µg/kg	<0.50	----	----	----	----
Endrin	72-20-8	0.50	µg/kg	<0.50	----	----	----	----
Endrin aldehyde	7421-93-4	0.50	µg/kg	<0.50	----	----	----	----
Endrin ketone	53494-70-5	0.50	µg/kg	<0.50	----	----	----	----
Heptachlor	76-44-8	0.50	µg/kg	<0.50	----	----	----	----
Heptachlor epoxide	1024-57-3	0.50	µg/kg	<0.50	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.50	µg/kg	<0.50	----	----	----	----
gamma-BHC	58-89-9	0.25	µg/kg	<0.25	----	----	----	----
Methoxychlor	72-43-5	0.50	µg/kg	<0.50	----	----	----	----
cis-Chlordane	5103-71-9	0.25	µg/kg	<0.25	----	----	----	----
trans-Chlordane	5103-74-2	0.25	µg/kg	<0.25	----	----	----	----
^ Total Chlordane (sum)	----	0.25	µg/kg	<0.25	----	----	----	----
Oxychlordane	27304-13-8	0.50	µg/kg	<0.50	----	----	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors)								
^ Total Polychlorinated biphenyls	----	5.0	µg/kg	<5.0	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
			Client sampling date / time	31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EP131B: Polychlorinated Biphenyls (as Aroclors) - Continued								
Aroclor 1016	12674-11-2	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1221	11104-28-2	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1232	11141-16-5	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1242	53469-21-9	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1248	12672-29-6	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1254	11097-69-1	5.0	µg/kg	<5.0	----	----	----	----
Aroclor 1260	11096-82-5	5.0	µg/kg	<5.0	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	5	µg/kg	<5	----	----	----	----
2-Methylnaphthalene	91-57-6	5	µg/kg	<5	----	----	----	----
Acenaphthylene	208-96-8	4	µg/kg	<4	----	----	----	----
Acenaphthene	83-32-9	4	µg/kg	<4	----	----	----	----
Fluorene	86-73-7	4	µg/kg	<4	----	----	----	----
Phenanthrene	85-01-8	4	µg/kg	**16**	----	----	----	----
Anthracene	120-12-7	4	µg/kg	<4	----	----	----	----
Fluoranthene	206-44-0	4	µg/kg	**10**	----	----	----	----
Pyrene	129-00-0	4	µg/kg	**11**	----	----	----	----
Benz(a)anthracene	56-55-3	4	µg/kg	**6**	----	----	----	----
Chrysene	218-01-9	4	µg/kg	**5**	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	4	µg/kg	**9**	----	----	----	----
Benzo(k)fluoranthene	207-08-9	4	µg/kg	<4	----	----	----	----
Benzo(e)pyrene	192-97-2	4	µg/kg	<4	----	----	----	----
Benzo(a)pyrene	50-32-8	4	µg/kg	**10**	----	----	----	----
Perylene	198-55-0	4	µg/kg	<4	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	4	µg/kg	**6**	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	4	µg/kg	<4	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	4	µg/kg	**6**	----	----	----	----
Coronene	191-07-1	5	µg/kg	<5	----	----	----	----
^ Sum of PAHs	----	4	µg/kg	**79**	----	----	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	----	**84.9**	**86.7**	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	----	**98.0**	**96.0**	----	----
EP068T: Organophosphorus Pesticide Surrogate								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
			Client sampling date / time	31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EP068T: Organophosphorus Pesticide Surrogate - Continued								
DEF	78-48-8	0.05	%	----	91.1	78.0	----	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.5	%	----	98.9	74.7	----	----
Toluene-D8	2037-26-5	0.5	%	----	123	105	----	----
4-Bromofluorobenzene	460-00-4	0.5	%	----	117	103	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	78.8	73.7	77.8	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	80.5	82.4	87.0	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	62.1	70.3	64.5	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	91.7	98.7	103	----	----
Anthracene-d10	1719-06-8	0.5	%	86.6	92.0	95.8	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	97.5	81.8	86.2	----	----
EP075S: Acid Extractable Surrogates								
2-Fluorophenol	367-12-4	0.5	%	101	----	----	----	----
Phenol-d6	13127-88-3	0.5	%	104	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	108	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	72.1	----	----	----	----
EP075T: Base/Neutral Extractable Surrogates								
Nitrobenzene-D5	4165-60-0	0.5	%	103	----	----	----	----
1.2-Dichlorobenzene-D4	2199-69-1	0.5	%	99.8	----	----	----	----
2-Fluorobiphenyl	321-60-8	0.5	%	96.1	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	104	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	113	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	95.7	73.2	99.3	99.4
Toluene-D8	2037-26-5	0.2	%	----	111	95.3	104	108
4-Bromofluorobenzene	460-00-4	0.2	%	----	109	96.3	117	116
EP080-SD: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	107	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	112	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	120	----	----	----	----
EP090S: Organotin Surrogate								
Tripropyltin	----	0.5	%	89.9	----	----	----	----

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

			Client sample ID	VC08_1.0-1.5	VC13_0.0-0.1	VC14_1.0-1.1	TS2	TB2
			Client sampling date / time	31-Oct-2019 20:45	31-Oct-2019 21:45	31-Oct-2019 22:15	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1936183-040	ES1936183-041	ES1936183-052	ES1936183-063	ES1936183-064
				Result	Result	Result	Result	Result
EP130S: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	10	%	55.3	----	----	----	----
EP131S: OC Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.50	%	55.6	----	----	----	----
EP131T: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.5	%	56.9	----	----	----	----
EP132T: Base/Neutral Extractable Surrogates								
2-Fluorobiphenyl	321-60-8	10	%	83.3	----	----	----	----
Anthracene-d10	1719-06-8	10	%	91.2	----	----	----	----
4-Terphenyl-d14	1718-51-0	10	%	86.4	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	Trip Spike control	----	----	----	----
			Client sampling date / time	31-Oct-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1936183-065	--------	--------	--------	--------
				Result	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	**10.9**	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	**1.9**	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	**10.4**	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	**4.5**	----	----	----	----
^ Total Xylenes	----	0.5	mg/kg	**14.9**	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	**27.7**	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**102**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	**109**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	**115**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	RIN_02	----	----	----	----
			Client sampling date / time	31-Oct-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1936183-062	--------	--------	--------	--------
				Result	----	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	RIN_02	----	----	----	----
			Client sampling date / time	31-Oct-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1936183-062	--------	--------	--------	--------
				Result	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L	<100	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L	<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**19.2**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	**54.7**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	**47.8**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**94.4**	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	**87.7**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	**75.7**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**125**	----	----	----	----
Toluene-D8	2037-26-5	2	%	**110**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	**105**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	17060-07-0	64	130
Toluene-D8	2037-26-5	66	136
4-Bromofluorobenzene	460-00-4	60	122
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	29	149
Phenol-d6	13127-88-3	32	128
2-Chlorophenol-D4	93951-73-6	32	128
2.4.6-Tribromophenol	118-79-6	13	121
EP075T: Base/Neutral Extractable Surrogates			
Nitrobenzene-D5	4165-60-0	33	125
1.2-Dichlorobenzene-D4	2199-69-1	34	108
2-Fluorobiphenyl	321-60-8	35	121
Anthracene-d10	1719-06-8	35	123
4-Terphenyl-d14	1718-51-0	33	125
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130
EP080-SD: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	67	137
Toluene-D8	2037-26-5	74	134
4-Bromofluorobenzene	460-00-4	73	137
EP090S: Organotin Surrogate			

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP090S: Organotin Surrogate - Continued			
Tripropyltin	----	35	130
EP130S: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	14	102
EP131S: OC Pesticide Surrogate			
Dibromo-DDE	21655-73-2	10	119
EP131T: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	10	106
EP132T: Base/Neutral Extractable Surrogates			
2-Fluorobiphenyl	321-60-8	55	135
Anthracene-d10	1719-06-8	70	136
4-Terphenyl-d14	1718-51-0	57	127

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1936183**	Page	: 1 of 17
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MS CARMEN YI	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 01-Nov-2019
Site	: ----	Issue Date	: 20-Nov-2019
Sampler	: SARAH ECCLESHALL	No. of samples received	: 66
Order number	: ----	No. of samples analysed	: 27

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG048: Hexavalent Chromium (Alkaline Digest)	ES1935800--022	Anonymous	**Hexavalent Chromium**	18540-29-9	2.00 %	70.0-130%	**Recovery less than lower data quality objective**
EG048: Hexavalent Chromium (Alkaline Digest)	ES1935800--022	Anonymous	**Hexavalent Chromium**	18540-29-9	2.00 %	70.0-130%	**Recovery less than lower data quality objective**
EP090: Organotin Compounds	EM1919013--022	Anonymous	**Tributyltin**	56573-85-4	866 %	20.0-130%	**Recovery greater than upper data quality objective**
EP132B: Polynuclear Aromatic Hydrocarbons	ES1936183--029	VC12_0.0-0.5	**Fluoranthene**	206-44-0	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP132B: Polynuclear Aromatic Hydrocarbons	ES1936183--029	VC12_0.0-0.5	**Pyrene**	129-00-0	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP132B: Polynuclear Aromatic Hydrocarbons	ES1936183--029	VC12_0.0-0.5	**Benz(a)anthracene**	56-55-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP132B: Polynuclear Aromatic Hydrocarbons	ES1936183--029	VC12_0.0-0.5	**Benzo(b+j)fluoranthene**	205-99-2 205-82-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP132B: Polynuclear Aromatic Hydrocarbons	ES1936183--029	VC12_0.0-0.5	**Benzo(a)pyrene**	50-32-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP132B: Polynuclear Aromatic Hydrocarbons	ES1936183--029	VC12_0.0-0.5	**Benzo(g.h.i)perylene**	191-24-2	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP132B: Polynuclear Aromatic Hydrocarbons	ES1936183--029	VC12_0.0-0.5	**Indeno(1.2.3.cd)pyrene**	193-39-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Moisture Content	2	21	9.52	10.00	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP) - Continued					
TRH - Semivolatile Fraction	0	5	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*		*Sample Date*	*Extraction / Preparation* Date extracted	Due for extraction	Evaluation	*Analysis* Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
VC13_0.5-0.6,	VC13_1.0-1.1	**30-Oct-2019**	**06-Nov-2019**	27-Apr-2020	✓	**07-Nov-2019**	27-Apr-2020	✓
Snap Lock Bag - frozen (EA037)								
VC06_0.0-0.1,	VC06_0.5-0.6,	**31-Oct-2019**	**06-Nov-2019**	28-Apr-2020	✓	**07-Nov-2019**	28-Apr-2020	✓
VC12_0.0-0.1,	VC12_0.5-0.6,							
VC12_1.0-1.1,	VC08_0.0-0.1,							
VC08_0.5-0.6,	VC08_1.0-1.1,							
VC08_1.5-1.6,	VC13_0.0-0.1,							
VC14_0.0-0.1,	VC14_0.5-0.6,							
VC14_1.0-1.1,	VC14_1.3-1.4							
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
VC06_0.0-0.1,	VC12_1.0-1.1,	**31-Oct-2019**	**----**	----	----	**05-Nov-2019**	14-Nov-2019	✓
VC12_0.0-0.5,	VC0S_0.0-0.1,							
VC08_1.0-1.5,	VC13_0.0-0.1,							
VC14_1.0-1.1								
EA150: Particle Sizing								
Snap Lock Bag (EA150H)								
VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**----**	----	----	**11-Nov-2019**	28-Apr-2020	✓
EA150: Soil Classification based on Particle Size								
Snap Lock Bag (EA150H)								
VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**----**	----	----	**11-Nov-2019**	28-Apr-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005(ED093)-SD: Total Metals in Sediments by ICP-AES								
Soil Glass Jar - Unpreserved (EG005-SD)								
VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**08-Nov-2019**	28-Apr-2020	✓	**08-Nov-2019**	28-Apr-2020	✓
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
VC06_0.0-0.1, VC0S_0.0-0.1, VC14_1.0-1.1	VC12_1.0-1.1, VC13_0.0-0.1,	**31-Oct-2019**	**08-Nov-2019**	28-Apr-2020	✓	**08-Nov-2019**	28-Apr-2020	✓
EG020-SD: Total Metals in Sediments by ICPMS								
Soil Glass Jar - Unpreserved (EG020-SD)								
VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**08-Nov-2019**	28-Apr-2020	✓	**08-Nov-2019**	28-Apr-2020	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
VC06_0.0-0.1, VC12_0.0-0.5, VC08_1.0-1.5, VC14_1.0-1.1	VC12_1.0-1.1, VC0S_0.0-0.1, VC13_0.0-0.1,	**31-Oct-2019**	**08-Nov-2019**	28-Nov-2019	✓	**11-Nov-2019**	28-Nov-2019	✓
EG048: Hexavalent Chromium (Alkaline Digest)								
Soil Glass Jar - Unpreserved (EG048G)								
VC06_0.0-0.1, VC0S_0.0-0.1, VC14_1.0-1.1	VC12_1.0-1.1, VC13_0.0-0.1,	**31-Oct-2019**	**06-Nov-2019**	28-Nov-2019	✓	**06-Nov-2019**	13-Nov-2019	✓
EK026SF: Total CN by Segmented Flow Analyser								
Soil Glass Jar - Unpreserved (EK026SF)								
VC06_0.0-0.1, VC12_0.0-0.5, VC08_1.0-1.5, VC14_1.0-1.1	VC12_1.0-1.1, VC0S_0.0-0.1, VC13_0.0-0.1,	**31-Oct-2019**	**05-Nov-2019**	14-Nov-2019	✓	**06-Nov-2019**	19-Nov-2019	✓
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser								
Soil Glass Jar - Unpreserved (EK028SF)								
VC06_0.0-0.1, VC0S_0.0-0.1, VC14_1.0-1.1	VC12_1.0-1.1, VC13_0.0-0.1,	**31-Oct-2019**	**05-Nov-2019**	14-Nov-2019	✓	**06-Nov-2019**	19-Nov-2019	✓
EK040T: Fluoride Total								
Snap Lock Bag (EK040T)								
VC06_0.0-0.1, VC0S_0.0-0.1, VC14_1.0-1.1	VC12_1.0-1.1, VC13_0.0-0.1,	**31-Oct-2019**	**05-Nov-2019**	28-Nov-2019	✓	**08-Nov-2019**	28-Nov-2019	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP003: Total Organic Carbon (TOC) in Soil								
Pulp Bag (EP003)								
VC06_0.0-0.1, VC12_0.0-0.5, VC13_0.0-0.1,	VC12_1.0-1.1, VC0S_0.0-0.1, VC14_1.0-1.1	**31-Oct-2019**	**08-Nov-2019**	28-Nov-2019	✓	**08-Nov-2019**	28-Nov-2019	✓
Pulp Bag (EP003)								
VC08_1.0-1.5		**31-Oct-2019**	**11-Nov-2019**	28-Nov-2019	✓	**11-Nov-2019**	28-Nov-2019	✓
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)								
VC06_0.0-0.1, VC0S_0.0-0.1, VC14_1.0-1.1	VC12_1.0-1.1, VC13_0.0-0.1,	**31-Oct-2019**	**06-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	16-Dec-2019	✓
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
VC06_0.0-0.1, VC0S_0.0-0.1, VC14_1.0-1.1	VC12_1.0-1.1, VC13_0.0-0.1,	**31-Oct-2019**	**06-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	16-Dec-2019	✓
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068)								
VC06_0.0-0.1, VC0S_0.0-0.1, VC14_1.0-1.1	VC12_1.0-1.1, VC13_0.0-0.1,	**31-Oct-2019**	**06-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	16-Dec-2019	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Soil Glass Jar - Unpreserved (EP071SG-S)								
VC06_0.0-0.1, VC0S_0.0-0.1, VC14_1.0-1.1	VC12_1.0-1.1, VC13_0.0-0.1,	**31-Oct-2019**	**06-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	16-Dec-2019	✓
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup								
Soil Glass Jar - Unpreserved (EP071SG-S)								
VC06_0.0-0.1, VC0S_0.0-0.1, VC14_1.0-1.1	VC12_1.0-1.1, VC13_0.0-0.1,	**31-Oct-2019**	**06-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	16-Dec-2019	✓
EP074A: Monocyclic Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP074)								
VC06_0.0-0.1, VC0S_0.0-0.1, VC14_1.0-1.1	VC12_1.0-1.1, VC13_0.0-0.1,	**31-Oct-2019**	**05-Nov-2019**	07-Nov-2019	✓	**06-Nov-2019**	07-Nov-2019	✓
EP074B: Oxygenated Compounds								
Soil Glass Jar - Unpreserved (EP074)								
VC06_0.0-0.1, VC0S_0.0-0.1, VC14_1.0-1.1	VC12_1.0-1.1, VC13_0.0-0.1,	**31-Oct-2019**	**05-Nov-2019**	07-Nov-2019	✓	**06-Nov-2019**	07-Nov-2019	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EP074E: Halogenated Aliphatic Compounds							
Soil Glass Jar - Unpreserved (EP074) VC06_0.0-0.1, VC12_1.0-1.1, VC0S_0.0-0.1, VC13_0.0-0.1, VC14_1.0-1.1	**31-Oct-2019**	**05-Nov-2019**	07-Nov-2019	✓	**06-Nov-2019**	07-Nov-2019	✓
EP074F: Halogenated Aromatic Compounds							
Soil Glass Jar - Unpreserved (EP074) VC06_0.0-0.1, VC12_1.0-1.1, VC0S_0.0-0.1, VC13_0.0-0.1, VC14_1.0-1.1	**31-Oct-2019**	**05-Nov-2019**	07-Nov-2019	✓	**06-Nov-2019**	07-Nov-2019	✓
EP074G: Trihalomethanes							
Soil Glass Jar - Unpreserved (EP074) VC06_0.0-0.1, VC12_1.0-1.1, VC0S_0.0-0.1, VC13_0.0-0.1, VC14_1.0-1.1	**31-Oct-2019**	**05-Nov-2019**	07-Nov-2019	✓	**06-Nov-2019**	07-Nov-2019	✓
EP075(SIM)A: Phenolic Compounds							
Soil Glass Jar - Unpreserved (EP075(SIM)) VC06_0.0-0.1, VC12_1.0-1.1, VC0S_0.0-0.1, VC13_0.0-0.1, VC14_1.0-1.1	**31-Oct-2019**	**06-Nov-2019**	14-Nov-2019	✓	**07-Nov-2019**	16-Dec-2019	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) VC12_0.0-0.5, VC08_1.0-1.5	**31-Oct-2019**	**07-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	17-Dec-2019	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) VC06_0.0-0.1, VC12_1.0-1.1, VC0S_0.0-0.1, VC13_0.0-0.1, VC14_1.0-1.1	**31-Oct-2019**	**06-Nov-2019**	14-Nov-2019	✓	**07-Nov-2019**	16-Dec-2019	✓
EP075A: Phenolic Compounds							
Soil Glass Jar - Unpreserved (EP075) VC12_0.0-0.5, VC08_1.0-1.5	**31-Oct-2019**	**08-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	18-Dec-2019	✓
EP075B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075) VC12_0.0-0.5, VC08_1.0-1.5	**31-Oct-2019**	**08-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	18-Dec-2019	✓
EP075C: Phthalate Esters							
Soil Glass Jar - Unpreserved (EP075) VC12_0.0-0.5, VC08_1.0-1.5	**31-Oct-2019**	**08-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	18-Dec-2019	✓
EP075D: Nitrosamines							
Soil Glass Jar - Unpreserved (EP075) VC12_0.0-0.5, VC08_1.0-1.5	**31-Oct-2019**	**08-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	18-Dec-2019	✓
EP075E: Nitroaromatics and Ketones							
Soil Glass Jar - Unpreserved (EP075) VC12_0.0-0.5, VC08_1.0-1.5	**31-Oct-2019**	**08-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	18-Dec-2019	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EP075F: Haloethers								
Soil Glass Jar - Unpreserved (EP075)								
VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**08-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	18-Dec-2019	✓
EP075G: Chlorinated Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075)								
VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**08-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	18-Dec-2019	✓
EP075H: Anilines and Benzidines								
Soil Glass Jar - Unpreserved (EP075)								
VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**08-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	18-Dec-2019	✓
EP075I: Organochlorine Pesticides								
Soil Glass Jar - Unpreserved (EP075)								
VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**08-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	18-Dec-2019	✓
EP075J: Organophosphorus Pesticides								
Soil Glass Jar - Unpreserved (EP075)								
VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**08-Nov-2019**	14-Nov-2019	✓	**08-Nov-2019**	18-Dec-2019	✓
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
VC06_0.0-0.1, VC0S_0.0-0.1, VC14_1.0-1.1	VC12_1.0-1.1, VC13_0.0-0.1,	**31-Oct-2019**	**05-Nov-2019**	14-Nov-2019	✓	**06-Nov-2019**	14-Nov-2019	✓
Soil Glass Jar - Unpreserved (EP080)								
TB2		**31-Oct-2019**	**07-Nov-2019**	14-Nov-2019	✓	**09-Nov-2019**	14-Nov-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080)								
VC06_0.0-0.1, VC0S_0.0-0.1, VC14_1.0-1.1	VC12_1.0-1.1, VC13_0.0-0.1,	**31-Oct-2019**	**05-Nov-2019**	14-Nov-2019	✓	**06-Nov-2019**	14-Nov-2019	✓
Soil Glass Jar - Unpreserved (EP071-SD)								
VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**06-Nov-2019**	14-Nov-2019	✓	**11-Nov-2019**	16-Dec-2019	✓
Soil Glass Jar - Unpreserved (EP080)								
TB2		**31-Oct-2019**	**07-Nov-2019**	14-Nov-2019	✓	**09-Nov-2019**	14-Nov-2019	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
TS2, Trip Spike control	TB2,	**31-Oct-2019**	**07-Nov-2019**	14-Nov-2019	✓	**09-Nov-2019**	14-Nov-2019	✓
EP080-SD / EP071-SD: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071-SD)								
VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**06-Nov-2019**	14-Nov-2019	✓	**11-Nov-2019**	16-Dec-2019	✓
Soil Glass Jar - Unpreserved (EP080-SD)								
VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**07-Nov-2019**	14-Nov-2019	✓	**09-Nov-2019**	14-Nov-2019	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080-SD / EP071-SD: Total Recoverable Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080-SD) VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**07-Nov-2019**	14-Nov-2019	✓	**09-Nov-2019**	14-Nov-2019	✓
EP080-SD: BTEXN								
Soil Glass Jar - Unpreserved (EP080-SD) VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**07-Nov-2019**	14-Nov-2019	✓	**09-Nov-2019**	14-Nov-2019	✓
EP090: Organotin Compounds								
Soil Glass Jar - Unpreserved (EP090) VC08_1.0-1.5		**31-Oct-2019**	**08-Nov-2019**	14-Nov-2019	✓	**11-Nov-2019**	18-Dec-2019	✓
Soil Glass Jar - Unpreserved (EP090) VC12_0.0-0.5		**31-Oct-2019**	**14-Nov-2019**	14-Nov-2019	✓	**15-Nov-2019**	24-Dec-2019	✓
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Soil Glass Jar - Unpreserved (EP130) VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**07-Nov-2019**	14-Nov-2019	✓	**11-Nov-2019**	17-Dec-2019	✓
EP131A: Organochlorine Pesticides								
Soil Glass Jar - Unpreserved (EP131A) VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**07-Nov-2019**	14-Nov-2019	✓	**11-Nov-2019**	17-Dec-2019	✓
EP131B: Polychlorinated Biphenyls (as Aroclors)								
Soil Glass Jar - Unpreserved (EP131B) VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**07-Nov-2019**	14-Nov-2019	✓	**11-Nov-2019**	17-Dec-2019	✓
EP132B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP132B-SD) VC12_0.0-0.5,	VC08_1.0-1.5	**31-Oct-2019**	**06-Nov-2019**	14-Nov-2019	✓	**07-Nov-2019**	16-Dec-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) RIN_02	**31-Oct-2019**	**05-Nov-2019**	28-Apr-2020	✓	**05-Nov-2019**	28-Apr-2020	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) RIN_02	**31-Oct-2019**	**----**	----	----	**07-Nov-2019**	28-Nov-2019	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) RIN_02	**31-Oct-2019**	**05-Nov-2019**	07-Nov-2019	✓	**06-Nov-2019**	15-Dec-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) RIN_02	**31-Oct-2019**	**05-Nov-2019**	07-Nov-2019	✓	**06-Nov-2019**	15-Dec-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) RIN_02	**31-Oct-2019**	**06-Nov-2019**	14-Nov-2019	✓	**06-Nov-2019**	14-Nov-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
RIN_02	**31-Oct-2019**	**05-Nov-2019**	07-Nov-2019	✓	**06-Nov-2019**	15-Dec-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
RIN_02	**31-Oct-2019**	**06-Nov-2019**	14-Nov-2019	✓	**06-Nov-2019**	14-Nov-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
RIN_02	**31-Oct-2019**	**06-Nov-2019**	14-Nov-2019	✓	**06-Nov-2019**	14-Nov-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type / *Analytical Methods*	*Method*	Count *QC*	*Regular*	Rate (%) **Actual**	**Expected**	*Evaluation*	*Quality Control Specification*
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	3	25	**12.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	21	**9.52**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Organochlorine Pesticides (Ultra-trace)	EP131A	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organophosphorus Pesticides (Ultra-trace)	EP130	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organotin Analysis	EP090	3	12	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	3	25	**12.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB's (Ultra-trace)	EP131B	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fe and Al in Sediments by ICPAES	EG005-SD	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS (Low Level)	EG035T-LL	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	20	**15.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Sediments by ICPMS	EG020-SD	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	3	15	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TPH - Semivolatile Fraction	EP071-SD	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX in Sediments	EP080-SD	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organochlorine Pesticides (Ultra-trace)	EP131A	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organophosphorus Pesticides (Ultra-trace)	EP130	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organotin Analysis	EP090	2	12	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB's (Ultra-trace)	EP131B	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Work Order : ES1936183
Client : GHD PTY LTD
Project : 12517046

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Semivolatile Organic Compounds	EP075	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fe and Al in Sediments by ICPAES	EG005-SD	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS (Low Level)	EG035T-LL	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Sediments by ICPMS	EG020-SD	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	4	15	**26.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TPH - Semivolatile Fraction	EP071-SD	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX in Sediments	EP080-SD	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organochlorine Pesticides (Ultra-trace)	EP131A	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organophosphorus Pesticides (Ultra-trace)	EP130	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organotin Analysis	EP090	2	12	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB's (Ultra-trace)	EP131B	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fe and Al in Sediments by ICPAES	EG005-SD	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS (Low Level)	EG035T-LL	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Sediments by ICPMS	EG020-SD	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	2	15	**13.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TPH - Semivolatile Fraction	EP071-SD	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX in Sediments	EP080-SD	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organochlorine Pesticides (Ultra-trace)	EP131A	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organophosphorus Pesticides (Ultra-trace)	EP130	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organotin Analysis	EP090	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAHs in Sediments by GCMS(SIM)	EP132B-SD	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB's (Ultra-trace)	EP131B	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS (Low Level)	EG035T-LL	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Sediments by ICPMS	EG020-SD	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TPH - Semivolatile Fraction	EP071-SD	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX in Sediments	EP080-SD	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	5	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Mercury by FIMS	EG035T	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	5	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
ASS Field Screening Analysis	* EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines, version 2.1 June 2004. As received samples are tested for pH field and pH fox and assessed for a reaction rating.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 6.1 and Table 1 (14 day holding time).
Particle Size Analysis by Hydrometer	EA150H	SOIL	Particle Size Analysis by Hydrometer according to AS1289.3.6.3 - 2003
Total Fe and Al in Sediments by ICPAES	EG005-SD	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3). LORs per NODG
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Sediments by ICPMS	EG020-SD	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. Analyte list and LORs per NODG.
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS (Low Level)	EG035T-LL	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060A. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Total Cyanide by Segmented Flow Analyser	EK026SF	SOIL	In house: Referenced to APHA 4500-CN C / ASTM D7511. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM (2013) Schedule B(3)
WAD Cyanide by Segmented Flow Analyser	EK028SF	SOIL	In house: Referenced to APHA 4500-CN-O. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Hydrogen cyanide is liberated from a slightly acidified (pH 4.5) and is dialysed. Tight cyanide complexes that would not be amenable to oxidation by chlorine are not converted. Iron cyanide complexes are precipitated with zinc acetate. Liberated HCN diffuses through a membrane into a stream of sodium hydroxide where it is carried as CN- The cyanide in caustic solution is buffered to pH 5.2 and further converted to cyanogen chloride by reaction with chloramine-T. Cyanogen chloride subsequently reacts with 4 ¿pyridine carboxylic and 1,3 - dimethylbarbituric acids to give a red colour complex. This colour is measured at 600 nm. This method is compliant with NEPM (2013) Schedule B(3)
Total Fluoride	EK040T	SOIL	(In-house) Total fluoride is determined by ion specific electrode (ISE) in a solution obtained after a Sodium Carbonate / Potassium Carbonate fusion dissolution.
Total Organic Carbon	EP003	SOIL	In house C-IR17. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO2) is automatically measured by infra-red detector.
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TPH - Semivolatile Fraction	EP071-SD	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
Volatile Organic Compounds	EP074	SOIL	In house: Referenced to USEPA SW 846 - 8260B Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 501)
Semivolatile Organic Compounds	EP075	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 502)

Analytical Methods	Method	Matrix	Method Descriptions
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
TRH Volatiles/BTEX in Sediments	EP080-SD	SOIL	In house: Referenced to USEPA SW 846 - 8260B Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve.
Organotin Analysis	EP090	SOIL	In house: Referenced to USEPA SW 846 - 8270D Prepared sample extracts are analysed by GC/MS coupled with high volume injection, and quanitified against an established calibration curve.
Organophosphorus Pesticides (Ultra-trace)	EP130	SOIL	In house: Referenced to USEPA Method 3640 (GPC cleanup), 8141 (GC/FPD - Capillary Column) This technique is compliant with NEPM (2013) Schedule B(3).
Organochlorine Pesticides (Ultra-trace)	EP131A	SOIL	In house: Referenced to USEPA Method 3640 (GPC cleanup),3620 (Florisil), 8081/8082 (GC/µECD/µECD) This technique is compliant with NEPM (2013) Schedule B(3)
PCB's (Ultra-trace)	EP131B	SOIL	In house: Referenced to USEPA Method 3640 (GPC cleanup),3620 (Florisil), 8081/8082 (GC/µECD/µECD) This technique is compliant with NEPM (2013) Schedule B(3)
PAHs in Sediments by GCMS(SIM)	EP132B-SD	SOIL	In house: Referenced to USEPA 8270D GCMS Capillary column, SIM mode using large volume programmed temperature vaporisation injection.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
NaOH leach for CN in Soils	CN-PR	SOIL	In house: APHA 4500 CN. Samples are extracted by end-over-end tumbling with NaOH.
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.

Preparation Methods	Method	Matrix	Method Descriptions
Total Fluoride	EK040T-PR	SOIL	In house: Samples are fused with Sodium Carbonate / Potassium Carbonate flux.
Drying only	EN020D	SOIL	In house
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Dry and Pulverise (up to 100g)	GEO30	SOIL	#
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Tumbler Extraction of Solids/ Sample Cleanup	ORG17A-UTP	SOIL	In house: Mechanical agitation (tumbler). 20g of sample, Na2SO4 and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. Samples are extracted, concentrated (by KD) and exchanged into an appropriate solvent for GPC and florisil cleanup as required.
Tumbler Extraction of Solids for LVI (Non-concentrating)	ORG17D	SOIL	In house: 10g of sample, Na2SO4 and surrogate are extracted with 50mL 1:1 DCM/Acetone by end over end tumbling. An aliquot is concentrated by nitrogen blowdown to a reduced volume for analysis if required.
Organotin Sample Preparation	ORG35	SOIL	In house: 20g sample is spiked with surrogate and leached in a methanol:acetic acid:UHP water mix and vacuum filtered. Reagents and solvents are added to the sample and the mixture tumbled. The butyltin compounds are simultaneously derivatised and extracted. The extract is further extracted with petroleum ether. The resultant extracts are combined and concentrated for analysis.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

Certificate of Analysis

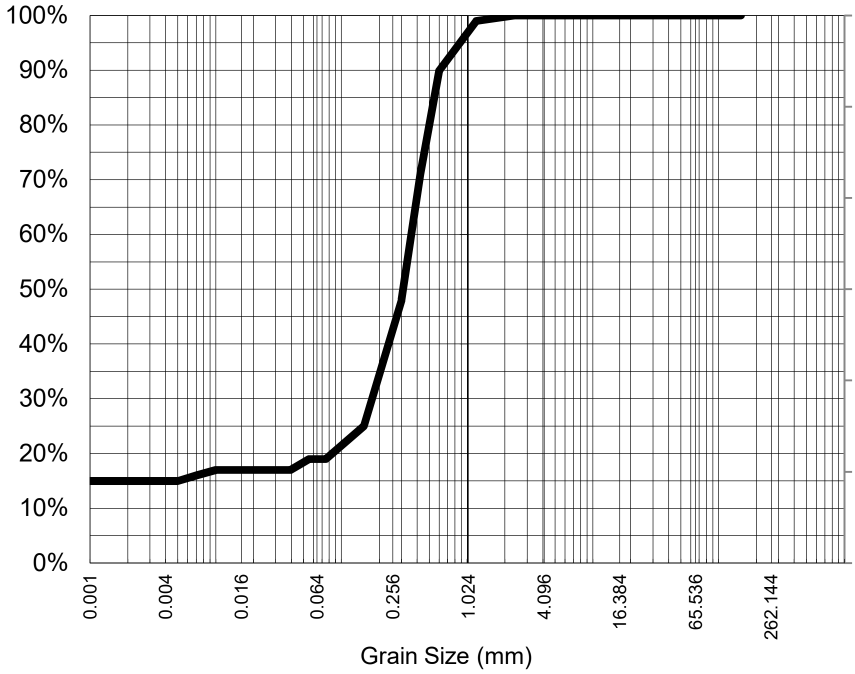
ALS Laboratory Group Pty Ltd
5/585 Maitland Road
Mayfield West, NSW 2304
pH 02 4014 2500
fax 02 4968 0349
samples.newcastle@alsenviro.com

ALS Environmental

Newcastle, NSW

CLIENT:	CARMEN YI	**DATE REPORTED:**	11-Nov-2019
COMPANY:	GHD PTY LTD	**DATE RECEIVED:**	1-Nov-2019
ADDRESS:	Level 15, 133 Castlereagh Street Sydney NSW, Australia	**REPORT NO:**	ES1936183-029 / PSD
PROJECT:	12517046	**SAMPLE ID:**	VC12_0.0-0.5

Particle Size Distribution



Particle Size (mm)	% Passing
2.36	100%
1.18	99%
0.600	90%
0.425	71%
0.300	48%
0.150	25%
0.075	19%
Particle Size (microns)	
55	19%
39	17%
27	17%
19	17%
14	17%
10	17%
7	16%
5	15%
1	15%

Median Particle Size (mm)*	0.311

Analysis Notes

Samples analysed as received.
** Soil Particle Density required for Hydrometer analysis according to AS 1289.3.5.1—2006 was not requested by the client . Typical sediment SPD values used for calculations and consequently, NATA endorsement does not apply to hydrometer results*

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments:

Analysed: 7-Nov-19

Loss on Pretreatment NA

Limit of Reporting: 1%

Sample Description: SAND, FINES

Dispersion Method Shaker

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) #N/A

NATA Accreditation: 825 Site: Newcastle
This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full.

NATA
WORLD RECOGNISED ACCREDITATION

Dianne Blane
Laboratory Coordinator
Authorised Signatory

Certificate of Analysis

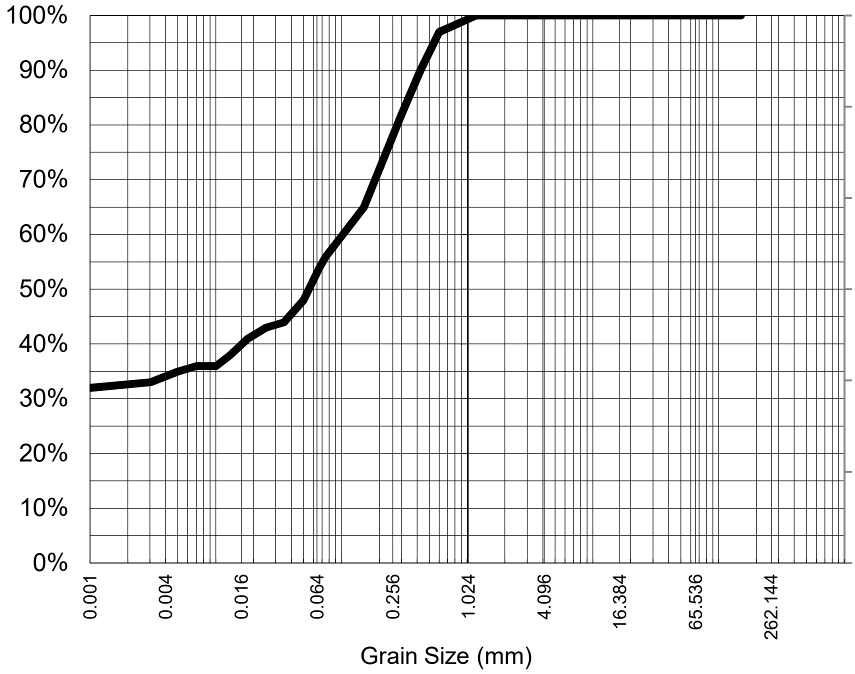
ALS Laboratory Group Pty Ltd
5/585 Maitland Road
Mayfield West, NSW 2304
pH 02 4014 2500
fax 02 4968 0349
samples.newcastle@alsenviro.com

ALS Environmental

Newcastle, NSW

CLIENT:	CARMEN YI	**DATE REPORTED:**	11-Nov-2019
COMPANY:	GHD PTY LTD	**DATE RECEIVED:**	1-Nov-2019
ADDRESS:	Level 15, 133 Castlereagh Street Sydney NSW, Australia	**REPORT NO:**	ES1936183-040 / PSD
PROJECT:	12517046	**SAMPLE ID:**	VC08_1.0-1.5

Particle Size Distribution



Particle Size (mm)	% Passing
1.18	100%
0.600	97%
0.425	90%
0.300	82%
0.150	65%
0.075	56%
Particle Size (microns)	
50	48%
35	44%
25	43%
18	41%
13	38%
10	36%
7	36%
5	35%
1	32%

Analysis Notes

Samples analysed as received.
** Soil Particle Density required for Hydrometer analysis according to AS 1289.3.5.1—2006 was not requested by the client . Typical sediment SPD values used for calculations and consequently, NATA endorsement does not apply to hydrometer results*

Median Particle Size (mm)*	0.056

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments:

Analysed: 7-Nov-19

Loss on Pretreatment NA

Limit of Reporting: 1%

Sample Description: FINES, SAND

Dispersion Method Shaker

Test Method: AS1289.3.6.2/AS1289.3.6.3

Soil Particle Density (<2.36mm) #N/A

NATA Accreditation: 825 Site: Newcastle
This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full.

NATA
WORLD RECOGNISED ACCREDITATION

Dianne Blane
Laboratory Coordinator
Authorised Signatory

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E:
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD

OFFICE: Level 19, 133 Castlereagh Street Sydney NSW

PROJECT: 12517046

ORDER NUMBER: 12517046

PROJECT MANAGER: Carmen Yi   CONTACT PH: 9239 7630

SAMPLER: Carmen Yi   SAMPLER MOBILE:

COC emailed to ALS? (YES)   EDD FORMAT (or default):

Email Reports to (will default to PM if no other addresses are listed): Sarah Eccleshall@ghd.com

Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)

☑ Standard TAT (List due date):

☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: SY-522-19 GHD V2

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

RELINQUISHED BY: Carmen Yi
DATE/TIME: 7/11/2019

RECEIVED BY: FAS
DATE/TIME: 8/11/19 11:30am

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please freeze zip lock bag

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screening Analysis	NSW DECCW Waste Classification (SCC) Short Suite	8 Metals + PAH	Hold					Additional Information: Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH05_4.6-4.7	7.11.2019	S	Jar, ZLB	2	x	x							
2	RIN_03	7.11.2019	W	V, AG	3			x						
3	SW04	7.11.2019	W	P	1				x					
4	SW05	7.11.2019	W	P	1				x					
				TOTAL		1	1	1	2					

Environmental Division
Sydney
Work Order Reference
ES1936922

Telephone : + 61-2-8784 8555

Forward Lab / Split WO
Lab / Analysis: ASS → Brisbane
Organised By / Date:
Relinquished By / Date:
Connote / Courier:
WO No:
Attach By PO / Internal Sheet:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved, AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1936922**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Jessica Watson	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jessica.watson@ghd.com	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 12517046	Page	: 1 of 2
Order number	: 12517046	Quote number	: ES2019GHDSER0030 (SY/522/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: CARMEN YI		

Dates

Date Samples Received	: 08-Nov-2019 11:30	Issue Date	: 08-Nov-2019
Client Requested Due Date	: 14-Nov-2019	Scheduled Reporting Date	: **14-Nov-2019**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 6.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **8 metals analysis has not been added for sample RIN_03 as no red nitric acid preserved bottle was received.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- ASS analysis to be conducted by ALS Brisbane.
- Total Fluoride analysis to be conducted by ALS Newcastle.
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA037 ASS Field Screening Analysis	SOIL - EA055-103 Moisture Content	SOIL - P- 7/4 - Short Suite NSW DECCW Waste Classification (SCC) -
ES1936922-001	07-Nov-2019 00:00	BH05_4.6-4.7	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	(On Hold) WATER No analysis requested	WATER - EP075 SIM PAH only SIM - PAH only
ES1936922-002	07-Nov-2019 00:00	RIN_03		✓
ES1936922-003	07-Nov-2019 00:00	SW04	✓	
ES1936922-004	07-Nov-2019 00:00	SW05	✓	

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

SARAH ECCLESHALL

- *AU Certificate of Analysis - NATA (COA)	Email	sarah.eccleshall@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sarah.eccleshall@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sarah.eccleshall@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sarah.eccleshall@ghd.com
- A4 - AU Tax Invoice (INV)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	sarah.eccleshall@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	sarah.eccleshall@ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1936922**	Page	: 1 of 9
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Jessica Watson	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 08-Nov-2019 11:30
Order number	: 12517046	Date Analysis Commenced	: 11-Nov-2019
C-O-C number	: ----	Issue Date	: 15-Nov-2019 15:15
Sampler	: CARMEN YI		
Site	: ----		
Quote number	: SY/522/19		
No. of samples received	: 4		
No. of samples analysed	: 2		

NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alison Graham	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield West, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Evie Sidarta	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EG048G: Poor spike recovery for ALkyl Hexavalent Chromium due to matrix interferences(confirmed by re-analysis).
- EG035: Positive Hg result ES1936922 #1 has been confirmed by reanalysis.
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH05_4.6-4.7	----	----	----	----
			Client sampling date / time	07-Nov-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1936922-001	--------	--------	--------	--------
				Result	----	----	----	----
EA037: Ass Field Screening Analysis								
ø pH (F)	----	0.1	pH Unit	**8.1**	----	----	----	----
ø pH (Fox)	----	0.1	pH Unit	**6.3**	----	----	----	----
ø Reaction Rate	----	1	-	**4**	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**47.0**	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**10**	----	----	----	----
Beryllium	7440-41-7	1	mg/kg	<1	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Lead	7439-92-1	5	mg/kg	**127**	----	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	----	----	----	----
Nickel	7440-02-0	2	mg/kg	**5**	----	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
Silver	7440-22-4	2	mg/kg	<2	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**1.1**	----	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	----	----	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	----	----	----	----
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser								
Weak Acid Dissociable Cyanide	----	1	mg/kg	<1	----	----	----	----
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	**160**	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH05_4.6-4.7	----	----	----	----
			Client sampling date / time	07-Nov-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1936922-001	--------	--------	--------	--------
				Result	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	----	----	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	**320**	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	**320**	----	----	----	----
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup								
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	**220**	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	**140**	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	**360**	----	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
Styrene	100-42-5	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
EP074B: Oxygenated Compounds								
2-Butanone (MEK)	78-93-3	5	mg/kg	<5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH05_4.6-4.7	----	----	----	----
			Client sampling date / time	07-Nov-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1936922-001	--------	--------	--------	--------
				Result	----	----	----	----
EP074E: Halogenated Aliphatic Compounds								
Vinyl chloride	75-01-4	4	mg/kg	<4	----	----	----	----
1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	----	----	----	----
Methylene chloride	75-09-2	0.5	mg/kg	<0.5	----	----	----	----
1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	----	----	----	----
Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	----	----	----	----
1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	----	----	----	----
Trichloroethene	79-01-6	0.5	mg/kg	<0.5	----	----	----	----
1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	----	----	----	----
Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	----	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	----	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	----	----	----	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	----	----	----	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	0.5	mg/kg	<0.5	----	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	----	----	----	----
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	----	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	----	----	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	----	----	----	----
Pentachlorophenol	87-86-5	2	mg/kg	<2	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	**0.5**	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	**1.4**	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	**0.6**	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	**4.9**	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	**5.7**	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	**2.4**	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	**2.2**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH05_4.6-4.7	----	----	----	----
			Client sampling date / time	07-Nov-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1936922-001	--------	--------	--------	--------
				Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	4.2	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	1.7	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	4.0	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	1.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	1.8	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	30.9	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	5.0	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	5.3	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	5.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	116	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	105	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	69.5	----	----	----	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.5	%	104	----	----	----	----
Toluene-D8	2037-26-5	0.5	%	114	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.5	%	108	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	83.8	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	102	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	72.2	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	111	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	104	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	103	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	105	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH05_4.6-4.7	----	----	----	----
			Client sampling date / time	07-Nov-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1936922-001	--------	--------	--------	--------
				Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued								
Toluene-D8	2037-26-5	0.2	%	**113**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	**100**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	RIN_03	----	----	----	----
			Client sampling date / time	07-Nov-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1936922-002	--------	--------	--------	--------
				Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**22.4**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	**44.2**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	**46.7**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**71.3**	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	**64.7**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	**62.1**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	17060-07-0	64	130
Toluene-D8	2037-26-5	66	136
4-Bromofluorobenzene	460-00-4	60	122
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1936922**	Page	: 1 of 11
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Jessica Watson	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 08-Nov-2019
Order number	: 12517046	Date Analysis Commenced	: 11-Nov-2019
C-O-C number	: ----	Issue Date	: 15-Nov-2019
Sampler	: CARMEN YI		
Site	: ----		
Quote number	: SY/522/19		
No. of samples received	: 4		
No. of samples analysed	: 2		

ilac-MRA NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alison Graham	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield West, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Evie Sidarta	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	***Client sample ID***	***Method: Compound***	***CAS Number***	***LOR***	***Unit***	***Original Result***	***Duplicate Result***	***RPD (%)***	***Recovery Limits (%)***
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2697194)									
ES1936824-003	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	9	9	0.00	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	9	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	17	21	23.1	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
EW1904851-002	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 2697697)									
EB1929956-008	Anonymous	EA037: pH (F)	----	0.1	pH Unit	9.2	9.2	0.00	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	6.8	6.8	0.00	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2695861)									
ES1936738-020	Anonymous	EA055: Moisture Content	----	0.1	%	17.8	17.4	2.67	0% - 50%
ES1936939-005	Anonymous	EA055: Moisture Content	----	0.1	%	14.1	14.4	2.12	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2697195)									
ES1936824-003	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2697195) - continued									
EW1904851-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 2698222)									
ES1936420-001	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1936738-005	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 2695855)									
ES1936731-001	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
ES1936921-001	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.00	No Limit
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser (QC Lot: 2695854)									
ES1936420-001	Anonymous	EK028SF: Weak Acid Dissociable Cyanide	----	1	mg/kg	<1	<1	0.00	No Limit
EK040T: Fluoride Total (QC Lot: 2700730)									
EB1928929-001	Anonymous	EK040T: Fluoride	16984-48-8	40	mg/kg	800	760	4.62	0% - 50%
ES1936922-001	BH05_4.6-4.7	EK040T: Fluoride	16984-48-8	40	mg/kg	160	150	0.00	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 2694921)									
ES1936922-001	BH05_4.6-4.7	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2694919)									
ES1936922-001	BH05_4.6-4.7	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 2694919)									
ES1936922-001	BH05_4.6-4.7	EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QC Lot: 2694920)									
ES1936922-001	BH05_4.6-4.7	EP071SG-S: C15 - C28 Fraction	----	100	mg/kg	220	210	6.76	No Limit
		EP071SG-S: C29 - C36 Fraction	----	100	mg/kg	140	130	8.38	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QC Lot: 2694920) - continued									
ES1936922-001	BH05_4.6-4.7	EP071SG-S: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071SG-S: C10 - C36 Fraction (sum)	----	50	mg/kg	360	340	5.71	No Limit
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QC Lot: 2694920)									
ES1936922-001	BH05_4.6-4.7	EP071SG-S: >C16 - C34 Fraction	----	100	mg/kg	320	300	6.10	No Limit
		EP071SG-S: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071SG-S: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 2696391)									
ES1937243-002	Anonymous	EP074: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP074: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 2696391)									
ES1937243-002	Anonymous	EP074: 2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 2696391)									
ES1937243-002	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Methylene chloride	75-09-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	5	mg/kg	<5	<5	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 2696391)									
ES1937243-002	Anonymous	EP074: Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 2696391)									
ES1937243-002	Anonymous	EP074: Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 2694918)									
ES1936922-001	BH05_4.6-4.7	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)A: Phenolic Compounds (QC Lot: 2694918) - continued									
ES1936922-001	BH05_4.6-4.7	EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2694918)									
ES1936922-001	BH05_4.6-4.7	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	1.4	1.4	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	0.6	0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	4.9	4.5	7.90	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	5.7	5.2	9.59	0% - 50%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	2.4	2.2	4.52	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	2.2	2.1	8.54	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	4.2	3.8	10.6	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	1.7	1.8	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	4.0	3.8	5.58	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	1.5	1.4	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	1.8	1.8	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	30.9	28.5	8.08	0% - 20%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	5.0	4.8	5.34	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2696392)									
ES1937243-002	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2696392)									
ES1937243-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2697194)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	105	86.0	126
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	107	90.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	92.3	83.0	113
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	99.1	80.0	114
EG005T: Molybdenum	7439-98-7	2	mg/kg	<2	----	----	----	----
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	111	87.0	123
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	123	75.0	131
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.1 mg/kg	105	77.0	117
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2697195)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	78.0	70.0	105
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 2698222)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	20 mg/kg	101	68.0	114
				<0.5	40 mg/kg	70.7	68.0	114
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2695855)								
EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	40 mg/kg	106	81.0	129
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser (QCLot: 2695854)								
EK028SF: Weak Acid Dissociable Cyanide	----	1	mg/kg	<1	40 mg/kg	106	70.0	130
EK040T: Fluoride Total (QCLot: 2700730)								
EK040T: Fluoride	16984-48-8	40	mg/kg	<40	400 mg/kg	74.0	67.2	96.3
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2694921)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	97.0	62.0	126
EP068A: Organochlorine Pesticides (OC) (QCLot: 2694919)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	89.5	69.0	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	87.9	65.0	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	92.4	67.0	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	88.6	68.0	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.3	65.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	88.6	67.0	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	86.0	69.0	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	92.4	62.0	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	91.5	63.0	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.4	66.0	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	90.6	64.0	116

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 2694919) - continued								
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	84.0	66.0	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	92.5	67.0	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	87.4	67.0	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.7	69.0	115
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	94.8	69.0	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	86.4	56.0	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	96.0	62.0	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	97.3	66.0	120
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2694919)								
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	86.5	76.0	118
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2694920)								
EP071SG-S: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	97.1	80.0	116
EP071SG-S: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	96.4	85.0	115
EP071SG-S: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	98.6	75.0	123
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2694920)								
EP071SG-S: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	94.1	89.0	109
EP071SG-S: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	97.7	84.0	112
EP071SG-S: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	95.1	71.0	119
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 2696391)								
EP074: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	95.7	71.0	121
EP074: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	96.8	65.0	131
EP074: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	95.6	72.0	114
EP074: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	93.9	70.0	116
EP074: Styrene	100-42-5	0.5	mg/kg	<0.5	1 mg/kg	93.6	67.0	113
EP074: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	96.1	75.0	115
EP074B: Oxygenated Compounds (QCLot: 2696391)								
EP074: 2-Butanone (MEK)	78-93-3	5	mg/kg	<5	10 mg/kg	94.3	58.0	136
EP074E: Halogenated Aliphatic Compounds (QCLot: 2696391)								
EP074: Vinyl chloride	75-01-4	5	mg/kg	<5	10 mg/kg	99.3	43.0	147
EP074: 1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	1 mg/kg	97.8	54.0	126
EP074: Methylene chloride	75-09-2	0.5	mg/kg	<0.5	1 mg/kg	99.2	58.0	148
EP074: 1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	1 mg/kg	93.9	65.0	117
EP074: Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	1 mg/kg	93.6	59.0	125
EP074: 1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	1 mg/kg	96.8	65.0	125
EP074: Trichloroethene	79-01-6	0.5	mg/kg	<0.5	1 mg/kg	94.0	70.0	118
EP074: 1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	1 mg/kg	99.2	64.0	126
EP074: Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	1 mg/kg	97.5	67.0	143

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 2696391) - continued								
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	1 mg/kg	93.4	62.0	122
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	1 mg/kg	95.2	65.0	121
EP074F: Halogenated Aromatic Compounds (QCLot: 2696391)								
EP074: Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	1 mg/kg	96.0	68.0	116
EP074G: Trihalomethanes (QCLot: 2696391)								
EP074: Chloroform	67-66-3	0.5	mg/kg	<0.5	1 mg/kg	94.3	66.0	124
EP075(SIM)A: Phenolic Compounds (QCLot: 2694918)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	6 mg/kg	104	71.0	125
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	6 mg/kg	104	71.0	123
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	12 mg/kg	113	67.0	127
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	6 mg/kg	112	70.0	116
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	6 mg/kg	101	54.0	114
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	6 mg/kg	102	60.0	114
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	12 mg/kg	50.2	10.0	57.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2694918)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	119	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	120	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	115	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	122	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	98.6	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	96.8	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	108	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	105	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	107	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	103	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	98.2	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	105	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	115	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	108	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	102	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	110	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2696392)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	98.1	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2696392)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	97.9	68.4	128

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2692989)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	74.0	50.0	94.0
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	74.1	63.6	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	68.6	62.2	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	73.8	63.9	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	67.3	62.6	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	66.4	64.3	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	66.8	63.6	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	74.1	63.1	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	72.8	64.1	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	79.2	62.5	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	78.7	61.7	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	76.4	63.0	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	78.9	63.3	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	73.4	59.9	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	71.8	61.2	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	75.6	59.1	118

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2697194)							
ES1936824-003	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	96.8	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	95.2	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	95.4	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	93.8	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2697195)							
ES1936824-003	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	83.8	70.0	130
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 2698222)							
ES1936560-001	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	40 mg/kg	# 5.00	70.0	130
ES1936560-001	Anonymous	EG048G: Hexavalent Chromium	18540-29-9	40 mg/kg	# 2.60	70.0	130
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 2695855)							
ES1936731-001	Anonymous	EK026SF: Total Cyanide	57-12-5	40 mg/kg	130	70.0	130
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser (QCLot: 2695854)							

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser (QCLot: 2695854) - continued							
ES1936420-001	Anonymous	EK028SF: Weak Acid Dissociable Cyanide	----	40 mg/kg	119	70.0	130
EK040T: Fluoride Total (QCLot: 2700730)							
EB1928929-001	Anonymous	EK040T: Fluoride	16984-48-8	400 mg/kg	104	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2694921)							
ES1936922-001	BH05_4.6-4.7	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	94.0	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 2694919)							
ES1936922-001	BH05_4.6-4.7	EP068: gamma-BHC	58-89-9	0.5 mg/kg	78.8	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	83.1	70.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	76.1	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	99.2	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	89.5	70.0	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	81.9	70.0	130
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2694920)							
ES1936922-001	BH05_4.6-4.7	EP071SG-S: C10 - C14 Fraction	----	523 mg/kg	106	43.0	139
		EP071SG-S: C15 - C28 Fraction	----	2319 mg/kg	118	49.0	131
		EP071SG-S: C29 - C36 Fraction	----	1714 mg/kg	130	64.0	158
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2694920)							
ES1936922-001	BH05_4.6-4.7	EP071SG-S: >C10 - C16 Fraction	----	860 mg/kg	110	33.0	137
		EP071SG-S: >C16 - C34 Fraction	----	3223 mg/kg	122	40.0	137
		EP071SG-S: >C34 - C40 Fraction	----	1058 mg/kg	118	30.0	190
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 2696391)							
ES1937243-002	Anonymous	EP074: Benzene	71-43-2	2.5 mg/kg	98.4	70.0	130
		EP074: Toluene	108-88-3	2.5 mg/kg	101	70.0	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 2696391)							
ES1937243-002	Anonymous	EP074: 1.1-Dichloroethene	75-35-4	2.5 mg/kg	94.0	70.0	130
		EP074: Trichloroethene	79-01-6	2.5 mg/kg	95.2	70.0	130
EP074F: Halogenated Aromatic Compounds (QCLot: 2696391)							
ES1937243-002	Anonymous	EP074: Chlorobenzene	108-90-7	2.5 mg/kg	102	70.0	130
EP075(SIM)A: Phenolic Compounds (QCLot: 2694918)							
ES1936922-001	BH05_4.6-4.7	EP075(SIM): Phenol	108-95-2	10 mg/kg	102	70.0	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	10 mg/kg	112	70.0	130
		EP075(SIM): Pentachlorophenol	87-86-5	10 mg/kg	84.8	20.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2694918)							
ES1936922-001	BH05_4.6-4.7	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	109	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	109	70.0	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2696392)							
ES1937243-002	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	108	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2696392)							
ES1937243-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	97.0	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1936922**	Page	: 1 of 8
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Jessica Watson	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 08-Nov-2019
Site	: ----	Issue Date	: 15-Nov-2019
Sampler	: CARMEN YI	No. of samples received	: 4
Order number	: 12517046	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG048: Hexavalent Chromium (Alkaline Digest)	ES1936560--001	Anonymous	**Hexavalent Chromium**	18540-29-9	5.00 %	70.0-130%	**Recovery less than lower data quality objective**
EG048: Hexavalent Chromium (Alkaline Digest)	ES1936560--001	Anonymous	**Hexavalent Chromium**	18540-29-9	2.60 %	70.0-130%	**Recovery less than lower data quality objective**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	13	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA037: Ass Field Screening Analysis							
Snap Lock Bag - frozen (EA037) BH05_4.6-4.7	**07-Nov-2019**	**14-Nov-2019**	05-May-2020	✓	**14-Nov-2019**	05-May-2020	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) BH05_4.6-4.7	**07-Nov-2019**	**----**	----	----	**12-Nov-2019**	21-Nov-2019	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	05-May-2020	✓	**13-Nov-2019**	05-May-2020	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	05-Dec-2019	✓	**13-Nov-2019**	05-Dec-2019	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EG048: Hexavalent Chromium (Alkaline Digest)							
Soil Glass Jar - Unpreserved (EG048G) BH05_4.6-4.7	**07-Nov-2019**	**13-Nov-2019**	05-Dec-2019	✓	**13-Nov-2019**	20-Nov-2019	✓
EK026SF: Total CN by Segmented Flow Analyser							
Soil Glass Jar - Unpreserved (EK026SF) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	21-Nov-2019	✓	**14-Nov-2019**	26-Nov-2019	✓
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser							
Soil Glass Jar - Unpreserved (EK028SF) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	21-Nov-2019	✓	**14-Nov-2019**	26-Nov-2019	✓
EK040T: Fluoride Total							
Snap Lock Bag (EK040T) BH05_4.6-4.7	**07-Nov-2019**	**11-Nov-2019**	05-Dec-2019	✓	**14-Nov-2019**	05-Dec-2019	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	21-Nov-2019	✓	**13-Nov-2019**	22-Dec-2019	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	21-Nov-2019	✓	**13-Nov-2019**	22-Dec-2019	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	21-Nov-2019	✓	**13-Nov-2019**	22-Dec-2019	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Soil Glass Jar - Unpreserved (EP071SG-S) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	21-Nov-2019	✓	**14-Nov-2019**	22-Dec-2019	✓
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup							
Soil Glass Jar - Unpreserved (EP071SG-S) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	21-Nov-2019	✓	**14-Nov-2019**	22-Dec-2019	✓
EP074A: Monocyclic Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP074) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	14-Nov-2019	✓	**12-Nov-2019**	14-Nov-2019	✓
EP074B: Oxygenated Compounds							
Soil Glass Jar - Unpreserved (EP074) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	14-Nov-2019	✓	**12-Nov-2019**	14-Nov-2019	✓
EP074E: Halogenated Aliphatic Compounds							
Soil Glass Jar - Unpreserved (EP074) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	14-Nov-2019	✓	**12-Nov-2019**	14-Nov-2019	✓
EP074F: Halogenated Aromatic Compounds							
Soil Glass Jar - Unpreserved (EP074) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	14-Nov-2019	✓	**12-Nov-2019**	14-Nov-2019	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EP074G: Trihalomethanes							
Soil Glass Jar - Unpreserved (EP074) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	14-Nov-2019	✓	**12-Nov-2019**	14-Nov-2019	✓
EP075(SIM)A: Phenolic Compounds							
Soil Glass Jar - Unpreserved (EP075(SIM)) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	21-Nov-2019	✓	**13-Nov-2019**	22-Dec-2019	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	21-Nov-2019	✓	**13-Nov-2019**	22-Dec-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	21-Nov-2019	✓	**12-Nov-2019**	21-Nov-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) BH05_4.6-4.7	**07-Nov-2019**	**12-Nov-2019**	21-Nov-2019	✓	**12-Nov-2019**	21-Nov-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) RIN_03	**07-Nov-2019**	**11-Nov-2019**	14-Nov-2019	✓	**12-Nov-2019**	21-Dec-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	13	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	13	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
ASS Field Screening Analysis	* EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines, version 2.1 June 2004. As received samples are tested for pH field and pH fox and assessed for a reaction rating.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 6.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060A. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Cyanide by Segmented Flow Analyser	EK026SF	SOIL	In house: Referenced to APHA 4500-CN C / ASTM D7511. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM (2013) Schedule B(3)
WAD Cyanide by Segmented Flow Analyser	EK028SF	SOIL	In house: Referenced to APHA 4500-CN-O. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Hydrogen cyanide is liberated from a slightly acidified (pH 4.5) and is dialysed. Tight cyanide complexes that would not be amenable to oxidation by chlorine are not converted. Iron cyanide complexes are precipitated with zinc acetate. Liberated HCN diffuses through a membrane into a stream of sodium hydroxide where it is carried as CN- The cyanide in caustic solution is buffered to pH 5.2 and further converted to cyanogen chloride by reaction with chloramine-T. Cyanogen chloride subsequently reacts with 4 ¿pyridine carboxylic and 1,3 - dimethylbarbituric acids to give a red colour complex. This colour is measured at 600 nm. This method is compliant with NEPM (2013) Schedule B(3)
Total Fluoride	EK040T	SOIL	(In-house) Total fluoride is determined by ion specific electrode (ISE) in a solution obtained after a Sodium Carbonate / Potassium Carbonate fusion dissolution.

Analytical Methods	Method	Matrix	Method Descriptions
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
Volatile Organic Compounds	EP074	SOIL	In house: Referenced to USEPA SW 846 - 8260B Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 501)
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
NaOH leach for CN in Soils	CN-PR	SOIL	In house: APHA 4500 CN. Samples are extracted by end-over-end tumbling with NaOH.
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
Total Fluoride	EK040T-PR	SOIL	In house: Samples are fused with Sodium Carbonate / Potassium Carbonate flux.
Drying only	EN020D	SOIL	In house
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.

UPDATED COC

Loren 19/11/19 14:00

Loren Schiavon

From:	Carmen Yi <Carmen.Yi@ghd.com>
Sent:	Tuesday, 19 November 2019 1:56 PM
To:	Loren Schiavon
Cc:	Sarah.Eccleshall@ghd.com; ALSEnviro Sydney
Subject:	[EXTERNAL] - RE: ALS samples received on hold
Attachments:	11112019112559-0001.pdf

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi Loren,

Thank you for following up on these.
Please proceed analysis for the following samples listed in the attached COC on standard TAT and have these samples extracted on time to meet the relevant holding time requirements:

BH06_1.2-1.45 and BH07_2.5-2.95: P-7/4 short suite, and TCLP for B(a)P

RB: 8 Metals and PAH

Trip blank and Trip spike: BTEX

Any questions please do not hesitate to contact me.

Environmental Division
Sydney
Work Order Reference
ES1937111

Telephone : + 61-2-8784 8555

Kind Regards,

Carmen Yi
Senior Environmental Engineer – Contamination and Environment Management

GHD
Proudly employee owned
T: +61 2 9239 7630 | M: +61 451 962 988 | E: carmen.yi@ghd.com
Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia | www.ghd.com

From: Loren Schiavon <loren.schiavon@alsglobal.com>
Sent: Tuesday, 19 November 2019 10:59 AM
To: Sarah Eccleshall <Sarah.Eccleshall@ghd.com>; Carmen Yi <Carmen.Yi@ghd.com>
Subject: RE: ALS samples received on hold

Hi Sarah and Carmen,

ALS still has the attached samples on hold. Are you able to confirm if analysis will be require don these samples?

Thanks.

Kind Regards

Loren Schiavon
Sample Administration Coordinator, Environmental

T +61 2 8784 8555
F +61 2 8784 8500
Loren.schiavon@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164
AUSTRALIA

From: Loren Schiavon
Sent: Monday, 11 November 2019 11:50 AM
To: sarah.eccleshall@ghd.com; carmen.yi@ghd.com
Subject: ALS samples received on hold

Hi Sarah and Carmen,

Please see attached a COC for samples received this morning on hold.

If you could provide me with an updated COC at your earliest convenience, I will be able to make the necessary arrangements for you.

Cheers.

P.S. Sorry to have called you at a bad time Carmen! I'll try calling again later if I don't hear back from you.

Kind Regards

Loren Schiavon
Sample Administration Coordinator, Environmental

T +61 2 8784 8555
F +61 2 8784 8500
Loren.schiavon@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164
AUSTRALIA

We are keen for your feedback! Please click here for your 3 minute survey

EnviroMail™ 00 - All EnviroMails™ in one convenient library.
Recent releases (click to access directly):
EnviroMail™ 124 – PFOS Analysis to Freshwater Species Protection Lvl 99%
EnviroMail™ 127 – Bacterial Diversity Profiling in NGS

We are keen for your feedback! Please click here for your 3 minute survey

Right Solutions · Right Partner
www.alsglobal.com

This e-mail has been scanned for viruses

ALS Environmental

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E:
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd
OFFICE: level 15, 133 Castlereagh St, Sydney
PROJECT: 12517046
ORDER NUMBER:
PROJECT MANAGER: Carmen Yi | CONTACT PH: 0451 962 988
SAMPLER: James Tomlinson | SAMPLER MOBILE: 0459 648 332
COC emailed to ALS? (YES / NO) | EDD FORMAT (or default):
Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com
Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENTS (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☐ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: SY-522-19

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
J. Tomlinson	TAS		
DATE/TIME: 11/11/2019 10:40 am	DATE/TIME: 11/11/19 11	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please inform GHD contacts of any possible holding time issues that are pecieved with these samples

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price)
Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (EA037)	Phenols (EP075A)	TRH/BTEXN (EP080-SD)	TRH Ultra trace in sediments (EP071-SD)	TOC (EP003)	TCN (EK026SF)	OC/OP/PCB/PAH (SD-02)	ICMPS Metals (15 metals + low level Hg) (SD03)	Particle Size distribution (EA150H)	P-7/4 Short Suite			TBT (EP090)	Dioxins/Furnas (EP300)		Hold
1	BH07_2.6-2.95	7/11/2019 0:00	S	Jar	1																X
2	BH06_4.0-4.45	7/11/2019 0:00	S	Jar	1																X
3	BH06_1.2-1.45	7/11/2019 0:00	S	Jar	1																X
4	BH06_2.7-2.95	7/11/2019 0:00	S	Jar	1																X
5	Elutriate	7/11/2019 0:00	W	5L Bottle	1																X
6	Elutriate Blank	7/11/2019 0:00	W	5L Bottle	1																X
7	RB	7/11/2019 0:00	W	2xV, 1xA, 1xH	4																X
8	Trip blank	7/11/2019 0:00	S	Jar	1																X
9	Trip spike	7/11/2019 0:00	S	Jar	1																X
10	TSC																				
				TOTAL	12																9

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1937111**	Page	: 1 of 12
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Jessica Watson	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 11-Nov-2019 11:00
Order number	: ----	Date Analysis Commenced	: 22-Nov-2019
C-O-C number	: ----	Issue Date	: 26-Nov-2019 18:46
Sampler	: JAMES TOMLINSON		
Site	: ----		
Quote number	: SY/522/19		
No. of samples received	: 10		
No. of samples analysed	: 6		

NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield West, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG048G: Poor spike recovery for Alkyl Hexavalent Chromium due to matrix interferences..
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EG005: Poor precision was obtained for Iron on sample ES1937111-1. Results have been confirmed by re-extraction and reanalysis.
- EG035: Positive Hg result ES1937111 #3 has been confirmed by reanalysis.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH07_2.5-2.95	BH06_1.2-1.45	Trip blank	Trip spike	TSC
			Client sampling date / time	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937111-001	ES1937111-003	ES1937111-008	ES1937111-009	ES1937111-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**18.2**	**23.7**	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	**6**	----	----	----
Beryllium	7440-41-7	1	mg/kg	<1	<1	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Lead	7439-92-1	5	mg/kg	<5	**68**	----	----	----
Molybdenum	7439-98-7	2	mg/kg	<2	<2	----	----	----
Nickel	7440-02-0	2	mg/kg	**5**	**2**	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	<5	----	----	----
Silver	7440-22-4	2	mg/kg	<2	<2	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	**0.2**	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	----	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	----	----	----
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser								
Weak Acid Dissociable Cyanide	----	1	mg/kg	<1	<1	----	----	----
EK040T: Fluoride Total								
Fluoride	16984-48-8	40	mg/kg	**40**	**170**	----	----	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	**5.4**	**9.2**	----	----	----
After HCl pH	----	0.1	pH Unit	**1.4**	**5.2**	----	----	----
Extraction Fluid Number	----	1	-	**1**	**2**	----	----	----
Final pH	----	0.1	pH Unit	**5.1**	**5.8**	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH07_2.5-2.95	BH06_1.2-1.45	Trip blank	Trip spike	TSC
			Client sampling date / time	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937111-001	ES1937111-003	ES1937111-008	ES1937111-009	ES1937111-010
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	----	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	**850**	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	**170**	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	**1020**	----	----	----
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	**560**	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	**400**	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	**960**	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	----	----
EP074B: Oxygenated Compounds								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH07_2.5-2.95	BH06_1.2-1.45	Trip blank	Trip spike	TSC
			Client sampling date / time	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937111-001	ES1937111-003	ES1937111-008	ES1937111-009	ES1937111-010
				Result	Result	Result	Result	Result
EP074B: Oxygenated Compounds - Continued								
2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5	----	----	----
EP074E: Halogenated Aliphatic Compounds								
Vinyl chloride	75-01-4	4	mg/kg	<4	<4	----	----	----
1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	<0.5	----	----	----
Methylene chloride	75-09-2	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	<0.5	----	----	----
Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	<0.5	----	----	----
1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	<0.5	----	----	----
Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	<0.5	----	----	----
Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	<0.5	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	<0.5	----	----	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	<0.5	----	----	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	----	----	----
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	----	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	----	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	----	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	----	----	----
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	**1.4**	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	**1.6**	----	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH07_2.5-2.95**	**BH06_1.2-1.45**	**Trip blank**	**Trip spike**	**TSC**
			Client sampling date / time	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1937111-001**	**ES1937111-003**	**ES1937111-008**	**ES1937111-009**	**ES1937111-010**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	**0.8**	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	**0.7**	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	**1.4**	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	**0.7**	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	**1.1**	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	**0.6**	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	**0.8**	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	**9.1**	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	**1.5**	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**1.7**	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**2.0**	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	**72**	**78**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	**86**	**92**
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	----	----	<10	**43**	**48**
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	<0.2	**0.3**	**0.4**
Toluene	108-88-3	0.5	mg/kg	----	----	<0.5	**19.9**	**20.7**
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	<0.5	**2.9**	**2.8**
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	<0.5	**14.5**	**14.6**
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	<0.5	**5.8**	**6.0**
^ **Sum of BTEX**	----	0.2	mg/kg	----	----	<0.2	**43.4**	**44.5**
^ **Total Xylenes**	----	0.5	mg/kg	----	----	<0.5	**20.3**	**20.6**
Naphthalene	91-20-3	1	mg/kg	----	----	<1	<1	<1
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**86.8**	**84.1**	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**105**	**105**	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**73.4**	**68.5**	----	----	----
EP074S: VOC Surrogates								

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	BH07_2.5-2.95	BH06_1.2-1.45	Trip blank	Trip spike	TSC
			Client sampling date / time	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00	07-Nov-2019 00:00
				ES1937111-001	ES1937111-003	ES1937111-008	ES1937111-009	ES1937111-010
				Result	Result	Result	Result	Result
EP074S: VOC Surrogates - Continued								
1.2-Dichloroethane-D4	17060-07-0	0.5	%	101	86.3	----	----	----
Toluene-D8	2037-26-5	0.5	%	90.0	94.6	----	----	----
4-Bromofluorobenzene	460-00-4	0.5	%	98.3	99.2	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	107	107	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	111	113	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	74.5	76.4	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	114	111	----	----	----
Anthracene-d10	1719-06-8	0.5	%	119	120	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	122	125	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	99.5	76.1	102	93.8	102
Toluene-D8	2037-26-5	0.2	%	109	86.7	106	119	116
4-Bromofluorobenzene	460-00-4	0.2	%	93.7	79.9	93.5	105	101

Analytical Results

Sub-Matrix: TCLP LEACHATE
(Matrix: WATER)

			Client sample ID	BH07_2.5-2.95	BH06_1.2-1.45	----	----	----
			Client sampling date / time	07-Nov-2019 00:00	07-Nov-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1937111-001	ES1937111-003	--------	--------	--------
				Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	21.9	19.2	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	56.9	51.2	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	57.6	47.9	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	86.4	88.0	----	----	----
Anthracene-d10	1719-06-8	1.0	%	83.9	88.1	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	89.7	89.3	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	RB	----	----	----	----
			Client sampling date / time	07-Nov-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1937111-007	--------	--------	--------	--------
				Result	----	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**20.4**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	**45.3**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	**38.5**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**91.1**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	RB	----	----	----	----
			Client sampling date / time	07-Nov-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1937111-007	--------	--------	--------	--------
				Result	----	----	----	----
EP075(SIM)T: PAH Surrogates - Continued								
Anthracene-d10	1719-06-8	1.0	%	**69.8**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	**82.4**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	17060-07-0	64	130
Toluene-D8	2037-26-5	66	136
4-Bromofluorobenzene	460-00-4	60	122
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Sub-Matrix: **TCLP LEACHATE**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates - Continued			
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1937111**	Page	: 1 of 11
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Jessica Watson	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 11-Nov-2019
Site	: ----	Issue Date	: 26-Nov-2019
Sampler	: JAMES TOMLINSON	No. of samples received	: 10
Order number	: ----	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG048: Hexavalent Chromium (Alkaline Digest)	ES1937111--003	BH06_1.2-1.45	**Hexavalent Chromium**	18540-29-9	0.0206 %	70.0-130%	**Recovery less than lower data quality objective**
EG048: Hexavalent Chromium (Alkaline Digest)	ES1937111--003	BH06_1.2-1.45	**Hexavalent Chromium**	18540-29-9	0.0426 %	70.0-130%	**Recovery less than lower data quality objective**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method		*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	***Days overdue***	*Date analysed*	*Due for analysis*	***Days overdue***
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	----	----	----	22-Nov-2019	21-Nov-2019	**1**
EK026SF: Total CN by Segmented Flow Analyser							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	21-Nov-2019	**1**	----	----	----
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	21-Nov-2019	**1**	----	----	----
EN33: TCLP Leach							
Non-Volatile Leach: 14 day HT(e.g. SV organics)							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	21-Nov-2019	**1**	----	----	----
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	21-Nov-2019	**1**	----	----	----
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	21-Nov-2019	**1**	----	----	----
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	21-Nov-2019	**1**	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	21-Nov-2019	**1**	----	----	----
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	21-Nov-2019	**1**	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons							

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Due for extraction	Days overdue	Analysis: Date analysed	Due for analysis	Days overdue
EP074A: Monocyclic Aromatic Hydrocarbons - Analysis Holding Time Compliance							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	14-Nov-2019	**8**	22-Nov-2019	14-Nov-2019	**8**
EP074B: Oxygenated Compounds							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	14-Nov-2019	**8**	22-Nov-2019	14-Nov-2019	**8**
EP074E: Halogenated Aliphatic Compounds							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	14-Nov-2019	**8**	22-Nov-2019	14-Nov-2019	**8**
EP074F: Halogenated Aromatic Compounds							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	14-Nov-2019	**8**	22-Nov-2019	14-Nov-2019	**8**
EP074G: Trihalomethanes							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	14-Nov-2019	**8**	22-Nov-2019	14-Nov-2019	**8**
EP075(SIM)A: Phenolic Compounds							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	21-Nov-2019	**1**	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95,	BH06_1.2-1.45	22-Nov-2019	21-Nov-2019	**1**	----	----	----
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95, Trip blank, TSC	BH06_1.2-1.45, Trip spike,	22-Nov-2019	21-Nov-2019	**1**	22-Nov-2019	21-Nov-2019	**1**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved							
BH07_2.5-2.95, Trip blank, TSC	BH06_1.2-1.45, Trip spike,	22-Nov-2019	21-Nov-2019	**1**	22-Nov-2019	21-Nov-2019	**1**
EP080: BTEXN							
Soil Glass Jar - Unpreserved							
Trip blank, TSC	Trip spike,	22-Nov-2019	21-Nov-2019	**1**	22-Nov-2019	21-Nov-2019	**1**

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Due for extraction	Days overdue	Analysis: Date analysed	Due for analysis	Days overdue
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons						

Matrix: **WATER**

Method Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Due for extraction	Days overdue	Analysis: Date analysed	Due for analysis	Days overdue
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Analysis Holding Time Compliance						
Amber Glass Bottle - Unpreserved						
RB	22-Nov-2019	14-Nov-2019	8	----	----	----

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	35	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	35	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**----**	----	----	**22-Nov-2019**	21-Nov-2019	×
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	05-May-2020	✓	**25-Nov-2019**	05-May-2020	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	05-Dec-2019	✓	**25-Nov-2019**	05-Dec-2019	✓
EG048: Hexavalent Chromium (Alkaline Digest)								
Soil Glass Jar - Unpreserved (EG048G)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	05-Dec-2019	✓	**22-Nov-2019**	29-Nov-2019	✓
EK026SF: Total CN by Segmented Flow Analyser								
Soil Glass Jar - Unpreserved (EK026SF)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	21-Nov-2019	×	**25-Nov-2019**	06-Dec-2019	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser								
Soil Glass Jar - Unpreserved (EK028SF)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	21-Nov-2019	×	**25-Nov-2019**	06-Dec-2019	✓
EK040T: Fluoride Total								
Soil Glass Jar - Unpreserved (EK040T)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	05-Dec-2019	✓	**26-Nov-2019**	05-Dec-2019	✓
EN33: TCLP Leach								
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	21-Nov-2019	×	**----**	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	21-Nov-2019	×	**23-Nov-2019**	01-Jan-2020	✓
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	21-Nov-2019	×	**23-Nov-2019**	01-Jan-2020	✓
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	21-Nov-2019	×	**23-Nov-2019**	01-Jan-2020	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Soil Glass Jar - Unpreserved (EP071SG-S)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	21-Nov-2019	×	**23-Nov-2019**	01-Jan-2020	✓
EP071 SG-S: Total Petroleum Hydrocarbons in Soil - Silica gel cleanup								
Soil Glass Jar - Unpreserved (EP071SG-S)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	21-Nov-2019	×	**23-Nov-2019**	01-Jan-2020	✓
EP074A: Monocyclic Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP074)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	14-Nov-2019	×	**22-Nov-2019**	14-Nov-2019	×
EP074B: Oxygenated Compounds								
Soil Glass Jar - Unpreserved (EP074)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	14-Nov-2019	×	**22-Nov-2019**	14-Nov-2019	×
EP074E: Halogenated Aliphatic Compounds								
Soil Glass Jar - Unpreserved (EP074)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	14-Nov-2019	×	**22-Nov-2019**	14-Nov-2019	×
EP074F: Halogenated Aromatic Compounds								
Soil Glass Jar - Unpreserved (EP074)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	14-Nov-2019	×	**22-Nov-2019**	14-Nov-2019	×
EP074G: Trihalomethanes								
Soil Glass Jar - Unpreserved (EP074)								
BH07_2.5-2.95,	BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	14-Nov-2019	×	**22-Nov-2019**	14-Nov-2019	×

Matrix: **SOIL**

Evaluation: ✘ = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation Date extracted	Due for extraction	Evaluation	Analysis Date analysed	Due for analysis	Evaluation
EP075(SIM)A: Phenolic Compounds							
Soil Glass Jar - Unpreserved (EP075(SIM)) BH07_2.5-2.95, BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	21-Nov-2019	✘	**22-Nov-2019**	01-Jan-2020	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) BH07_2.5-2.95, BH06_1.2-1.45	**07-Nov-2019**	**22-Nov-2019**	21-Nov-2019	✘	**22-Nov-2019**	01-Jan-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) BH07_2.5-2.95, BH06_1.2-1.45, Trip blank, Trip spike, TSC	**07-Nov-2019**	**22-Nov-2019**	21-Nov-2019	✘	**22-Nov-2019**	21-Nov-2019	✘
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) BH07_2.5-2.95, BH06_1.2-1.45, Trip blank, Trip spike, TSC	**07-Nov-2019**	**22-Nov-2019**	21-Nov-2019	✘	**22-Nov-2019**	21-Nov-2019	✘
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) Trip blank, Trip spike, TSC	**07-Nov-2019**	**22-Nov-2019**	21-Nov-2019	✘	**22-Nov-2019**	21-Nov-2019	✘

Matrix: **WATER**

Evaluation: ✘ = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation Date extracted	Due for extraction	Evaluation	Analysis Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) RB	**07-Nov-2019**	**22-Nov-2019**	05-May-2020	✓	**22-Nov-2019**	05-May-2020	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) RB	**07-Nov-2019**	**----**	----	----	**22-Nov-2019**	05-Dec-2019	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) RB	**07-Nov-2019**	**22-Nov-2019**	14-Nov-2019	✘	**22-Nov-2019**	01-Jan-2020	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH07_2.5-2.95, BH06_1.2-1.45	**22-Nov-2019**	**25-Nov-2019**	29-Nov-2019	✓	**25-Nov-2019**	04-Jan-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TCLP for Non & Semivolatile Analytes	EN33a	1	3	**33.33**	**9.09**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Method Blanks (MB) - Continued							
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*	
Laboratory Duplicates (DUP)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	35	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	35	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 6.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060A. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Cyanide by Segmented Flow Analyser	EK026SF	SOIL	In house: Referenced to APHA 4500-CN C / ASTM D7511. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM (2013) Schedule B(3)
WAD Cyanide by Segmented Flow Analyser	EK028SF	SOIL	In house: Referenced to APHA 4500-CN-O. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Hydrogen cyanide is liberated from a slightly acidified (pH 4.5) and is dialysed. Tight cyanide complexes that would not be amenable to oxidation by chlorine are not converted. Iron cyanide complexes are precipitated with zinc acetate. Liberated HCN diffuses through a membrane into a stream of sodium hydroxide where it is carried as CN- The cyanide in caustic solution is buffered to pH 5.2 and further converted to cyanogen chloride by reaction with chloramine-T. Cyanogen chloride subsequently reacts with 4 ¿pyridine carboxylic and 1,3 - dimethylbarbituric acids to give a red colour complex. This colour is measured at 600 nm. This method is compliant with NEPM (2013) Schedule B(3)
Total Fluoride	EK040T	SOIL	(In-house) Total fluoride is determined by ion specific electrode (ISE) in a solution obtained after a Sodium Carbonate / Potassium Carbonate fusion dissolution.
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)

Analytical Methods	Method	Matrix	Method Descriptions
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction (Silica Gel Clean Up)	EP071SG-S	SOIL	In house: Referenced to USEPA SW 846 - 8015A. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
Volatile Organic Compounds	EP074	SOIL	In house: Referenced to USEPA SW 846 - 8260B Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 501)
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
NaOH leach for CN in Soils	CN-PR	SOIL	In house: APHA 4500 CN. Samples are extracted by end-over-end tumbling with NaOH.
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
Total Fluoride	EK040T-PR	SOIL	In house: Samples are fused with Sodium Carbonate / Potassium Carbonate flux.
TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)

Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	SOIL	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.

EN 8L

CLP B(a)P	TCLP Lead	TCLP Mercury	Lead, PAH	Mercury, Mercury TCLP	PCB	TBT + Dioxin (extraction only)	Elutriate for PAH, PCB	Porewater PAH and PCB
	x		x	x				
			x					
			x					
			x					
			x	x				
			x		x			
	x		x					
			x					
			x					
			x					
			x	x				
			x					
			x	x				
	x			TBT / ALS Brisbane #29, 51, 53 work order split from ES1937554/ ES 1990050			17 (97) x (please include replicate analysis on this sample)	x 17 ANDREW 12/11/19
			x		x			
	x		x	x				
			x					
			x					
	x		x					
			x					
			x					

(94)

5:25 PM

Subcon / Forward Lab / Split WO
Lab / Analysis:
Organised By / Date:
Relinquished By / Date:
Connote / Courier:
WO No: ES 1937483
Attached By PO / Internal Sheet:

Environmental Division
Sydney
Work Order Reference
ES1937483

Telephone : + 61-2-8784 8555

TCLP Sap	TCLP lead	TCLP mercury	on soil PB/PAH	on soil mercury / TCLP mercury	on soil PCB	TBT + Dioxin extraction only	Elutriate for PAH, PCB	Porewater PAH & PCB
	x		x	x				
			x					
	x		x	x				
			x					
	x		x	x				
			x					
						x S1		
	X	X				x S3	x S3	S3 x (please include replicate analysis on this sample)
			x					
	X							
			x	x				
			x					
			x					
			x					
			x					
			x					
			x		x			
			x					
	x		x					
			x		x as per email			

96

TCLP merc on soil PB on soil ~~TCLP PAH~~ On Soil mercy. / TCLP mercury

TCLP BAP	TCLP Lead	PB/~~PAH~~	x Mercury	~~PAH~~ 0 ~~A soil~~					
			x						
	x								
			x	x					
			x						
			x						
			x						
			x						
			x						
	x		x	x					
			x						
			x						
	x		x						
			x						
			x						
			x						

Vishal
13/11/2019
0835

.al Patel

From: Angus Harding
Sent: Wednesday, 13 November 2019 8:34 AM
To: Vishal Patel
Cc: Loren Schiavon
Subject: FW: [EXTERNAL] - Additional analyses for project 12517046

Hey Vishal,

Some slight changes to that re-batch:

- We will need VC12_0.0-0.5 instead of VC03_0.0-0.5
- PCBs on VC12_1.0-1.1

Let me know when you are getting to it and I shall help.

Cheers.

Kind Regards,

Angus Harding

Client Services Officer, Environmental
Sydney

T +61 2 8784 8555
F +61 2 8784 8500
D +61 2 8784 8503
angus.harding@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA

We are keen for your feedback! Please click here for your 3 minute survey

EnviroMail™ 00 – All EnviroMails™ in one convenient library.
Recent releases (click to access directly):
EnviroMail™ 124 – PFOS Analysis to Freshwater Species Protection Lvl 99%
EnviroMail™ 127 – Bacterial Diversity Profiling in NGS

See how ALS is making sampling easier! Register your interest here.

Right Solutions · Right Partner
www.alsglobal.com

From: Sarah.Eccleshall@ghd.com [mailto:Sarah.Eccleshall@ghd.com]
Sent: Tuesday, 12 November 2019 5:25 PM
To: Angus Harding <angus.harding@ALSGlobal.com>; Brenda Hong <Brenda.Hong@alsglobal.com>
Cc: Carmen Yi <Carmen.Yi@ghd.com>
Subject: RE: [EXTERNAL] - Additional analyses for project 12517046

Hi Angus,

A couple of modifications to the additional analyses based on the results we just received, sorry about that.

Can we also get PCB analyses on sample VC12_1.0-1.1

Can sample VC03_0.0-0.5 be removed from the PVS and elutriate analyses and VC12_0.0-0.5 be analysed in its place.

Thanks

Sarah Eccleshall
PhD MSc BSc Hons
Graduate Environmental Scientist
Contamination & Environmental Management

GHD
Proudly employee owned
T: +61 2 9239 7715 | M: +61 459 546 332 | E: sarah.eccleshall@ghd.com
Level 15 133 Castlereagh Street Sydney NSW 2000 Australia | www.ghd.com

Connect

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

From: Angus Harding <angus.harding@ALSGlobal.com>
Sent: Tuesday, 12 November 2019 3:55 PM
To: Sarah Eccleshall <Sarah.Eccleshall@ghd.com>; Brenda Hong (InTouch) <brenda.hong@alsglobal.com>
Cc: Carmen Yi <Carmen.Yi@ghd.com>
Subject: RE: [EXTERNAL] - Additional analyses for project 12517046

No worries Sarah ☺

Kind Regards,

Angus Harding

Client Services Officer, Environmental
Sydney

T +61 2 8784 8555
F +61 2 8784 8500
D +61 2 8784 8503
angus.harding@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA

From: Sarah.Eccleshall@ghd.com [mailto:Sarah.Eccleshall@ghd.com]
Sent: Tuesday, 12 November 2019 3:46 PM
To: Angus Harding <angus.harding@ALSGlobal.com>; Brenda Hong <Brenda.Hong@alsglobal.com>
Cc: Carmen Yi <Carmen.Yi@ghd.com>
Subject: RE: [EXTERNAL] - Additional analyses for project 12517046

Hi Angus,

One work order will be fine.

Thanks,

Sarah Eccleshall
PhD MSc BSc Hons
Graduate Environmental Scientist
Contamination & Environmental Management

GHD
Proudly employee owned

T: +61 2 9239 7715 | M: +61 459 546 332 | E: sarah.eccleshall@ghd.com
Level 15 133 Castlereagh Street Sydney NSW 2000 Australia | www.ghd.com

Connect

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

From: Angus Harding <angus.harding@ALSGlobal.com>
Sent: Tuesday, 12 November 2019 3:41 PM
To: Sarah Eccleshall <Sarah.Eccleshall@ghd.com>; Brenda Hong (InTouch) <brenda.hong@alsglobal.com>
Cc: Carmen Yi <Carmen.Yi@ghd.com>
Subject: RE: [EXTERNAL] - Additional analyses for project 12517046

Hey Sarah,

Thanks for sending this one through, we shall get it organised for you. Will it be okay for us to re-batch all of these samples into one workorder? Or did you need it separated into two?

Thank you.

Kind Regards,

Angus Harding

Client Services Officer, Environmental
Sydney

T +61 2 8784 8555
F +61 2 8784 8500
D +61 2 8784 8503
angus.harding@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA

From: Sarah.Eccleshall@ghd.com [mailto:Sarah.Eccleshall@ghd.com]
Sent: Tuesday, 12 November 2019 3:17 PM
To: Brenda Hong <Brenda.Hong@alsglobal.com>
Cc: Angus Harding <angus.harding@ALSGlobal.com>; Carmen Yi <Carmen.Yi@ghd.com>
Subject: [EXTERNAL] - Additional analyses for project 12517046

Hi Brenda,
We'd like to schedule the additional analyses in the tables below.
Any queries please give myself or Carmen a call, thanks.

					TCLP B(a)P	TCLP Lead	TCLP Mercury	Lead, PAH	Mercury, Mercury TCLP	F
ES1936029	VC11_0.0-0.2	30/10/2019			x	x		x	x	
ES1936029	VC11_0.5-0.7	30/10/2019								

ES1936029	VC11_1.0-1.2	30/10/2019						x		
ES1936029	VC11_0.0-0.5	30/10/2019						x		
ES1936029	VC11_0.5-1.0	30/10/2019						x		
ES1936029	VC07_0.2-0.4	30/10/2019						x	x	
ES1936029	VC09_0.0-0.2	30/10/2019								
ES1936029	VC09_0.4-0.6	30/10/2019						x		x
ES1936029	VC09_0.7-0.8	30/10/2019			x	x		x		
ES1936029	VC09_0.8-1.0	30/10/2019						x		
ES1936029	VC09_0.0-0.5	30/10/2019						x		
ES1936029	VC09_0.5-1.0	30/10/2019						x		
ES1936029	VC07_0.0-0.2	30/10/2019								
ES1936029	VC07_0.5-0.6	30/10/2019						x	x	
ES1936029	VC07_0.7-0.8	30/10/2019						x		
ES1936029	VC07_1.0-1.2	30/10/2019						x	x	
ES1936029	VC07_0.0-0.5	30/10/2019	Note: could we please confirm PCB results for this sample?		X	X				
ES1936029	VC07_0.5-1.0	30/10/2019						x		x
ES1936029	VC05_0.0-0.1	30/10/2019			x	x		x	x	x

ES1936029	VC05_0.5-0.7	30/10/2019						x	
ES1936029	VC05_0.8-0.9	30/10/2019							
ES1936029	VC05_0.0-0.5	30/10/2019							
ES1936029	VC05_0.5-0.9	30/10/2019						x	
ES1936029	VC03_0.0-0.2	30/10/2019			x	x		x	
ES1936029	VC03_0.3-0.4	30/10/2019							
ES1936029	VC03_0.4-0.6	30/10/2019						x	
ES1936029	VC03_0.6-0.7	30/10/2019						x	
ES1936029	VC03_1.0-1.2	30/10/2019						x	
ES1936029	VC03_0.0-0.5	30/10/2019							
ES1936029	VC03_0.5-1.0	30/10/2019						x	
ES1936029	VC04_0.0-0.1	31/10/2019			x	x		x	x
ES1936029	VC04_0.4-0.5	31/10/2019							
ES1936029	VC04_0.5-0.6	31/10/2019						x	
ES1936029	VC04_0.7-0.8	31/10/2019			x	x		x	
ES1936029	VC04_0.9-1.0	31/10/2019						x	
ES1936029	VC04_0.0-0.5	31/10/2019							
ES1936029	VC04_0.5-1.0	31/10/2019							

ES1936029	VC02_0.0-0.2	30/10/2019			x	x		x	
ES1936029	VC02_0.5-0.6	30/10/2019						x	x
ES1936029	VC02_1.0-1.2	30/10/2019			x	x		x	x
ES1936029	VC02_1.5-1.6	30/10/2019							
ES1936029	VC02_1.0-1.5	30/10/2019						x	
ES1936029	VC01_0.0-0.2	30/10/2019			x	x		x	x
ES1936029	vc01_0.4-0.6	30/10/2019						x	
ES1936029	VC01_1.0-1.1	30/10/2019							
ES1936029	VC01_0.0-0.5	30/10/2019							
ES1936029	VC01_0.5-1.0	30/10/2019							
ES1936029	VC10_0.0-0.2	31/10/2019			x	x		x	x
ES1936029	VC10_0.5-0.6	31/10/2019						x	
ES1936029	VC10_0.7-0.8	31/10/2019							
ES1936029	VC10_0.0-0.5	31/10/2019							
ES1936029	VC10_0.5-1.0	31/10/2019							
ES1936029	VC02_0.0-0.5	30/10/2019			X	X	X		
ES1936029	VC02_0.5-1.0	30/10/2019						x	
ES1936183	VC06_0.0-0.1	31/10/2019			X	X			

ES1936183	VC06_0.3-0.4	31/10/2019						x	x	
ES1936183	VC06_0.5-0.6	31/10/2019						x		
ES1936183	VC06_0.7-0.8	31/10/2019						x		
ES1936183	VC06_0.8-0.9	31/10/2019						x		
ES1936183	VC06_0.0-0.5	31/10/2019						x		
ES1936183	VC06_0.5-1.0	31/10/2019						x		
ES1936183	VC12_0.0-0.1	31/10/2019								
ES1936183	VC12_0.3-0.4	31/10/2019						x		x
ES1936183	VC12_0.5-0.6	31/10/2019						x		
ES1936183	VC12_0.8-0.9	31/10/2019			x	x		x		
ES1936183	VC12_1.0-1.1	31/10/2019						x		
ES1936183	VC12_0.0-0.5	31/10/2019								
ES1936183	VC12_0.5-1.0	31/10/2019								
ES1936183	VC08_0.0-0.1	31/10/2019	Note: this is ES1936183-031. Logged erroneously as VC0S_0.0-0.1		X	X				
ES1936183	VC08_0.3-0.4	31/10/2019						x	x	x
ES1936183	VC08_0.5-0.6	31/10/2019						x		
ES1936183	VC08_0.7-0.8	31/10/2019						x		

ES1936183	VC08_1.0-1.1	31/10/2019						x	
ES1936183	VC08_1.3-1.4	31/10/2019						x	
ES1936183	VC08_1.5-1.6	31/10/2019						x	
ES1936183	VC08_0.0-0.5	31/10/2019						x	
ES1936183	VC08_0.5-1.0	31/10/2019						x	
ES1936183	VC08_1.0-1.5	31/10/2019							
ES1936183	VC13_0.0-0.1	31/10/2019			X	X			
ES1936183	VC13_0.3-0.4	31/10/2019						x	x
ES1936183	VC13_0.5-0.6	31/10/2019						x	
ES1936183	VC13_0.7-0.8	31/10/2019						x	
ES1936183	VC13_1.0-1.1	31/10/2019						x	
ES1936183	VC13_0.0-0.5	31/10/2019						x	
ES1936183	VC13_0.5-1.0	31/10/2019						x	
ES1936183	VC14_0.0-0.1	31/10/2019			x	x		x	x
ES1936183	VC14_0.3-0.4	31/10/2019						x	
ES1936183	VC14-0.5-0.6	31/10/2019						x	
ES1936183	VC14_0.7-0.8	31/10/2019			x	x		x	
ES1936183	VC14_1.0-1.1	31/10/2019							

ES1936183	VC14_1.3-1.4	31/10/2019						x	
ES1936183	VC14_0.0-0.5	31/10/2019						x	
ES1936183	VC14_0.5-1.0	31/10/2019						x	

Lab report	Sample ID	Date		Chromium Reducible Sulphur
ES1936029	VC11_0.0-0.1	30/10/2019		x
ES1936029	VC11_0.5-0.6	30/10/2019		
ES1936029	VC11_1.0-1.1	30/10/2019		x
ES1936029	VC09_0.0-0.1	30/10/2019		
ES1936029	VC09_0.5-0.6	30/10/2019		
ES1936029	VC09_0.9-1.0	30/10/2019		x
ES1936029	VC07_0.0-0.1	30/10/2019		x
ES1936029	VC07_0.5-0.6	30/10/2019		
ES1936029	VC07_1.0-1.1	30/10/2019		x
ES1936029	VC05_0.0-0.1	30/10/2019		x
ES1936029	VC05_0.5-0.6	30/10/2019		
ES1936029	VC05_0.8-1.0	30/10/2019		x
ES1936029	VC03_0.0-0.1	30/10/2019		
ES1936029	VC03_0.5-0.6	30/10/2019		

ES1936029	VC03_10-1.1	30/10/2019		x
ES1936029	VC01_0.0-0.1	30/10/2019		x
ES1936029	vc01_0.5-0.6	30/10/2019		
ES1936029	VC01_1.0-1.1	30/10/2019		x
ES1936029	VC02_0.0-0.1	30/10/2019		x
ES1936029	VC02_0.5-0.6	30/10/2019		
ES1936029	VC02_0.9-1.0	30/10/2019		
ES1936029	VC02_1.5-1.6	30/10/2019		x
ES1936029	VC10_0.0-0.1	30/10/2019		
ES1936029	VC10_0.5-0.6	30/10/2019		x
ES1936029	VC04_0.0-0.1	30/10/2019		
ES1936029	VC04_0.9-1.0	30/10/2019		x
ES1936183	VC06_0.0-0.1	31/10/2019		x
ES1936183	VC06_0.5-0.6	31/10/2019		
ES1936183	VC12_0.0-0.1	31/10/2019		x
ES1936183	VC12_0.5-0.6	31/10/2019		
ES1936183	VC12_1.0-1.1	31/10/2019		
ES1936183	VC08_0.0-0.1	31/10/2019		

ES1936183	VC08_0.5-0.6	31/10/2019		x
ES1936183	VC08_1.0-1.1	31/10/2019		
ES1936183	VC08_1.5-1.6	31/10/2019		x
ES1936183	VC13_0.0-0.1	31/10/2019		
ES1936183	VC13_0.5-0.6	31/10/2019		x
ES1936183	VC13_1.0-1.1	31/10/2019		
ES1936183	VC14_0.0-0.1	31/10/2019		x
ES1936183	VC14_0.5-0.6	31/10/2019		
ES1936183	VC14_1.0-1.1	31/10/2019		
ES1936183	VC14_1.3-1.4	31/10/2019		x

Many Thanks,

Sarah Eccleshall
PhD MSc BSc Hons
Graduate Environmental Scientist
Contamination & Environmental Management

GHD
Proudly employee owned
T: +61 2 9239 7715 | M: +61 459 546 332 | E: sarah.eccleshall@ghd.com
Level 15 133 Castlereagh Street Sydney NSW 2000 Australia | www.ghd.com

Connect

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

Please consider our environment before printing this email

CONFIDENTIALITY NOTICE: This email, including any attachments, is confidential and may be privileged. If you are not the intended recipient please notify the sender immediately, and please delete it; you should not copy it or use it for any purpose or disclose its contents to any other person. GHD and its affiliates reserve the right to monitor and modify all email communications through their networks.

This e-mail has been scanned for viruses

CONFIDENTIALITY NOTICE: This email, including any attachments, is confidential and may be privileged. If you are not the intended recipient please notify the sender immediately, and please delete it; you should not copy it or use it for any purpose or disclose its contents to any other person. GHD and its affiliates reserve the right to monitor and modify all email communications through their networks.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1937483**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: sarah.eccleshall@ghd.com	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 12517046	Page	: 1 of 5
Order number	: ----	Quote number	: ES2019GHDSER0030 (SY/522/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	:		

Dates

Date Samples Received	: 13-Nov-2019 14:57	Issue Date	: 13-Nov-2019
Client Requested Due Date	: 20-Nov-2019	Scheduled Reporting Date	: **20-Nov-2019**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 4.1'C
Receipt Detail	:	No. of samples received / analysed	: 100 / 80

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **This work order is a rebatch of ES1936029/ES1936183 and a split from ES1937554/ES1990050.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- TBT suite Analysis to be conducted by ALS Brisbane
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA055-103 Moisture Content	SOIL - EG005C Leachable Metals by ICPAES	SOIL - EG005T (solids) Total Metals by ICP-AES	SOIL - EG035C Leachable Mercury	SOIL - EG035T (solids) Total Mercury by FIMS	SOIL - EP075 SIM PAH only SIM - PAH only	SOIL - TCLP TCLP Leach
ES1937483-001	30-Oct-2019 00:00	VC11_0.0-0.2	✓	✓	✓	✓	✓	✓	✓
ES1937483-003	30-Oct-2019 00:00	VC11_1.0-1.2	✓		✓			✓	
ES1937483-004	30-Oct-2019 00:00	VC11_0.0-0.5	✓		✓			✓	
ES1937483-005	30-Oct-2019 00:00	VC11_0.5-1.0	✓		✓			✓	
ES1937483-006	30-Oct-2019 00:00	VC07_0.2-0.4	✓		✓	✓	✓	✓	✓
ES1937483-008	30-Oct-2019 00:00	VC09_0.4-0.6	✓		✓			✓	
ES1937483-009	30-Oct-2019 00:00	VC09_0.7-0.8	✓	✓	✓			✓	✓
ES1937483-010	30-Oct-2019 00:00	VC09_0.8-1.0	✓		✓			✓	
ES1937483-011	30-Oct-2019 00:00	VC09_0.0-0.5	✓		✓			✓	
ES1937483-012	30-Oct-2019 00:00	VC09_0.5-1.0	✓		✓			✓	
ES1937483-014	30-Oct-2019 00:00	VC07_0.5-0.6	✓		✓	✓	✓	✓	✓
ES1937483-015	30-Oct-2019 00:00	VC07_0.7-0.8	✓		✓			✓	
ES1937483-016	30-Oct-2019 00:00	VC07_1.0-1.2	✓		✓	✓	✓	✓	✓
ES1937483-017	30-Oct-2019 00:00	VC07_0.0-0.5		✓				✓	✓
ES1937483-018	30-Oct-2019 00:00	VC07_0.5-1.0	✓		✓			✓	
ES1937483-019	30-Oct-2019 00:00	VC05_0.0-0.1	✓	✓	✓	✓	✓	✓	✓
ES1937483-020	30-Oct-2019 00:00	VC05_0.5-0.7	✓		✓			✓	
ES1937483-023	30-Oct-2019 00:00	VC05_0.5-0.9	✓		✓			✓	
ES1937483-024	30-Oct-2019 00:00	VC03_0.0-0.2	✓	✓	✓			✓	✓
ES1937483-026	30-Oct-2019 00:00	VC03_0.4-0.6	✓		✓			✓	
ES1937483-027	30-Oct-2019 00:00	VC03_0.6-0.7	✓		✓			✓	
ES1937483-028	30-Oct-2019 00:00	VC03_1.0-1.2	✓		✓			✓	
ES1937483-029	30-Oct-2019 00:00	VC12_0.0-0.5	✓						
ES1937483-030	30-Oct-2019 00:00	VC03_0.5-1.0	✓		✓			✓	
ES1937483-031	30-Oct-2019 00:00	VC04_0.0-0.1	✓	✓	✓	✓	✓	✓	✓
ES1937483-033	31-Oct-2019 00:00	VC04_0.5-0.6	✓		✓			✓	
ES1937483-034	31-Oct-2019 00:00	VC04_0.7-0.8	✓	✓	✓			✓	✓
ES1937483-035	31-Oct-2019 00:00	VC04_0.9-1.0	✓		✓			✓	
ES1937483-038	30-Oct-2019 00:00	VC02_0.0-0.2	✓	✓	✓			✓	✓
ES1937483-039	30-Oct-2019 00:00	VC02_0.5-0.6	✓		✓	✓	✓	✓	✓
ES1937483-040	30-Oct-2019 00:00	VC02_1.0-1.2	✓	✓	✓	✓	✓	✓	✓
ES1937483-042	30-Oct-2019 00:00	VC02_1.0-1.5	✓		✓			✓	
ES1937483-043	30-Oct-2019 00:00	VC01_0.0-0.2	✓	✓	✓	✓	✓	✓	✓
ES1937483-044	30-Oct-2019 00:00	vc01_0.4-0.6	✓		✓			✓	
ES1937483-048	31-Oct-2019 00:00	VC10_0.0-0.2	✓	✓	✓	✓	✓	✓	✓

			SOIL - EA055-103 Moisture Content	SOIL - EG005C Leachable Metals by ICPAES	SOIL - EG005T (solids) Total Metals by ICP-AES	SOIL - EG035C Leachable Mercury	SOIL - EG035T (solids) Total Mercury by FIMS	SOIL - EP075 SIM PAH only SIM - PAH only	SOIL - TCLP TCLP Leach
ES1937483-049	31-Oct-2019 00:00	VC10_0.5-0.6	✓		✓			✓	
ES1937483-051	31-Oct-2019 00:00	VC10_0.0-0.5	✓						
ES1937483-053	30-Oct-2019 00:00	VC02_0.0-0.5	✓	✓		✓		✓	✓
ES1937483-054	30-Oct-2019 00:00	VC02_0.5-1.0	✓		✓			✓	
ES1937483-055	31-Oct-2019 00:00	VC06_0.0-0.1		✓				✓	✓
ES1937483-056	31-Oct-2019 00:00	VC06_0.3-0.4	✓		✓	✓	✓	✓	✓
ES1937483-057	31-Oct-2019 00:00	VC06_0.5-0.6	✓		✓			✓	
ES1937483-058	31-Oct-2019 00:00	VC06_0.7-0.8	✓		✓			✓	
ES1937483-059	31-Oct-2019 00:00	VC06_0.8-0.9	✓		✓			✓	
ES1937483-060	31-Oct-2019 00:00	VC06_0.0-0.5	✓		✓			✓	
ES1937483-061	31-Oct-2019 00:00	VC06_0.5-1.0	✓		✓			✓	
ES1937483-063	31-Oct-2019 00:00	VC12_0.3-0.4	✓		✓			✓	
ES1937483-064	31-Oct-2019 00:00	VC12_0.5-0.6	✓		✓			✓	
ES1937483-065	31-Oct-2019 00:00	VC12_0.8-0.9	✓	✓	✓			✓	✓
ES1937483-066	31-Oct-2019 00:00	VC12_1.0-1.1	✓		✓			✓	
ES1937483-069	31-Oct-2019 00:00	VC08_0.0-0.1		✓				✓	✓
ES1937483-070	31-Oct-2019 00:00	VC08_0.3-0.4	✓		✓	✓	✓	✓	✓
ES1937483-071	31-Oct-2019 00:00	VC08_0.5-0.6	✓		✓			✓	
ES1937483-072	31-Oct-2019 00:00	VC08_0.7-0.8	✓		✓			✓	
ES1937483-073	31-Oct-2019 00:00	VC08_1.0-1.1	✓		✓			✓	
ES1937483-074	31-Oct-2019 00:00	VC08_1.3-1.4	✓		✓			✓	
ES1937483-075	31-Oct-2019 00:00	VC08_1.5-1.6	✓		✓			✓	
ES1937483-076	31-Oct-2019 00:00	VC08_0.0-0.5	✓		✓			✓	
ES1937483-077	31-Oct-2019 00:00	VC08_0.5-1.0	✓		✓			✓	
ES1937483-079	31-Oct-2019 00:00	VC13_0.0-0.1		✓				✓	✓
ES1937483-080	31-Oct-2019 00:00	VC13_0.3-0.4	✓		✓	✓	✓	✓	✓
ES1937483-081	31-Oct-2019 00:00	VC13_0.5-0.6	✓		✓			✓	
ES1937483-082	31-Oct-2019 00:00	VC13_0.7-0.8	✓		✓			✓	
ES1937483-083	31-Oct-2019 00:00	VC13_1.0-1.1	✓		✓			✓	
ES1937483-084	31-Oct-2019 00:00	VC13_0.0-0.5	✓		✓			✓	
ES1937483-085	31-Oct-2019 00:00	VC13_0.5-1.0	✓		✓			✓	
ES1937483-086	31-Oct-2019 00:00	VC14_0.0-0.1	✓	✓	✓	✓	✓	✓	✓
ES1937483-087	31-Oct-2019 00:00	VC14_0.3-0.4	✓		✓			✓	
ES1937483-088	31-Oct-2019 00:00	VC14-0.5-0.6	✓		✓			✓	
ES1937483-089	31-Oct-2019 00:00	VC14_0.7-0.8	✓	✓	✓	✓	✓	✓	✓
ES1937483-091	31-Oct-2019 00:00	VC14_1.3-1.4	✓		✓			✓	
ES1937483-092	31-Oct-2019 00:00	VC14_0.0-0.5	✓		✓			✓	
ES1937483-093	31-Oct-2019 00:00	VC14_0.5-1.0	✓		✓			✓	
ES1937483-094	30-Oct-2019 00:00	VC07_0.0-0.5						✓	
ES1937483-095	30-Oct-2019 00:00	VC12_0.0-0.5						✓	
ES1937483-096	30-Oct-2019 00:00	VC02_0.0-0.5						✓	

			SOIL - EA055-103 Moisture Content	SOIL - EG005C Leachable Metals by ICPAES	SOIL - EG005T (solids) Total Metals by ICP-AES	SOIL - EG035C Leachable Mercury	SOIL - EG035T (solids) Total Mercury by FIMS	SOIL - EP075 SIM PAH only SIM - PAH only	SOIL - TCLP TCLP Leach
ES1937483-097	30-Oct-2019 00:00	VC07_0.0-0.5						✓	
ES1937483-098	30-Oct-2019 00:00	VC02_0.0-0.5						✓	
ES1937483-099	30-Oct-2019 00:00	VC12_0.0-0.5						✓	
ES1937483-100	31-Oct-2019 00:00	SEAWATER						✓	

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	(On Hold) SOIL No analysis requested	SOIL - EN68-2/3 Preparation of Elutriates for 2-3 analysis	SOIL - EN82 Porewater Extraction	SOIL - EP066 (solids) Polychlorinated Biphenyls by GCMS	SOIL - EP066-PCB-WA Polychlorinated Biphenyls (PCB)	SOIL - EP090 (solids) Organotins
ES1937483-002	30-Oct-2019 00:00	VC11_0.5-0.7	✓					
ES1937483-007	30-Oct-2019 00:00	VC09_0.0-0.2	✓					
ES1937483-008	30-Oct-2019 00:00	VC09_0.4-0.6				✓		
ES1937483-013	30-Oct-2019 00:00	VC07_0.0-0.2	✓					
ES1937483-018	30-Oct-2019 00:00	VC07_0.5-1.0				✓		
ES1937483-019	30-Oct-2019 00:00	VC05_0.0-0.1				✓		
ES1937483-021	30-Oct-2019 00:00	VC05_0.8-0.9	✓					
ES1937483-022	30-Oct-2019 00:00	VC05_0.0-0.5	✓					
ES1937483-025	30-Oct-2019 00:00	VC03_0.3-0.4	✓					
ES1937483-029	30-Oct-2019 00:00	VC12_0.0-0.5						✓
ES1937483-032	31-Oct-2019 00:00	VC04_0.4-0.5	✓					
ES1937483-036	31-Oct-2019 00:00	VC04_0.0-0.5	✓					
ES1937483-037	31-Oct-2019 00:00	VC04_0.5-1.0	✓					
ES1937483-041	30-Oct-2019 00:00	VC02_1.5-1.6	✓					
ES1937483-045	31-Oct-2019 00:00	VC01_1.0-1.1	✓					
ES1937483-046	30-Oct-2019 00:00	VC01_0.0-0.5	✓					
ES1937483-047	30-Oct-2019 00:00	VC01_0.5-1.0	✓					
ES1937483-050	31-Oct-2019 00:00	VC10_0.7-0.8	✓					
ES1937483-051	31-Oct-2019 00:00	VC10_0.0-0.5						✓
ES1937483-052	31-Oct-2019 00:00	VC10_0.5-1.0	✓					
ES1937483-053	30-Oct-2019 00:00	VC02_0.0-0.5						✓
ES1937483-062	31-Oct-2019 00:00	VC12_0.0-0.1	✓					
ES1937483-063	31-Oct-2019 00:00	VC12_0.3-0.4				✓		
ES1937483-066	31-Oct-2019 00:00	VC12_1.0-1.1				✓		
ES1937483-067	31-Oct-2019 00:00	VC12_0.0-0.5	✓					
ES1937483-068	31-Oct-2019 00:00	VC12_0.5-1.0	✓					

			(On Hold) SOIL No analysis requested	SOIL - EN68-2/3 Preparation of Elutriates for 2-3 analysis	SOIL - EN82 Porewater Extraction	SOIL - EP066 (solids) Polychlorinated Biphenyls by GCMS	SOIL - EP066-PCB-WA Polychlorinated Biphenyls (PCB)	SOIL - EP090 (solids) Organotins
ES1937483-070	31-Oct-2019 00:00	VC08_0.3-0.4				✓		
ES1937483-078	31-Oct-2019 00:00	VC08_1.0-1.5	✓					
ES1937483-090	31-Oct-2019 00:00	VC14_1.0-1.1	✓					
ES1937483-094	30-Oct-2019 00:00	VC07_0.0-0.5			✓		✓	
ES1937483-095	30-Oct-2019 00:00	VC12_0.0-0.5			✓		✓	
ES1937483-096	30-Oct-2019 00:00	VC02_0.0-0.5			✓		✓	
ES1937483-097	30-Oct-2019 00:00	VC07_0.0-0.5		✓			✓	
ES1937483-098	30-Oct-2019 00:00	VC02_0.0-0.5		✓			✓	
ES1937483-099	30-Oct-2019 00:00	VC12_0.0-0.5		✓			✓	
ES1937483-100	31-Oct-2019 00:00	SEAWATER		✓			✓	

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (Hobart)		
- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com
Accounts Payable Australia		
- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com
GHD LAB REPORTS		
- *AU Certificate of Analysis - NATA (COA)	Email	ghdlabreports@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ghdlabreports@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ghdlabreports@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ghdlabreports@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ghdlabreports@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ghdlabreports@ghd.com
SARAH ECCLESHALL		
- *AU Certificate of Analysis - NATA (COA)	Email	sarah.eccleshall@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sarah.eccleshall@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sarah.eccleshall@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	sarah.eccleshall@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	sarah.eccleshall@ghd.com
- EDI Format - XTab (XTAB)	Email	sarah.eccleshall@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	sarah.eccleshall@ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1937483**	Page	: 1 of 37
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 13-Nov-2019 14:57
Order number	: ----	Date Analysis Commenced	: 14-Nov-2019
C-O-C number	: ----	Issue Date	: 25-Nov-2019 17:44
Sampler	: ----		
Site	:		
Quote number	: SY/522/19		
No. of samples received	: 100		
No. of samples analysed	: 73		

NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Evie Sidarta	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Sarah Ashworth	Laboratory Manager - Brisbane	Brisbane Organics, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EG035: Positive Hg result for ES1937483 #1 has been confirmed by reanalysis.
- EG035: Positive Hg result for ES1937483 #43, 70 have been confirmed by reanalysis.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC11_0.0-0.2	VC11_1.0-1.2	VC11_0.0-0.5	VC11_0.5-1.0	VC07_0.2-0.4
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-001	ES1937483-003	ES1937483-004	ES1937483-005	ES1937483-006
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	28.6	27.7	28.4	29.0	32.7
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	55	6	5	9	89
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	0.8	----	----	----	1.0
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	9.2	----	----	----	9.2
After HCl pH	----	0.1	pH Unit	5.3	----	----	----	5.2
Extraction Fluid Number	----	1	-	2	----	----	----	2
Final pH	----	0.1	pH Unit	6.1	----	----	----	6.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	1.0
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	1.2
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	0.7
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	0.7
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	3.6
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	0.8
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	1.1
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.4
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	89.2	91.8	85.8	84.1	85.8
2-Chlorophenol-D4	93951-73-6	0.5	%	108	110	103	99.9	101

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC11_0.0-0.2	VC11_1.0-1.2	VC11_0.0-0.5	VC11_0.5-1.0	VC07_0.2-0.4
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-001	ES1937483-003	ES1937483-004	ES1937483-005	ES1937483-006
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
2.4.6-Tribromophenol	118-79-6	0.5	%	92.4	89.5	82.4	79.8	92.4
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	129	126	123	126	127
Anthracene-d10	1719-06-8	0.5	%	126	120	121	117	118
4-Terphenyl-d14	1718-51-0	0.5	%	120	123	115	112	113

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.4-0.6	VC09_0.7-0.8	VC09_0.8-1.0	VC09_0.0-0.5	VC09_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-008	ES1937483-009	ES1937483-010	ES1937483-011	ES1937483-012
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	16.3	17.2	15.6	14.5	17.8
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	17	10	5	<5	22
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	----	8.2	----	----	----
After HCl pH	----	0.1	pH Unit	----	1.7	----	----	----
Extraction Fluid Number	----	1	-	----	1	----	----	----
Final pH	----	0.1	pH Unit	----	5.0	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	110	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC09_0.4-0.6	VC09_0.7-0.8	VC09_0.8-1.0	VC09_0.0-0.5	VC09_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-008	ES1937483-009	ES1937483-010	ES1937483-011	ES1937483-012
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
Phenol-d6	13127-88-3	0.5	%	89.3	82.7	86.0	92.8	94.2
2-Chlorophenol-D4	93951-73-6	0.5	%	106	99.3	102	109	110
2.4.6-Tribromophenol	118-79-6	0.5	%	84.8	77.2	75.6	79.9	80.3
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	127	120	122	128	125
Anthracene-d10	1719-06-8	0.5	%	122	116	118	121	119
4-Terphenyl-d14	1718-51-0	0.5	%	118	115	117	125	126

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC07_0.5-0.6	VC07_0.7-0.8	VC07_1.0-1.2	VC07_0.0-0.5	VC07_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-014	ES1937483-015	ES1937483-016	ES1937483-017	ES1937483-018
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	19.0	20.6	17.4	----	22.3
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	10	6	198	----	7
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	<0.1	----	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	8.7	----	8.5	8.9	----
After HCl pH	----	0.1	pH Unit	1.4	----	1.4	5.2	----
Extraction Fluid Number	----	1	-	1	----	1	2	----
Final pH	----	0.1	pH Unit	5.1	----	5.1	6.0	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	----	----	----	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	----	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	----	1.2
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC07_0.5-0.6	VC07_0.7-0.8	VC07_1.0-1.2	VC07_0.0-0.5	VC07_0.5-1.0
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-014	ES1937483-015	ES1937483-016	ES1937483-017	ES1937483-018
				Result	Result	Result	Result	Result
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	0.1	%	----	----	----	----	93.7
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	97.0	90.1	94.5	----	97.1
2-Chlorophenol-D4	93951-73-6	0.5	%	113	107	110	----	114
2.4.6-Tribromophenol	118-79-6	0.5	%	84.4	72.2	75.8	----	79.5
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	121	125	126	----	133
Anthracene-d10	1719-06-8	0.5	%	120	126	119	----	122
4-Terphenyl-d14	1718-51-0	0.5	%	121	124	126	----	124

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.0-0.1	VC05_0.5-0.7	VC05_0.5-0.9	VC03_0.0-0.2	VC03_0.4-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-019	ES1937483-020	ES1937483-023	ES1937483-024	ES1937483-026
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	23.5	17.8	14.7	20.4	20.2
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	56	<5	5	14	29
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	0.6	----	----	----	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	9.2	----	----	8.8	----
After HCl pH	----	0.1	pH Unit	2.0	----	----	1.6	----
Extraction Fluid Number	----	1	-	1	----	----	1	----
Final pH	----	0.1	pH Unit	6.5	----	----	5.0	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	0.7	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	0.8	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	1.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.0-0.1	VC05_0.5-0.7	VC05_0.5-0.9	VC03_0.0-0.2	VC03_0.4-0.6
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-019	ES1937483-020	ES1937483-023	ES1937483-024	ES1937483-026
				Result	Result	Result	Result	Result
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	0.1	%	81.8	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	93.3	93.1	96.0	102	104
2-Chlorophenol-D4	93951-73-6	0.5	%	110	110	113	108	110
2.4.6-Tribromophenol	118-79-6	0.5	%	96.6	83.8	87.2	80.5	81.7
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	128	128	126	113	117
Anthracene-d10	1719-06-8	0.5	%	124	121	124	119	122
4-Terphenyl-d14	1718-51-0	0.5	%	123	122	125	123	127

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC03_0.6-0.7	VC03_1.0-1.2	VC12_0.0-0.5	VC03_0.5-1.0	VC04_0.0-0.1
Client sampling date / time				30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
				ES1937483-027	ES1937483-028	ES1937483-029	ES1937483-030	ES1937483-031
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	19.3	17.3	18.4	18.5	24.0
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	5	<5	----	<5	16
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	----	<0.1
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	----	----	----	----	6.7
After HCl pH	----	0.1	pH Unit	----	----	----	----	1.4
Extraction Fluid Number	----	1	-	----	----	----	----	1
Final pH	----	0.1	pH Unit	----	----	----	----	5.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	----	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	----	1.2	1.2
EP090: Organotin Compounds								
Tributyltin	56573-85-4	0.5	µgSn/kg	----	----	4.0	----	----
EP075(SIM)S: Phenolic Compound Surrogates								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC03_0.6-0.7	VC03_1.0-1.2	VC12_0.0-0.5	VC03_0.5-1.0	VC04_0.0-0.1
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-027	ES1937483-028	ES1937483-029	ES1937483-030	ES1937483-031
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
Phenol-d6	13127-88-3	0.5	%	102	111	----	95.5	115
2-Chlorophenol-D4	93951-73-6	0.5	%	108	118	----	102	123
2.4.6-Tribromophenol	118-79-6	0.5	%	76.0	84.4	----	70.2	85.7
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	115	114	----	108	112
Anthracene-d10	1719-06-8	0.5	%	119	115	----	110	119
4-Terphenyl-d14	1718-51-0	0.5	%	124	125	----	116	120
EP090S: Organotin Surrogate								
Tripropyltin	----	0.5	%	----	----	39.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC04_0.5-0.6	VC04_0.7-0.8	VC04_0.9-1.0	VC02_0.0-0.2	VC02_0.5-0.6
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-033	ES1937483-034	ES1937483-035	ES1937483-038	ES1937483-039
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	15.9	19.2	20.1	43.8	22.4
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	7	<5	<5	223	66
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	----	0.9
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	----	6.7	----	8.8	8.1
After HCl pH	----	0.1	pH Unit	----	1.3	----	5.5	1.4
Extraction Fluid Number	----	1	-	----	1	----	2	1
Final pH	----	0.1	pH Unit	----	4.9	----	5.7	5.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	0.9	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	2.6	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	2.9	0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	1.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	1.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	2.7	0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	0.9	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	1.9	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	1.2	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	1.6	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	17.7	1.0
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	2.6	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	2.8	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	3.1	1.2
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	97.8	110	100.0	91.6	92.8
2-Chlorophenol-D4	93951-73-6	0.5	%	105	116	105	94.8	97.7

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

			Client sample ID	VC04_0.5-0.6	VC04_0.7-0.8	VC04_0.9-1.0	VC02_0.0-0.2	VC02_0.5-0.6
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-033	ES1937483-034	ES1937483-035	ES1937483-038	ES1937483-039
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
2.4.6-Tribromophenol	118-79-6	0.5	%	72.7	96.3	81.7	79.7	78.2
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	112	124	122	110	111
Anthracene-d10	1719-06-8	0.5	%	115	118	118	109	108
4-Terphenyl-d14	1718-51-0	0.5	%	121	124	114	115	117

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC02_1.0-1.2	VC02_1.0-1.5	VC01_0.0-0.2	vc01_0.4-0.6	VC10_0.0-0.2
Client sampling date / time				30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
				ES1937483-040	ES1937483-042	ES1937483-043	ES1937483-044	ES1937483-048
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	20.7	17.6	29.0	13.8	19.4
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	13	8	156	<5	29
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	1.9	----	0.1
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	8.6	----	9.0	----	9.0
After HCl pH	----	0.1	pH Unit	1.4	----	4.1	----	1.7
Extraction Fluid Number	----	1	-	1	----	1	----	1
Final pH	----	0.1	pH Unit	4.9	----	6.4	----	5.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.7	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	1.9	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	2.1	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	1.2	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	1.1	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	1.9	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.8	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	1.4	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.8	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	1.1	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	13.0	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	1.9	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	2.1	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	2.4	1.2	1.2
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	93.8	91.0	101	93.7	105
2-Chlorophenol-D4	93951-73-6	0.5	%	98.5	96.6	103	99.8	110

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC02_1.0-1.2	VC02_1.0-1.5	VC01_0.0-0.2	vc01_0.4-0.6	VC10_0.0-0.2
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-040	ES1937483-042	ES1937483-043	ES1937483-044	ES1937483-048
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
2.4.6-Tribromophenol	118-79-6	0.5	%	77.6	73.8	82.9	72.8	86.8
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	113	111	120	115	120
Anthracene-d10	1719-06-8	0.5	%	111	109	116	112	113
4-Terphenyl-d14	1718-51-0	0.5	%	123	118	124	123	124

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID			VC10_0.5-0.6	VC10_0.0-0.5	VC02_0.0-0.5	VC02_0.5-1.0	VC06_0.0-0.1
	Client sampling date / time			31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-049	ES1937483-051	ES1937483-053	ES1937483-054	ES1937483-055
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	20.4	16.1	49.8	21.4	----
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	9	----	----	6	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	----	----	9.1	----	9.1
After HCl pH	----	0.1	pH Unit	----	----	5.2	----	5.4
Extraction Fluid Number	----	1	-	----	----	2	----	2
Final pH	----	0.1	pH Unit	----	----	4.8	----	5.2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	<0.5	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	----	<0.5	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	----	<0.5	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	----	<0.5	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	----	<0.5	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	----	<0.5	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	----	<0.5	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	----	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	----	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	----	<0.5	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	----	----	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	----	----	<0.5	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	----	----	0.6	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	----	----	1.2	----
EP090: Organotin Compounds								
Tributyltin	56573-85-4	0.5	µgSn/kg	----	<0.5	2.8	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	110	----	----	106	----
2-Chlorophenol-D4	93951-73-6	0.5	%	116	----	----	113	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC10_0.5-0.6	VC10_0.0-0.5	VC02_0.0-0.5	VC02_0.5-1.0	VC06_0.0-0.1
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-049	ES1937483-051	ES1937483-053	ES1937483-054	ES1937483-055
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
2.4.6-Tribromophenol	118-79-6	0.5	%	88.6	----	----	83.1	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	135	----	----	120	----
Anthracene-d10	1719-06-8	0.5	%	117	----	----	113	----
4-Terphenyl-d14	1718-51-0	0.5	%	118	----	----	127	----
EP090S: Organotin Surrogate								
Tripropyltin	----	0.5	%	----	102	60.8	----	----

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC06_0.3-0.4	VC06_0.5-0.6	VC06_0.7-0.8	VC06_0.8-0.9	VC06_0.0-0.5
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
				ES1937483-056	ES1937483-057	ES1937483-058	ES1937483-059	ES1937483-060
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	18.1	18.9	22.1	21.6	20.0
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	8	11	36	18	11
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	8.0	----	----	----	----
After HCl pH	----	0.1	pH Unit	1.4	----	----	----	----
Extraction Fluid Number	----	1	-	1	----	----	----	----
Final pH	----	0.1	pH Unit	5.1	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	106	99.7	86.6	81.2	83.1
2-Chlorophenol-D4	93951-73-6	0.5	%	114	107	92.6	87.1	88.0

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC06_0.3-0.4	VC06_0.5-0.6	VC06_0.7-0.8	VC06_0.8-0.9	VC06_0.0-0.5
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-056	ES1937483-057	ES1937483-058	ES1937483-059	ES1937483-060
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
2.4.6-Tribromophenol	118-79-6	0.5	%	81.1	74.8	61.8	58.4	57.8
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	120	117	108	102	104
Anthracene-d10	1719-06-8	0.5	%	115	119	103	98.1	96.4
4-Terphenyl-d14	1718-51-0	0.5	%	126	121	116	108	109

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC06_0.5-1.0	VC12_0.3-0.4	VC12_0.5-0.6	VC12_0.8-0.9	VC12_1.0-1.1
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-061	ES1937483-063	ES1937483-064	ES1937483-065	ES1937483-066
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**21.4**	**19.3**	**19.6**	**16.6**	**24.1**
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	**30**	<5	<5	<5	**32**
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	----	----	----	**8.2**	----
After HCl pH	----	0.1	pH Unit	----	----	----	**1.6**	----
Extraction Fluid Number	----	1	-	----	----	----	**1**	----
Final pH	----	0.1	pH Unit	----	----	----	**4.9**	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	<0.1	----	----	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	----	**102**	----	----	**97.0**
EP075(SIM)S: Phenolic Compound Surrogates								

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC06_0.5-1.0	VC12_0.3-0.4	VC12_0.5-0.6	VC12_0.8-0.9	VC12_1.0-1.1
Client sampling date / time				31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
				ES1937483-061	ES1937483-063	ES1937483-064	ES1937483-065	ES1937483-066
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
Phenol-d6	13127-88-3	0.5	%	81.5	94.6	81.8	84.2	97.5
2-Chlorophenol-D4	93951-73-6	0.5	%	86.5	111	86.7	89.1	115
2.4.6-Tribromophenol	118-79-6	0.5	%	55.7	78.7	55.4	55.0	83.8
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	101	129	102	105	125
Anthracene-d10	1719-06-8	0.5	%	95.1	123	97.7	99.4	124
4-Terphenyl-d14	1718-51-0	0.5	%	109	123	110	112	122

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC08_0.0-0.1	VC08_0.3-0.4	VC08_0.5-0.6	VC08_0.7-0.8	VC08_1.0-1.1
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-069	ES1937483-070	ES1937483-071	ES1937483-072	ES1937483-073
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	----	46.0	31.3	27.1	18.6
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	----	216	19	6	6
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	2.5	----	----	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	9.2	9.2	----	----	----
After HCl pH	----	0.1	pH Unit	5.4	5.2	----	----	----
Extraction Fluid Number	----	1	-	2	2	----	----	----
Final pH	----	0.1	pH Unit	6.0	6.1	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	<0.1	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	----	2.7	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	----	0.8	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	----	4.6	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	----	5.0	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	2.0	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	----	2.0	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	3.0	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	1.3	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	3.0	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	0.9	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	1.1	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	26.4	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	3.8	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	4.0	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	4.2	1.2	1.2	1.2
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	VC08_0.0-0.1	VC08_0.3-0.4	VC08_0.5-0.6	VC08_0.7-0.8	VC08_1.0-1.1
Client sampling date / time				31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
				ES1937483-069	ES1937483-070	ES1937483-071	ES1937483-072	ES1937483-073
				Result	Result	Result	Result	Result
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	0.1	%	----	88.7	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	87.6	83.5	81.6	80.4
2-Chlorophenol-D4	93951-73-6	0.5	%	----	102	87.6	85.4	86.0
2.4.6-Tribromophenol	118-79-6	0.5	%	----	90.3	55.6	54.8	55.4
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	121	104	100	99.7
Anthracene-d10	1719-06-8	0.5	%	----	119	99.1	96.6	94.7
4-Terphenyl-d14	1718-51-0	0.5	%	----	112	109	108	106

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC08_1.3-1.4	VC08_1.5-1.6	VC08_0.0-0.5	VC08_0.5-1.0	VC13_0.0-0.1
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-074	ES1937483-075	ES1937483-076	ES1937483-077	ES1937483-079
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	18.7	15.4	36.7	27.3	----
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	9	11	111	7	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	----	----	----	----	9.0
After HCl pH	----	0.1	pH Unit	----	----	----	----	5.4
Extraction Fluid Number	----	1	-	----	----	----	----	2
Final pH	----	0.1	pH Unit	----	----	----	----	6.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.7	<0.5	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.8	<0.5	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.7	<0.5	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.6	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	2.8	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.7	<0.5	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	1.0	0.6	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.3	1.2	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	81.1	84.3	84.1	86.1	----
2-Chlorophenol-D4	93951-73-6	0.5	%	86.3	89.7	89.0	91.1	----
2.4.6-Tribromophenol	118-79-6	0.5	%	53.9	56.3	60.1	59.8	----
EP075(SIM)T: PAH Surrogates								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC08_1.3-1.4	VC08_1.5-1.6	VC08_0.0-0.5	VC08_0.5-1.0	VC13_0.0-0.1
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-074	ES1937483-075	ES1937483-076	ES1937483-077	ES1937483-079
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
2-Fluorobiphenyl	321-60-8	0.5	%	**101**	**105**	**104**	**105**	----
Anthracene-d10	1719-06-8	0.5	%	**95.8**	**99.0**	**97.7**	**102**	----
4-Terphenyl-d14	1718-51-0	0.5	%	**107**	**111**	**107**	**112**	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC13_0.3-0.4	VC13_0.5-0.6	VC13_0.7-0.8	VC13_1.0-1.1	VC13_0.0-0.5
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-080	ES1937483-081	ES1937483-082	ES1937483-083	ES1937483-084
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	30.5	15.4	14.8	13.6	30.0
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	18	6	16	7	84
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	0.3	----	----	----	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	9.3	----	----	----	----
After HCl pH	----	0.1	pH Unit	5.1	----	----	----	----
Extraction Fluid Number	----	1	-	2	----	----	----	----
Final pH	----	0.1	pH Unit	5.8	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	0.8
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	0.9	<0.5	<0.5	<0.5	2.0
Pyrene	129-00-0	0.5	mg/kg	1.0	<0.5	<0.5	<0.5	2.1
Benz(a)anthracene	56-55-3	0.5	mg/kg	0.5	<0.5	<0.5	<0.5	1.0
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	0.9
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	0.8	<0.5	<0.5	<0.5	1.2
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	0.7	<0.5	<0.5	<0.5	1.0
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	0.5	<0.5	<0.5	<0.5	0.7
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	4.4	<0.5	<0.5	<0.5	10.2
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	0.8	<0.5	<0.5	<0.5	1.3
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	1.1	0.6	0.6	0.6	1.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.4	1.2	1.2	1.2	1.8
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	87.2	82.6	82.8	84.4	81.5
2-Chlorophenol-D4	93951-73-6	0.5	%	91.9	87.4	87.8	88.9	87.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC13_0.3-0.4	VC13_0.5-0.6	VC13_0.7-0.8	VC13_1.0-1.1	VC13_0.0-0.5
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-080	ES1937483-081	ES1937483-082	ES1937483-083	ES1937483-084
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
2.4.6-Tribromophenol	118-79-6	0.5	%	63.3	57.3	54.9	57.3	58.8
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	107	101	101	104	101
Anthracene-d10	1719-06-8	0.5	%	102	97.7	97.2	99.8	97.6
4-Terphenyl-d14	1718-51-0	0.5	%	112	108	108	110	105

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC13_0.5-1.0	VC14_0.0-0.1	VC14_0.3-0.4	VC14-0.5-0.6	VC14_0.7-0.8
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-085	ES1937483-086	ES1937483-087	ES1937483-088	ES1937483-089
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	15.0	35.7	34.0	30.8	26.1
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	9	57	20	6	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	0.7	----	----	<0.1
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	----	9.3	----	----	9.4
After HCl pH	----	0.1	pH Unit	----	5.2	----	----	5.3
Extraction Fluid Number	----	1	-	----	2	----	----	2
Final pH	----	0.1	pH Unit	----	6.0	----	----	6.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	89.4	80.8	83.4	82.9	87.4
2-Chlorophenol-D4	93951-73-6	0.5	%	94.0	85.5	89.2	88.5	93.7

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC13_0.5-1.0	VC14_0.0-0.1	VC14_0.3-0.4	VC14-0.5-0.6	VC14_0.7-0.8
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-085	ES1937483-086	ES1937483-087	ES1937483-088	ES1937483-089
				Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
2.4.6-Tribromophenol	118-79-6	0.5	%	62.9	55.8	76.9	72.6	77.3
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	109	97.8	97.7	99.1	97.1
Anthracene-d10	1719-06-8	0.5	%	106	96.1	98.1	95.9	104
4-Terphenyl-d14	1718-51-0	0.5	%	116	105	93.4	93.5	100

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC14_1.3-1.4	VC14_0.0-0.5	VC14_0.5-1.0	----	----
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1937483-091	ES1937483-092	ES1937483-093	--------	--------
				Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	17.9	38.0	31.7	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	8	14	6	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	88.1	85.6	86.4	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	93.6	90.4	92.7	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	72.5	71.5	69.9	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	94.9	91.8	94.0	----	----
Anthracene-d10	1719-06-8	0.5	%	104	101	100	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	101	94.3	98.5	----	----

Analytical Results

Sub-Matrix: TCLP LEACHATE
(Matrix: WATER)

			Client sample ID	VC11_0.0-0.2	VC07_0.2-0.4	VC09_0.7-0.8	VC07_0.5-0.6	VC07_1.0-1.2
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-001	ES1937483-006	ES1937483-009	ES1937483-014	ES1937483-016
				Result	Result	Result	Result	Result
EG005(ED093)C: Leachable Metals by ICPAES								
Lead	7439-92-1	0.1	mg/L	<0.1	----	<0.1	----	----
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	<0.0010	----	<0.0010	<0.0010
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	<0.5	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**18.8**	----	**22.7**	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	**47.6**	----	**56.9**	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	**43.2**	----	**43.6**	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**67.6**	----	**68.0**	----	----
Anthracene-d10	1719-06-8	1.0	%	**64.8**	----	**74.4**	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	**69.0**	----	**75.8**	----	----

Analytical Results

Sub-Matrix: **TCLP LEACHATE**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	VC07_0.0-0.5	VC05_0.0-0.1	VC03_0.0-0.2	VC04_0.0-0.1	VC04_0.7-0.8
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
				ES1937483-017	ES1937483-019	ES1937483-024	ES1937483-031	ES1937483-034
				Result	Result	Result	Result	Result
EG005(ED093)C: Leachable Metals by ICPAES								
Lead	7439-92-1	0.1	mg/L	**0.1**	<0.1	<0.1	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	----	<0.0010	----	<0.0010	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**19.1**	**17.8**	**22.4**	**16.9**	**23.7**
2-Chlorophenol-D4	93951-73-6	1.0	%	**46.2**	**41.5**	**54.7**	**44.2**	**54.3**
2.4.6-Tribromophenol	118-79-6	1.0	%	**45.3**	**42.7**	**40.3**	**49.9**	**39.4**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**65.3**	**70.0**	**70.7**	**70.0**	**71.8**
Anthracene-d10	1719-06-8	1.0	%	**65.5**	**61.6**	**70.2**	**67.1**	**67.3**
4-Terphenyl-d14	1718-51-0	1.0	%	**69.9**	**69.2**	**74.7**	**72.3**	**69.2**

Analytical Results

Sub-Matrix: **TCLP LEACHATE**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	VC02_0.0-0.2	VC02_0.5-0.6	VC02_1.0-1.2	VC01_0.0-0.2	VC10_0.0-0.2
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	31-Oct-2019 00:00
				ES1937483-038	ES1937483-039	ES1937483-040	ES1937483-043	ES1937483-048
				Result	Result	Result	Result	Result
EG005(ED093)C: Leachable Metals by ICPAES								
Lead	7439-92-1	0.1	mg/L	**0.2**	----	<0.1	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	----	<0.0010	<0.0010	<0.0010	<0.0010
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	<0.5	<0.5	<0.5
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**19.3**	----	**22.5**	**19.6**	**21.1**
2-Chlorophenol-D4	93951-73-6	1.0	%	**42.1**	----	**53.0**	**41.1**	**45.0**
2.4.6-Tribromophenol	118-79-6	1.0	%	**36.0**	----	**50.7**	**39.7**	**46.6**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**63.8**	----	**67.8**	**67.8**	**68.0**
Anthracene-d10	1719-06-8	1.0	%	**61.1**	----	**61.7**	**61.0**	**62.0**
4-Terphenyl-d14	1718-51-0	1.0	%	**61.9**	----	**63.2**	**60.4**	**66.4**

Analytical Results

Sub-Matrix: **TCLP LEACHATE**
(Matrix: **WATER**)

			Client sample ID	VC02_0.0-0.5	VC06_0.0-0.1	VC06_0.3-0.4	VC12_0.8-0.9	VC08_0.0-0.1
			Client sampling date / time	30-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-053	ES1937483-055	ES1937483-056	ES1937483-065	ES1937483-069
				Result	Result	Result	Result	Result
EG005(ED093)C: Leachable Metals by ICPAES								
Lead	7439-92-1	0.1	mg/L	**0.7**	**0.8**	----	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	----	<0.0010	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	----	<0.5	<0.5
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**20.7**	**18.2**	----	**20.8**	**21.2**
2-Chlorophenol-D4	93951-73-6	1.0	%	**35.9**	**43.9**	----	**43.9**	**40.2**
2.4.6-Tribromophenol	118-79-6	1.0	%	**44.1**	**48.4**	----	**48.1**	**45.8**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**62.3**	**71.7**	----	**63.1**	**65.4**
Anthracene-d10	1719-06-8	1.0	%	**61.1**	**66.4**	----	**65.4**	**67.6**
4-Terphenyl-d14	1718-51-0	1.0	%	**62.6**	**67.1**	----	**64.4**	**68.4**

Analytical Results

Sub-Matrix: TCLP LEACHATE
(Matrix: WATER)

			Client sample ID	VC08_0.3-0.4	VC13_0.0-0.1	VC13_0.3-0.4	VC14_0.0-0.1	VC14_0.7-0.8
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937483-070	ES1937483-079	ES1937483-080	ES1937483-086	ES1937483-089
				Result	Result	Result	Result	Result
EG005(ED093)C: Leachable Metals by ICPAES								
Lead	7439-92-1	0.1	mg/L	----	<0.1	----	<0.1	<0.1
EG035C: Leachable Mercury by FIMS								
Mercury	7439-97-6	0.0010	mg/L	<0.0010	----	<0.0010	<0.0010	<0.0010
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Benzo(a)pyrene	50-32-8	0.5	µg/L	----	<0.5	----	<0.5	<0.5
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	----	**20.8**	----	**22.6**	**19.5**
2-Chlorophenol-D4	93951-73-6	1.0	%	----	**41.2**	----	**56.1**	**52.2**
2.4.6-Tribromophenol	118-79-6	1.0	%	----	**45.7**	----	**50.4**	**45.2**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	----	**64.6**	----	**65.2**	**64.4**
Anthracene-d10	1719-06-8	1.0	%	----	**63.7**	----	**76.3**	**67.8**
4-Terphenyl-d14	1718-51-0	1.0	%	----	**66.4**	----	**79.2**	**71.7**

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP090S: Organotin Surrogate			
Tripropyltin	----	35	130

Sub-Matrix: **TCLP LEACHATE**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112

QUALITY CONTROL REPORT

Work Order	: **ES1937483**	Page	: 1 of 14
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 13-Nov-2019
Order number	: ----	Date Analysis Commenced	: 14-Nov-2019
C-O-C number	: ----	Issue Date	: 25-Nov-2019
Sampler	: ----		
Site	:		
Quote number	: SY/522/19		
No. of samples received	: 100		
No. of samples analysed	: 73		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Evie Sidarta	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Sarah Ashworth	Laboratory Manager - Brisbane	Brisbane Organics, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
- Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2707726)									
ES1937419-031	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	5	<5	0.00	No Limit
ES1937483-001	VC11_0.0-0.2	EG005T: Lead	7439-92-1	5	mg/kg	55	50	10.9	0% - 50%
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2707768)									
ES1937483-028	VC03_1.0-1.2	EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
ES1937483-014	VC07_0.5-0.6	EG005T: Lead	7439-92-1	5	mg/kg	10	7	32.9	No Limit
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2707770)									
ES1937483-043	VC01_0.0-0.2	EG005T: Lead	7439-92-1	5	mg/kg	156	166	6.24	0% - 20%
ES1937483-061	VC06_0.5-1.0	EG005T: Lead	7439-92-1	5	mg/kg	30	8	117	No Limit
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2707800)									
ES1937483-087	VC14_0.3-0.4	EG005T: Lead	7439-92-1	5	mg/kg	20	12	52.5	No Limit
ES1937483-080	VC13_0.3-0.4	EG005T: Lead	7439-92-1	5	mg/kg	18	37	69.7	No Limit
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2710607)									
ES1937483-006	VC07_0.2-0.4	EG005T: Lead	7439-92-1	5	mg/kg	89	79	11.0	0% - 50%
ES1938021-008	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	54	43	22.9	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2707729)									
ES1937419-034	Anonymous	EA055: Moisture Content	----	0.1	%	3.4	3.8	12.8	No Limit
ES1937483-005	VC11_0.5-1.0	EA055: Moisture Content	----	0.1	%	29.0	27.8	4.01	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2707771)									
ES1937483-016	VC07_1.0-1.2	EA055: Moisture Content	----	0.1	%	17.4	18.5	6.24	0% - 20%
ES1937483-033	VC04_0.5-0.6	EA055: Moisture Content	----	0.1	%	15.9	15.1	5.04	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2707772)									
ES1937483-048	VC10_0.0-0.2	EA055: Moisture Content	----	0.1	%	19.4	22.5	15.2	0% - 20%
ES1937483-065	VC12_0.8-0.9	EA055: Moisture Content	----	0.1	%	16.6	16.0	3.95	0% - 20%

Sub-Matrix: **SOIL**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2707804)									
ES1937483-077	VC08_0.5-1.0	EA055: Moisture Content	----	0.1	%	27.3	25.3	7.39	0% - 20%
ES1937483-091	VC14_1.3-1.4	EA055: Moisture Content	----	0.1	%	17.9	18.3	2.30	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2710241)									
ES1937483-053	VC02_0.0-0.5	EA055: Moisture Content	----	0.1	%	49.8	51.7	3.66	0% - 20%
ES1937840-003	Anonymous	EA055: Moisture Content	----	0.1	%	7.2	6.7	6.94	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2713070)									
ES1937483-029	VC12_0.0-0.5	EA055: Moisture Content	----	0.1	%	18.4	18.2	0.934	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2707727)									
ES1937483-001	VC11_0.0-0.2	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.8	0.4	74.3	No Limit
ES1937419-031	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2707769)									
ES1937483-014	VC07_0.5-0.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2707801)									
ES1937483-080	VC13_0.3-0.4	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.3	0.3	0.00	No Limit
ES1937501-020	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2710606)									
ES1937483-006	VC07_0.2-0.4	EG035T: Mercury	7439-97-6	0.1	mg/kg	1.0	1.0	0.00	0% - 50%
ES1938021-008	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.1	<0.1	0.00	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 2701079)									
ES1937483-008	VC09_0.4-0.6	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2701078)									
ES1937483-014	VC07_0.5-0.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2701078) - continued									
ES1937483-014	VC07_0.5-0.6	EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1937483-008	VC09_0.4-0.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2701090)									
ES1937483-024	VC03_0.0-0.2	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2701090) - continued									
ES1937483-024	VC03_0.0-0.2	EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1937483-039	VC02_0.5-0.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.5	0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	0.5	0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	1.0	1.0	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2701091)									
ES1937483-058	VC06_0.7-0.8	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2701091) - continued									
ES1937483-058	VC06_0.7-0.8	EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1937483-075	VC08_1.5-1.6	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2701122)									
ES1937404-028	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2701122) - continued									
ES1937404-028	Anonymous	EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1937404-040	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP090: Organotin Compounds (QC Lot: 2713069)									
ES1937483-051	VC10_0.0-0.5	EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EG005(ED093)C: Leachable Metals by ICPAES (QC Lot: 2706695)									
ES1937276-001	Anonymous	EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES1937423-002	Anonymous	EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EG005(ED093)C: Leachable Metals by ICPAES (QC Lot: 2706696)									
ES1937483-043	VC01_0.0-0.2	EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES1937535-003	Anonymous	EG005C: Lead	7439-92-1	0.1	mg/L	0.1	0.1	0.00	No Limit
EG035C: Leachable Mercury by FIMS (QC Lot: 2707496)									
ES1937422-015	Anonymous	EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
ES1937535-003	Anonymous	EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG035C: Leachable Mercury by FIMS (QC Lot: 2711136)									
ES1937418-002	Anonymous	EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
ES1937701-003	Anonymous	EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
EG035C: Leachable Mercury by FIMS (QC Lot: 2713255)									
ES1937483-080	VC13_0.3-0.4	EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2707726)								
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	91.8	80.0	114
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2707768)								
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	90.7	80.0	114
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2707770)								
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	94.4	80.0	114
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2707800)								
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	97.4	80.0	114
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2710607)								
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	103	80.0	114
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2707727)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	82.9	70.0	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2707769)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	93.3	70.0	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2707801)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	93.7	70.0	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2710606)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	92.9	70.0	105
EN33: TCLP Leach (QCLot: 2701092)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33: TCLP Leach (QCLot: 2701093)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33: TCLP Leach (QCLot: 2701094)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33: TCLP Leach (QCLot: 2705480)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EN33: TCLP Leach (QCLot: 2705480) - continued								
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33: TCLP Leach (QCLot: 2706713)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33: TCLP Leach (QCLot: 2706714)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33: TCLP Leach (QCLot: 2711098)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2701079)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	94.0	62.0	126
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2701078)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	90.4	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	89.7	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	92.5	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	91.5	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	94.1	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	94.1	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	92.9	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	92.1	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	89.8	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	93.6	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	88.4	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	92.0	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	90.3	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	88.0	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	85.0	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	89.5	63.0	121
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2701090)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	121	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	120	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	120	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	122	72.0	126

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2701090) - continued								
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	126	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	125	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	124	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	124	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	120	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	122	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	111	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	118	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	121	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	112	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	109	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	113	63.0	121
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2701091)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	97.8	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	97.8	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	97.7	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	97.3	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	100	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	102	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	100	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	100	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	98.7	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	101	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	99.8	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	102	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	96.5	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	92.0	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	87.2	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	94.7	63.0	121
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2701122)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	98.0	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	93.8	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	99.1	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	97.1	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	95.2	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	93.6	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	96.6	73.0	127

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2701122) - continued								
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	98.9	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	91.8	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	95.4	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	100	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	95.4	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	89.2	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	91.0	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	97.7	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	91.4	63.0	121
EP090: Organotin Compounds (QCLot: 2713069)								
EP090: Tributyltin	56573-85-4	0.5	µgSn/kg	<0.5	1.25 µgSn/kg	104	52.0	139

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EG005(ED093)C: Leachable Metals by ICPAES (QCLot: 2706695)								
EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	0.1 mg/L	96.9	80.0	118
EG005(ED093)C: Leachable Metals by ICPAES (QCLot: 2706696)								
EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	0.1 mg/L	96.4	80.0	118
EG035C: Leachable Mercury by FIMS (QCLot: 2707496)								
EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	99.4	79.0	109
EG035C: Leachable Mercury by FIMS (QCLot: 2711136)								
EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	99.0	79.0	109
EG035C: Leachable Mercury by FIMS (QCLot: 2713255)								
EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	104	79.0	109
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2705372)								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	79.7	63.3	117
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2707071)								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	86.6	63.3	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2707726)							
ES1937419-031	Anonymous	EG005T: Lead	7439-92-1	250 mg/kg	93.4	70.0	130
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2707768)							
ES1937483-014	VC07_0.5-0.6	EG005T: Lead	7439-92-1	250 mg/kg	95.4	70.0	130
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2707770)							
ES1937483-043	VC01_0.0-0.2	EG005T: Lead	7439-92-1	250 mg/kg	89.6	70.0	130
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2707800)							
ES1937483-080	VC13_0.3-0.4	EG005T: Lead	7439-92-1	250 mg/kg	91.6	70.0	130
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2710607)							
ES1937483-006	VC07_0.2-0.4	EG005T: Lead	7439-92-1	250 mg/kg	94.4	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2707727)							
ES1937419-031	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	89.2	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2707769)							
ES1937483-014	VC07_0.5-0.6	EG035T: Mercury	7439-97-6	5 mg/kg	98.0	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2707801)							
ES1937483-080	VC13_0.3-0.4	EG035T: Mercury	7439-97-6	5 mg/kg	95.6	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2710606)							
ES1937483-006	VC07_0.2-0.4	EG035T: Mercury	7439-97-6	5 mg/kg	91.0	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2701079)							
ES1937483-008	VC09_0.4-0.6	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	84.0	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2701078)							
ES1937483-008	VC09_0.4-0.6	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	128	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	# 140	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2701090)							
ES1937483-024	VC03_0.0-0.2	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	114	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	110	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2701091)							
ES1937483-058	VC06_0.7-0.8	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	93.8	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	92.2	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2701122)							
ES1937404-028	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	100	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	98.0	70.0	130
EP090: Organotin Compounds (QCLot: 2713069)							
ES1937483-053	VC02_0.0-0.5	EP090: Tributyltin	56573-85-4	1.25 µgSn/kg	106	20.0	130

Sub-Matrix: **WATER**

Matrix Spike (MS) Report

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)C: Leachable Metals by ICPAES (QCLot: 2706695)							
ES1937276-002	Anonymous	EG005C: Lead	7439-92-1	1 mg/L	93.8	70.0	130
EG005(ED093)C: Leachable Metals by ICPAES (QCLot: 2706696)							
ES1937483-048	VC10_0.0-0.2	EG005C: Lead	7439-92-1	1 mg/L	106	70.0	130
EG035C: Leachable Mercury by FIMS (QCLot: 2707496)							
ES1937483-001	VC11_0.0-0.2	EG035C: Mercury	7439-97-6	0.01 mg/L	88.1	70.0	130
EG035C: Leachable Mercury by FIMS (QCLot: 2711136)							
ES1937422-017	Anonymous	EG035C: Mercury	7439-97-6	0.01 mg/L	84.9	70.0	130
EG035C: Leachable Mercury by FIMS (QCLot: 2713255)							
ES1937483-080	VC13_0.3-0.4	EG035C: Mercury	7439-97-6	0.01 mg/L	73.4	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1937483**	Page	: 1 of 16
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 13-Nov-2019
Site	:	Issue Date	: 25-Nov-2019
Sampler	: ----	No. of samples received	: 100
Order number	: ----	No. of samples analysed	: 73

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	ES1937483--008	VC09_0.4-0.6	**Pyrene**	129-00-0	140 %	70.0-130%	**Recovery greater than upper data quality objective**

Regular Sample Surrogates

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP075(SIM)S: Phenolic Compound Surrogates	ES1937483-031	VC04_0.0-0.1	**2-Chlorophenol-D4**	93951-73-6	123 %	66.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-001	VC11_0.0-0.2	**2-Fluorobiphenyl**	321-60-8	129 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-003	VC11_1.0-1.2	**2-Fluorobiphenyl**	321-60-8	126 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-004	VC11_0.0-0.5	**2-Fluorobiphenyl**	321-60-8	123 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-005	VC11_0.5-1.0	**2-Fluorobiphenyl**	321-60-8	126 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-006	VC07_0.2-0.4	**2-Fluorobiphenyl**	321-60-8	127 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-008	VC09_0.4-0.6	**2-Fluorobiphenyl**	321-60-8	127 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-034	VC04_0.7-0.8	**2-Fluorobiphenyl**	321-60-8	124 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-011	VC09_0.0-0.5	**2-Fluorobiphenyl**	321-60-8	128 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-012	VC09_0.5-1.0	**2-Fluorobiphenyl**	321-60-8	125 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-015	VC07_0.7-0.8	**2-Fluorobiphenyl**	321-60-8	125 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-016	VC07_1.0-1.2	**2-Fluorobiphenyl**	321-60-8	126 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-018	VC07_0.5-1.0	**2-Fluorobiphenyl**	321-60-8	133 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-019	VC05_0.0-0.1	**2-Fluorobiphenyl**	321-60-8	128 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-020	VC05_0.5-0.7	**2-Fluorobiphenyl**	321-60-8	128 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-023	VC05_0.5-0.9	**2-Fluorobiphenyl**	321-60-8	126 %	70.0-122 %	**Recovery greater than upper data quality objective**

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted - Continued							
EP075(SIM)T: PAH Surrogates	ES1937483-049	VC10_0.5-0.6	**2-Fluorobiphenyl**	321-60-8	135 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-063	VC12_0.3-0.4	**2-Fluorobiphenyl**	321-60-8	129 %	70.0-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	ES1937483-066	VC12_1.0-1.1	**2-Fluorobiphenyl**	321-60-8	125 %	70.0-122 %	**Recovery greater than upper data quality objective**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	***Days overdue***	*Date analysed*	*Due for analysis*	***Days overdue***
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved							
VC11_0.0-0.2,	VC11_1.0-1.2,	----	----	----	18-Nov-2019	13-Nov-2019	**5**
VC11_0.0-0.5,	VC11_0.5-1.0,						
VC09_0.4-0.6,	VC09_0.7-0.8,						
VC09_0.8-1.0,	VC09_0.0-0.5,						
VC09_0.5-1.0,	VC07_0.5-0.6,						
VC07_0.7-0.8,	VC07_1.0-1.2,						
VC07_0.5-1.0,	VC05_0.0-0.1,						
VC05_0.5-0.7,	VC05_0.5-0.9,						
VC03_0.0-0.2,	VC03_0.4-0.6,						
VC03_0.6-0.7,	VC03_1.0-1.2,						
VC03_0.5-1.0,	VC04_0.0-0.1,						
VC02_1.0-1.2,	VC02_1.0-1.5,						
VC01_0.0-0.2,	vc01_0.4-0.6,						
VC02_0.5-1.0							
Soil Glass Jar - Unpreserved							
VC07_0.2-0.4,	VC02_0.0-0.2,	----	----	----	19-Nov-2019	13-Nov-2019	**6**
VC02_0.5-0.6,	VC02_0.0-0.5						
Soil Glass Jar - Unpreserved							
VC12_0.0-0.5		----	----	----	20-Nov-2019	13-Nov-2019	**7**

Matrix: **SOIL**

Method Container / Client Sample ID(s)		Extraction / Preparation Date extracted	Due for extraction	Days overdue	Analysis Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°C) - Analysis Holding Time Compliance							
Soil Glass Jar - Unpreserved							
VC04_0.5-0.6,	VC04_0.7-0.8,	----	----	----	18-Nov-2019	14-Nov-2019	**4**
VC04_0.9-1.0,	VC10_0.0-0.2,						
VC10_0.5-0.6,	VC06_0.3-0.4,						
VC06_0.5-0.6,	VC06_0.7-0.8,						
VC06_0.8-0.9,	VC06_0.0-0.5,						
VC06_0.5-1.0,	VC12_0.8-0.9,						
VC12_1.0-1.1,	VC08_0.3-0.4,						
VC08_0.5-0.6,	VC08_0.7-0.8,						
VC08_1.0-1.1,	VC08_1.3-1.4,						
VC08_1.5-1.6,	VC08_0.0-0.5,						
VC08_0.5-1.0,	VC13_0.3-0.4,						
VC13_0.5-0.6,	VC13_0.7-0.8,						
VC13_1.0-1.1,	VC13_0.0-0.5,						
VC13_0.5-1.0,	VC14_0.0-0.1,						
VC14_0.3-0.4,	VC14-0.5-0.6,						
VC14_0.7-0.8,	VC14_1.3-1.4,						
VC14_0.0-0.5,	VC14_0.5-1.0						
Soil Glass Jar - Unpreserved							
VC12_0.3-0.4,	VC12_0.5-0.6	----	----	----	19-Nov-2019	14-Nov-2019	**5**
Soil Glass Jar - Unpreserved							
VC10_0.0-0.5		----	----	----	20-Nov-2019	14-Nov-2019	**6**
EN33: TCLP Leach							
Non-Volatile Leach: 14 day HT(e.g. SV organics)							
VC11_0.0-0.2,	VC09_0.7-0.8,	14-Nov-2019	13-Nov-2019	**1**	----	----	----
VC07_0.0-0.5,	VC05_0.0-0.1,						
VC03_0.0-0.2,	VC04_0.0-0.1,						
VC02_0.0-0.2,	VC01_0.0-0.2,						
VC02_0.0-0.5							
Non-Volatile Leach: 14 day HT(e.g. SV organics)							
VC02_1.0-1.2		15-Nov-2019	13-Nov-2019	**2**	----	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics)							
VC04_0.7-0.8,	VC06_0.0-0.1	15-Nov-2019	14-Nov-2019	**1**	----	----	----
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved							
VC09_0.4-0.6,	VC07_0.5-1.0,	14-Nov-2019	13-Nov-2019	**1**	----	----	----
VC05_0.0-0.1							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							

Matrix: **SOIL**

Method Container / Client Sample ID(s)		Extraction / Preparation Date extracted	Due for extraction	Days overdue	Analysis Date analysed	Due for analysis	Days overdue
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Analysis Holding Time Compliance							
Soil Glass Jar - Unpreserved							
VC11_0.0-0.2, VC11_0.0-0.5, VC07_0.2-0.4, VC09_0.7-0.8, VC09_0.0-0.5, VC07_0.5-0.6, VC07_1.0-1.2, VC05_0.0-0.1, VC05_0.5-0.9	VC11_1.0-1.2, VC11_0.5-1.0, VC09_0.4-0.6, VC09_0.8-1.0, VC09_0.5-1.0, VC07_0.7-0.8, VC07_0.5-1.0, VC05_0.5-0.7,	14-Nov-2019	13-Nov-2019	**1**	----	----	----
Soil Glass Jar - Unpreserved							
VC03_0.0-0.2, VC03_0.6-0.7, VC03_0.5-1.0, VC02_0.0-0.2, VC02_1.0-1.2, VC01_0.0-0.2, VC02_0.5-1.0	VC03_0.4-0.6, VC03_1.0-1.2, VC04_0.0-0.1, VC02_0.5-0.6, VC02_1.0-1.5, vc01_0.4-0.6,	14-Nov-2019	13-Nov-2019	**1**	----	----	----
Soil Glass Jar - Unpreserved							
VC14_0.3-0.4, VC14_0.7-0.8, VC14_0.0-0.5,	VC14-0.5-0.6, VC14_1.3-1.4, VC14_0.5-1.0	15-Nov-2019	14-Nov-2019	**1**	----	----	----
EP090: Organotin Compounds							
Soil Glass Jar - Unpreserved							
VC12_0.0-0.5,	VC02_0.0-0.5	20-Nov-2019	13-Nov-2019	**7**	----	----	----
Soil Glass Jar - Unpreserved							
VC10_0.0-0.5		20-Nov-2019	14-Nov-2019	**6**	----	----	----

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count QC	Regular	Rate (%) Actual	Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	32	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	32	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
VC11_0.0-0.2,	VC11_1.0-1.2,	**30-Oct-2019**	**----**	----	----	**18-Nov-2019**	13-Nov-2019	×
VC11_0.0-0.5,	VC11_0.5-1.0,							
VC09_0.4-0.6,	VC09_0.7-0.8,							
VC09_0.8-1.0,	VC09_0.0-0.5,							
VC09_0.5-1.0,	VC07_0.5-0.6,							
VC07_0.7-0.8,	VC07_1.0-1.2,							
VC07_0.5-1.0,	VC05_0.0-0.1,							
VC05_0.5-0.7,	VC05_0.5-0.9,							
VC03_0.0-0.2,	VC03_0.4-0.6,							
VC03_0.6-0.7,	VC03_1.0-1.2,							
VC03_0.5-1.0,	VC04_0.0-0.1,							
VC02_1.0-1.2,	VC02_1.0-1.5,							
VC01_0.0-0.2,	vc01_0.4-0.6,							
VC02_0.5-1.0								
Soil Glass Jar - Unpreserved (EA055)								
VC07_0.2-0.4,	VC02_0.0-0.2,	**30-Oct-2019**	**----**	----	----	**19-Nov-2019**	13-Nov-2019	×
VC02_0.5-0.6,	VC02_0.0-0.5							
Soil Glass Jar - Unpreserved (EA055)								
VC12_0.0-0.5		**30-Oct-2019**	**----**	----	----	**20-Nov-2019**	13-Nov-2019	×
Soil Glass Jar - Unpreserved (EA055)								

Matrix: **SOIL**

Evaluation: ✘ = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C) - Continued								
VC04_0.5-0.6,	VC04_0.7-0.8,	**31-Oct-2019**	**----**	----	----	**18-Nov-2019**	14-Nov-2019	✘
VC04_0.9-1.0,	VC10_0.0-0.2,							
VC10_0.5-0.6,	VC06_0.3-0.4,							
VC06_0.5-0.6,	VC06_0.7-0.8,							
VC06_0.8-0.9,	VC06_0.0-0.5,							
VC06_0.5-1.0,	VC12_0.8-0.9,							
VC12_1.0-1.1,	VC08_0.3-0.4,							
VC08_0.5-0.6,	VC08_0.7-0.8,							
VC08_1.0-1.1,	VC08_1.3-1.4,							
VC08_1.5-1.6,	VC08_0.0-0.5,							
VC08_0.5-1.0,	VC13_0.3-0.4,							
VC13_0.5-0.6,	VC13_0.7-0.8,							
VC13_1.0-1.1,	VC13_0.0-0.5,							
VC13_0.5-1.0,	VC14_0.0-0.1,							
VC14_0.3-0.4,	VC14-0.5-0.6,							
VC14_0.7-0.8,	VC14_1.3-1.4,							
VC14_0.0-0.5,	VC14_0.5-1.0							
Soil Glass Jar - Unpreserved (EA055)								
VC12_0.3-0.4,	VC12_0.5-0.6	**31-Oct-2019**	**----**	----	----	**19-Nov-2019**	14-Nov-2019	✘
Soil Glass Jar - Unpreserved (EA055)								
VC10_0.0-0.5		**31-Oct-2019**	**----**	----	----	**20-Nov-2019**	14-Nov-2019	✘

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
VC11_0.0-0.2,	VC11_1.0-1.2,	**30-Oct-2019**	**18-Nov-2019**	27-Apr-2020	✓	**19-Nov-2019**	27-Apr-2020	✓
VC11_0.0-0.5,	VC11_0.5-1.0,							
VC09_0.4-0.6,	VC09_0.7-0.8,							
VC09_0.8-1.0,	VC09_0.0-0.5,							
VC09_0.5-1.0,	VC07_0.5-0.6,							
VC07_0.7-0.8,	VC07_1.0-1.2,							
VC07_0.5-1.0,	VC05_0.0-0.1,							
VC05_0.5-0.7,	VC05_0.5-0.9,							
VC03_0.0-0.2,	VC03_0.4-0.6,							
VC03_0.6-0.7,	VC03_1.0-1.2,							
VC03_0.5-1.0,	VC04_0.0-0.1,							
VC02_1.0-1.2,	VC02_1.0-1.5,							
VC01_0.0-0.2,	vc01_0.4-0.6,							
VC02_0.5-1.0								
Soil Glass Jar - Unpreserved (EG005T)								
VC07_0.2-0.4,	VC02_0.0-0.2,	**30-Oct-2019**	**19-Nov-2019**	27-Apr-2020	✓	**19-Nov-2019**	27-Apr-2020	✓
VC02_0.5-0.6								
Soil Glass Jar - Unpreserved (EG005T)								
VC04_0.5-0.6,	VC04_0.7-0.8,	**31-Oct-2019**	**18-Nov-2019**	28-Apr-2020	✓	**19-Nov-2019**	28-Apr-2020	✓
VC04_0.9-1.0,	VC10_0.0-0.2,							
VC10_0.5-0.6,	VC06_0.3-0.4,							
VC06_0.5-0.6,	VC06_0.7-0.8,							
VC06_0.8-0.9,	VC06_0.0-0.5,							
VC06_0.5-1.0,	VC12_0.8-0.9,							
VC12_1.0-1.1,	VC08_0.3-0.4,							
VC08_0.5-0.6,	VC08_0.7-0.8,							
VC08_1.0-1.1,	VC08_1.3-1.4,							
VC08_1.5-1.6,	VC08_0.0-0.5,							
VC08_0.5-1.0,	VC13_0.3-0.4,							
VC13_0.5-0.6,	VC13_0.7-0.8,							
VC13_1.0-1.1,	VC13_0.0-0.5,							
VC13_0.5-1.0,	VC14_0.0-0.1,							
VC14_0.3-0.4,	VC14-0.5-0.6,							
VC14_0.7-0.8,	VC14_1.3-1.4,							
VC14_0.0-0.5,	VC14_0.5-1.0							
Soil Glass Jar - Unpreserved (EG005T)								
VC12_0.3-0.4,	VC12_0.5-0.6	**31-Oct-2019**	**19-Nov-2019**	28-Apr-2020	✓	**19-Nov-2019**	28-Apr-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T) VC11_0.0-0.2		30-Oct-2019	18-Nov-2019	27-Nov-2019	✓	19-Nov-2019	27-Nov-2019	✓
Soil Glass Jar - Unpreserved (EG035T) VC07_0.5-0.6, VC05_0.0-0.1, VC02_1.0-1.2,	VC07_1.0-1.2, VC04_0.0-0.1, VC01_0.0-0.2	30-Oct-2019	18-Nov-2019	27-Nov-2019	✓	20-Nov-2019	27-Nov-2019	✓
Soil Glass Jar - Unpreserved (EG035T) VC07_0.2-0.4,	VC02_0.5-0.6	30-Oct-2019	19-Nov-2019	27-Nov-2019	✓	20-Nov-2019	27-Nov-2019	✓
Soil Glass Jar - Unpreserved (EG035T) VC10_0.0-0.2, VC08_0.3-0.4, VC14_0.0-0.1,	VC06_0.3-0.4, VC13_0.3-0.4, VC14_0.7-0.8	31-Oct-2019	18-Nov-2019	28-Nov-2019	✓	20-Nov-2019	28-Nov-2019	✓
EN33: TCLP Leach								
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a) VC11_0.0-0.2, VC07_0.0-0.5, VC03_0.0-0.2, VC02_0.0-0.2, VC02_0.0-0.5	VC09_0.7-0.8, VC05_0.0-0.1, VC04_0.0-0.1, VC01_0.0-0.2,	30-Oct-2019	14-Nov-2019	13-Nov-2019	×	----	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a) VC02_1.0-1.2		30-Oct-2019	15-Nov-2019	13-Nov-2019	×	----	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a) VC10_0.0-0.2, VC08_0.0-0.1, VC14_0.0-0.1,	VC12_0.8-0.9, VC13_0.0-0.1, VC14_0.7-0.8	31-Oct-2019	14-Nov-2019	14-Nov-2019	✓	----	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a) VC04_0.7-0.8,	VC06_0.0-0.1	31-Oct-2019	15-Nov-2019	14-Nov-2019	×	----	----	----
Non-Volatile Leach: 28 day HT(e.g. Hg, CrVI) (EN33a) VC07_0.2-0.4, VC07_1.0-1.2,	VC07_0.5-0.6, VC02_0.5-0.6	30-Oct-2019	18-Nov-2019	27-Nov-2019	✓	----	----	----
Non-Volatile Leach: 28 day HT(e.g. Hg, CrVI) (EN33a) VC06_0.3-0.4,	VC08_0.3-0.4	31-Oct-2019	18-Nov-2019	28-Nov-2019	✓	----	----	----
Non-Volatile Leach: 28 day HT(e.g. Hg, CrVI) (EN33a) VC13_0.3-0.4		31-Oct-2019	19-Nov-2019	28-Nov-2019	✓	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066) VC09_0.4-0.6, VC05_0.0-0.1	VC07_0.5-1.0,	30-Oct-2019	14-Nov-2019	13-Nov-2019	×	17-Nov-2019	24-Dec-2019	✓
Soil Glass Jar - Unpreserved (EP066) VC12_0.3-0.4, VC08_0.3-0.4	VC12_1.0-1.1,	31-Oct-2019	14-Nov-2019	14-Nov-2019	✓	17-Nov-2019	24-Dec-2019	✓

Work Order : ES1937483
Client : GHD PTY LTD
Project : 12517046

Matrix: **SOIL** Evaluation: ✘ = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) VC11_0.0-0.2, VC11_1.0-1.2, VC11_0.0-0.5, VC11_0.5-1.0, VC07_0.2-0.4, VC09_0.4-0.6, VC09_0.7-0.8, VC09_0.8-1.0, VC09_0.0-0.5, VC09_0.5-1.0, VC07_0.5-0.6, VC07_0.7-0.8, VC07_1.0-1.2, VC07_0.5-1.0, VC05_0.0-0.1, VC05_0.5-0.7, VC05_0.5-0.9	**30-Oct-2019**	**14-Nov-2019**	13-Nov-2019	✘	**15-Nov-2019**	24-Dec-2019	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) VC03_0.0-0.2, VC03_0.4-0.6, VC03_0.6-0.7, VC03_1.0-1.2, VC03_0.5-1.0, VC04_0.0-0.1, VC02_0.0-0.2, VC02_0.5-0.6, VC02_1.0-1.2, VC02_1.0-1.5, VC01_0.0-0.2, vc01_0.4-0.6, VC02_0.5-1.0	**30-Oct-2019**	**14-Nov-2019**	13-Nov-2019	✘	**16-Nov-2019**	24-Dec-2019	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) VC12_0.3-0.4, VC12_1.0-1.1, VC08_0.3-0.4	**31-Oct-2019**	**14-Nov-2019**	14-Nov-2019	✓	**15-Nov-2019**	24-Dec-2019	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) VC04_0.5-0.6, VC04_0.7-0.8, VC04_0.9-1.0, VC10_0.0-0.2, VC10_0.5-0.6, VC06_0.3-0.4, VC06_0.5-0.6	**31-Oct-2019**	**14-Nov-2019**	14-Nov-2019	✓	**16-Nov-2019**	24-Dec-2019	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) VC06_0.7-0.8, VC06_0.8-0.9, VC06_0.0-0.5, VC06_0.5-1.0, VC12_0.5-0.6, VC12_0.8-0.9, VC08_0.5-0.6, VC08_0.7-0.8, VC08_1.0-1.1, VC08_1.3-1.4, VC08_1.5-1.6, VC08_0.0-0.5, VC08_0.5-1.0, VC13_0.3-0.4, VC13_0.5-0.6, VC13_0.7-0.8, VC13_1.0-1.1, VC13_0.0-0.5, VC13_0.5-1.0, VC14_0.0-0.1	**31-Oct-2019**	**14-Nov-2019**	14-Nov-2019	✓	**18-Nov-2019**	24-Dec-2019	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) VC14_0.3-0.4, VC14-0.5-0.6, VC14_0.7-0.8, VC14_1.3-1.4, VC14_0.0-0.5, VC14_0.5-1.0	**31-Oct-2019**	**15-Nov-2019**	14-Nov-2019	✘	**16-Nov-2019**	25-Dec-2019	✓

Matrix: **SOIL**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP090: Organotin Compounds								
Soil Glass Jar - Unpreserved (EP090)								
VC12_0.0-0.5,	VC02_0.0-0.5	**30-Oct-2019**	**20-Nov-2019**	13-Nov-2019	✗	**21-Nov-2019**	30-Dec-2019	✓
Soil Glass Jar - Unpreserved (EP090)								
VC10_0.0-0.5		**31-Oct-2019**	**20-Nov-2019**	14-Nov-2019	✗	**21-Nov-2019**	30-Dec-2019	✓

Matrix: **WATER**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005(ED093)C: Leachable Metals by ICPAES								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG005C)								
VC11_0.0-0.2,	VC09_0.7-0.8,	**14-Nov-2019**	**18-Nov-2019**	12-May-2020	✓	**18-Nov-2019**	12-May-2020	✓
VC07_0.0-0.5,	VC05_0.0-0.1,							
VC03_0.0-0.2,	VC04_0.0-0.1,							
VC02_0.0-0.2,	VC01_0.0-0.2,							
VC10_0.0-0.2,	VC02_0.0-0.5,							
VC12_0.8-0.9,	VC08_0.0-0.1,							
VC13_0.0-0.1,	VC14_0.0-0.1,							
VC14_0.7-0.8								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG005C)								
VC04_0.7-0.8,	VC02_1.0-1.2,	**15-Nov-2019**	**18-Nov-2019**	13-May-2020	✓	**18-Nov-2019**	13-May-2020	✓
VC06_0.0-0.1								
EG035C: Leachable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035C)								
VC11_0.0-0.2,	VC05_0.0-0.1,	**14-Nov-2019**	**----**	----	----	**18-Nov-2019**	12-Dec-2019	✓
VC04_0.0-0.1,	VC01_0.0-0.2,							
VC10_0.0-0.2,	VC02_0.0-0.5,							
VC14_0.0-0.1,	VC14_0.7-0.8							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035C)								
VC02_1.0-1.2		**15-Nov-2019**	**----**	----	----	**18-Nov-2019**	13-Dec-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035C)								
VC07_0.2-0.4,	VC07_0.5-0.6,	**18-Nov-2019**	**----**	----	----	**19-Nov-2019**	16-Dec-2019	✓
VC07_1.0-1.2,	VC02_0.5-0.6,							
VC06_0.3-0.4,	VC08_0.3-0.4							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035C)								
VC13_0.3-0.4		**19-Nov-2019**	**----**	----	----	**20-Nov-2019**	17-Dec-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
VC11_0.0-0.2,	VC09_0.7-0.8,	**14-Nov-2019**	**18-Nov-2019**	21-Nov-2019	✓	**18-Nov-2019**	28-Dec-2019	✓
VC07_0.0-0.5,	VC05_0.0-0.1,							
VC03_0.0-0.2,	VC04_0.0-0.1,							
VC02_0.0-0.2,	VC01_0.0-0.2,							
VC10_0.0-0.2,	VC02_0.0-0.5,							
VC12_0.8-0.9,	VC08_0.0-0.1,							
VC13_0.0-0.1,	VC14_0.0-0.1,							
VC14_0.7-0.8								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
VC04_0.7-0.8,	VC02_1.0-1.2,	**15-Nov-2019**	**18-Nov-2019**	22-Nov-2019	✓	**18-Nov-2019**	28-Dec-2019	✓
VC06_0.0-0.1								

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	10	95	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organotin Analysis	EP090	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	8	78	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	7	58	**12.07**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	10	95	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Organotin Analysis	EP090	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	4	78	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	58	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	5	95	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Organotin Analysis	EP090	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	4	78	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TCLP for Non & Semivolatile Analytes	EN33a	7	44	**15.91**	**9.09**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	58	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	5	95	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Organotin Analysis	EP090	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	4	78	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	58	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	5	95	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Leachable Mercury by FIMS	EG035C	5	27	**18.52**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	32	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Leachable Mercury by FIMS	EG035C	3	27	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	**Actual**	**Expected**	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Leachable Mercury by FIMS	EG035C	3	27	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Leachable Mercury by FIMS	EG035C	3	27	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	32	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 6.1 and Table 1 (14 day holding time).
Leachable Metals by ICPAES	EG005C	SOIL	In house: referenced to APHA 3120; USEPA SW 846 - 6010: The ICPAES technique ionises leachate sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Leachable Mercury by FIMS	EG035C	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the TCLP solution. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
Organotin Analysis	EP090	SOIL	In house: Referenced to USEPA SW 846 - 8270D Prepared sample extracts are analysed by GC/MS coupled with high volume injection, and quanitified against an established calibration curve.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Digestion for Total Recoverable Metals in TCLP Leachate	EN25C	SOIL	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Separatory Funnel Extraction of Liquids	ORG14	SOIL	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Organotin Sample Preparation	ORG35	SOIL	In house: 20g sample is spiked with surrogate and leached in a methanol:acetic acid:UHP water mix and vacuum filtered. Reagents and solvents are added to the sample and the mixture tumbled. The butyltin compounds are simultaneously derivatised and extracted. The extract is further extracted with petroleum ether. The resultant extracts are combined and concentrated for analysis.

	Lab report	Sample ID	Date		Chromium Reducible Sulphur
1	ES1936029	VC11_0.0-0.1	30/10/2019	25	x
2	ES1936029	VC11_0.5-0.6	30/10/2019	26	
3	ES1936029	VC11_1.0-1.1	30/10/2019	27	x
4	ES1936029	VC09_0.0-0.1	30/10/2019	28	
5	ES1936029	VC09_0.5-0.6	30/10/2019	29	
6	ES1936029	VC09_0.9-1.0	30/10/2019	30	x
7	ES1936029	VC07_0.0-0.1	30/10/2019	31	x
8	ES1936029	VC07_0.5-0.6	30/10/2019	32	
9	ES1936029	VC07_1.0-1.1	30/10/2019	33	x
10	ES1936029	VC05_0.0-0.1	30/10/2019	34	x
11	ES1936029	VC05_0.5-0.6	30/10/2019	35	
12	ES1936029	VC05_0.8-1.0	30/10/2019	36	x
13	ES1936029	VC03_0.0-0.1	30/10/2019	13	
14	ES1936029	VC03_0.5-0.6	30/10/2019	14	
15	ES1936029	VC03_10-1.1	30/10/2019	15	x
16	ES1936029	VC01_0.0-0.1	30/10/2019	16	x
17	ES1936029	vc01_0.5-0.6	30/10/2019	17	
18	ES1936029	VC01_1.0-1.1	30/10/2019	18	x
19	ES1936029	VC02_0.0-0.1	30/10/2019	19	x
20	ES1936029	VC02_0.5-0.6	30/10/2019	20	
21	ES1936029	VC02_0.9-1.0	30/10/2019	21	
22	ES1936029	VC02_1.5-1.6	30/10/2019	22	x
23	ES1936029	VC10_0.0-0.1	30/10/2019	23	
24	ES1936029	VC10_0.5-0.6	30/10/2019	24	x
25	ES1936029	VC04_0.0-0.1	30/10/2019	37	
26	ES1936029	VC04_0.9-1.0	30/10/2019	38	x
27	ES1936183	VC06_0.0-0.1	31/10/2019	17	x
28	ES1936183	VC06_0.5-0.6	31/10/2019	19	
29	ES1936183	VC12_0.0-0.1	31/10/2019	24	x
30	ES1936183	VC12_0.5-0.6	31/10/2019	26	
31	ES1936183	VC12_1.0-1.1	31/10/2019	28	
32	ES1936183	VC08_0.0-0.1	31/10/2019	6	
33	ES1936183	VC08_0.5-0.6	31/10/2019	7	x
34	ES1936183	VC08_1.0-1.1	31/10/2019	8	
35	ES1936183	VC08_1.5-1.6	31/10/2019	9	x
36	ES1936183	VC13_0.0-0.1	31/10/2019	10	
37	ES1936183	VC13_0.5-0.6	31/10/2019	11	x
38	ES1936183	VC13_1.0-1.1	31/10/2019	12	
39	ES1936183	VC14_0.0-0.1	31/10/2019	13	x
40	ES1936183	VC14_0.5-0.6	31/10/2019	14	
41	ES1936183	VC14_1.0-1.1	31/10/2019	15	
42	ES1936183	VC14_1.3-1.4	31/10/2019	16	x

Environmental Division
Sydney
Work Order Reference
ES1937554

Telephone : + 61-2-8784 8555

Chromium Suite /
ALS BRISBANE

Subcon / Forward Lab / Split WO: ES1937483
Lab / Analysis: → ES1940050
Organised By / Date:
Relinquished By / Date:
Connote / Courier:
WO No: ES1937554
Attached By PO / Internal Sheet:

Andrew
12/11/19
5:25pm

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1937554**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: sarah.eccleshall@ghd.com	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 12517046	Page	: 1 of 3
Order number	: ----	Quote number	: ES2019GHDSER0030 (SY/522/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 12-Nov-2019 17:22	Issue Date	: 13-Nov-2019
Client Requested Due Date	: 22-Nov-2019	Scheduled Reporting Date	: **22-Nov-2019**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 4.1'c
Receipt Detail	:	No. of samples received / analysed	: 42 / 21

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **This work order is a split from ES1937483 & ES199005.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- EA033 Analysis to be conducted by ALS Brisbane.
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	(On Hold) SOIL No analysis requested	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
ES1937554-001	30-Oct-2019 00:00	VC11_0.0-0.1		✓
ES1937554-002	30-Oct-2019 00:00	VC11_0.5-0.6	✓	
ES1937554-003	30-Oct-2019 00:00	VC11_1.0-1.1		✓
ES1937554-004	30-Oct-2019 00:00	VC09_0.0-0.1	✓	
ES1937554-005	30-Oct-2019 00:00	VC09_0.5-0.6	✓	
ES1937554-006	30-Oct-2019 00:00	VC09_0.9-1.0		✓
ES1937554-007	30-Oct-2019 00:00	VC07_0.0-0.1		✓
ES1937554-008	30-Oct-2019 00:00	VC07_0.5-0.6	✓	
ES1937554-009	30-Oct-2019 00:00	VC07_1.0-1.1		✓
ES1937554-010	30-Oct-2019 00:00	VC05_0.0-0.1		✓
ES1937554-011	30-Oct-2019 00:00	VC05_0.5-0.6	✓	
ES1937554-012	30-Oct-2019 00:00	VC05_0.8-1.0		✓
ES1937554-013	30-Oct-2019 00:00	VC03_0.0-0.1	✓	
ES1937554-014	30-Oct-2019 00:00	VC03_0.5-0.6	✓	
ES1937554-015	30-Oct-2019 00:00	VC03_10-1.1		✓
ES1937554-016	30-Oct-2019 00:00	VC01_0.0-0.1		✓
ES1937554-017	30-Oct-2019 00:00	vc01_0.5-0.6	✓	
ES1937554-018	30-Oct-2019 00:00	VC01_1.0-1.1		✓
ES1937554-019	30-Oct-2019 00:00	VC02_0.0-0.1		✓
ES1937554-020	30-Oct-2019 00:00	VC02_0.5-0.6	✓	
ES1937554-021	30-Oct-2019 00:00	VC02_0.9-1.0	✓	
ES1937554-022	30-Oct-2019 00:00	VC02_1.5-1.6		✓
ES1937554-023	30-Oct-2019 00:00	VC10_0.0-0.1	✓	
ES1937554-024	30-Oct-2019 00:00	VC10_0.5-0.6		✓
ES1937554-025	30-Oct-2019 00:00	VC04_0.0-0.1	✓	
ES1937554-026	30-Oct-2019 00:00	VC04_0.9-1.0		✓
ES1937554-027	30-Oct-2019 00:00	VC06_0.0-0.1		✓
ES1937554-028	30-Oct-2019 00:00	VC06_0.5-0.6	✓	
ES1937554-029	30-Oct-2019 00:00	VC12_0.0-0.1		✓
ES1937554-030	30-Oct-2019 00:00	VC12_0.5-0.6	✓	
ES1937554-031	30-Oct-2019 00:00	VC12_1.0-1.1	✓	
ES1937554-032	30-Oct-2019 00:00	VC08_0.0-0.1	✓	
ES1937554-033	30-Oct-2019 00:00	VC08_0.5-0.6		✓
ES1937554-034	30-Oct-2019 00:00	VC08_1.0-1.1	✓	
ES1937554-035	30-Oct-2019 00:00	VC08_1.5-1.6		✓

			(On Hold) SOIL No analysis requested	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
ES1937554-036	30-Oct-2019 00:00	VC13_0.0-0.1	✓	
ES1937554-037	30-Oct-2019 00:00	VC13_0.5-0.6		✓
ES1937554-038	30-Oct-2019 00:00	VC13_1.0-1.1	✓	
ES1937554-039	30-Oct-2019 00:00	VC14_0.0-0.1		✓
ES1937554-040	30-Oct-2019 00:00	VC14_0.5-0.6	✓	
ES1937554-041	30-Oct-2019 00:00	VC14_1.0-1.1	✓	
ES1937554-042	30-Oct-2019 00:00	VC14_1.3-1.4		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

SARAH ECCLESHALL

- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sarah.eccleshall@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sarah.eccleshall@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	sarah.eccleshall@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	sarah.eccleshall@ghd.com
- EDI Format - XTab (XTAB)	Email	sarah.eccleshall@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	sarah.eccleshall@ghd.com

Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1937554**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: sarah.eccleshall@ghd.com	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 12517046	Page	: 1 of 3
Order number	: ----	Quote number	: ES2019GHDSER0030 (SY/522/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 12-Nov-2019 17:22	Issue Date	: 13-Nov-2019
Client Requested Due Date	: 22-Nov-2019	Scheduled Reporting Date	: **22-Nov-2019**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 4.1'c
Receipt Detail	:	No. of samples received / analysed	: 42 / 21

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **This work order is a split from ES1937483 & ES1990050.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- EA033 Analysis to be conducted by ALS Brisbane.
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	(On Hold) SOIL No analysis requested	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
ES1937554-001	30-Oct-2019 00:00	VC11_0.0-0.1		✓
ES1937554-002	30-Oct-2019 00:00	VC11_0.5-0.6	✓	
ES1937554-003	30-Oct-2019 00:00	VC11_1.0-1.1		✓
ES1937554-004	30-Oct-2019 00:00	VC09_0.0-0.1	✓	
ES1937554-005	30-Oct-2019 00:00	VC09_0.5-0.6	✓	
ES1937554-006	30-Oct-2019 00:00	VC09_0.9-1.0		✓
ES1937554-007	30-Oct-2019 00:00	VC07_0.0-0.1		✓
ES1937554-008	30-Oct-2019 00:00	VC07_0.5-0.6	✓	
ES1937554-009	30-Oct-2019 00:00	VC07_1.0-1.1		✓
ES1937554-010	30-Oct-2019 00:00	VC05_0.0-0.1		✓
ES1937554-011	30-Oct-2019 00:00	VC05_0.5-0.6	✓	
ES1937554-012	30-Oct-2019 00:00	VC05_0.8-1.0		✓
ES1937554-013	30-Oct-2019 00:00	VC03_0.0-0.1	✓	
ES1937554-014	30-Oct-2019 00:00	VC03_0.5-0.6	✓	
ES1937554-015	30-Oct-2019 00:00	VC03_10-1.1		✓
ES1937554-016	30-Oct-2019 00:00	VC01_0.0-0.1		✓
ES1937554-017	30-Oct-2019 00:00	vc01_0.5-0.6	✓	
ES1937554-018	30-Oct-2019 00:00	VC01_1.0-1.1		✓
ES1937554-019	30-Oct-2019 00:00	VC02_0.0-0.1		✓
ES1937554-020	30-Oct-2019 00:00	VC02_0.5-0.6	✓	
ES1937554-021	30-Oct-2019 00:00	VC02_0.9-1.0	✓	
ES1937554-022	30-Oct-2019 00:00	VC02_1.5-1.6		✓
ES1937554-023	30-Oct-2019 00:00	VC10_0.0-0.1	✓	
ES1937554-024	30-Oct-2019 00:00	VC10_0.5-0.6		✓
ES1937554-025	30-Oct-2019 00:00	VC04_0.0-0.1	✓	
ES1937554-026	30-Oct-2019 00:00	VC04_0.9-1.0		✓
ES1937554-027	30-Oct-2019 00:00	VC06_0.0-0.1		✓
ES1937554-028	30-Oct-2019 00:00	VC06_0.5-0.6	✓	
ES1937554-029	30-Oct-2019 00:00	VC12_0.0-0.1		✓
ES1937554-030	30-Oct-2019 00:00	VC12_0.5-0.6	✓	
ES1937554-031	30-Oct-2019 00:00	VC12_1.0-1.1	✓	
ES1937554-032	30-Oct-2019 00:00	VC08_0.0-0.1	✓	
ES1937554-033	30-Oct-2019 00:00	VC08_0.5-0.6		✓
ES1937554-034	30-Oct-2019 00:00	VC08_1.0-1.1	✓	
ES1937554-035	30-Oct-2019 00:00	VC08_1.5-1.6		✓

			(On Hold) SOIL No analysis requested	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
ES1937554-036	30-Oct-2019 00:00	VC13_0.0-0.1	✓	
ES1937554-037	30-Oct-2019 00:00	VC13_0.5-0.6		✓
ES1937554-038	30-Oct-2019 00:00	VC13_1.0-1.1	✓	
ES1937554-039	30-Oct-2019 00:00	VC14_0.0-0.1		✓
ES1937554-040	30-Oct-2019 00:00	VC14_0.5-0.6	✓	
ES1937554-041	30-Oct-2019 00:00	VC14_1.0-1.1	✓	
ES1937554-042	30-Oct-2019 00:00	VC14_1.3-1.4		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

SARAH ECCLESHALL

- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sarah.eccleshall@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sarah.eccleshall@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	sarah.eccleshall@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	sarah.eccleshall@ghd.com
- EDI Format - XTab (XTAB)	Email	sarah.eccleshall@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	sarah.eccleshall@ghd.com

Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1937554**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: sarah.eccleshall@ghd.com	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 12517046	Page	: 1 of 3
Order number	: ----	Quote number	: ES2019GHDSER0030 (SY/522/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 12-Nov-2019 17:22	Issue Date	: 13-Nov-2019
Client Requested Due Date	: 22-Nov-2019	Scheduled Reporting Date	: **22-Nov-2019**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 4.1'c
Receipt Detail	:	No. of samples received / analysed	: 42 / 21

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **This work order is a split from ES1937483 & ES1990050.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- EA033 Analysis to be conducted by ALS Brisbane.
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
ES1937554-001	31-Oct-2019 00:00	VC11_0.0-0.1		✓
ES1937554-002	30-Oct-2019 00:00	VC11_0.5-0.6	✓	
ES1937554-003	30-Oct-2019 00:00	VC11_1.0-1.1		✓
ES1937554-004	30-Oct-2019 00:00	VC09_0.0-0.1	✓	
ES1937554-005	30-Oct-2019 00:00	VC09_0.5-0.6	✓	
ES1937554-006	30-Oct-2019 00:00	VC09_0.9-1.0		✓
ES1937554-007	30-Oct-2019 00:00	VC07_0.0-0.1		✓
ES1937554-008	30-Oct-2019 00:00	VC07_0.5-0.6	✓	
ES1937554-009	30-Oct-2019 00:00	VC07_1.0-1.1		✓
ES1937554-010	30-Oct-2019 00:00	VC05_0.0-0.1		✓
ES1937554-011	30-Oct-2019 00:00	VC05_0.5-0.6	✓	
ES1937554-012	30-Oct-2019 00:00	VC05_0.8-1.0		✓
ES1937554-013	30-Oct-2019 00:00	VC03_0.0-0.1	✓	
ES1937554-014	30-Oct-2019 00:00	VC03_0.5-0.6	✓	
ES1937554-015	30-Oct-2019 00:00	VC03_10-1.1		✓
ES1937554-016	30-Oct-2019 00:00	VC01_0.0-0.1		✓
ES1937554-017	30-Oct-2019 00:00	vc01_0.5-0.6	✓	
ES1937554-018	30-Oct-2019 00:00	VC01_1.0-1.1		✓
ES1937554-019	30-Oct-2019 00:00	VC02_0.0-0.1		✓
ES1937554-020	30-Oct-2019 00:00	VC02_0.5-0.6	✓	
ES1937554-021	30-Oct-2019 00:00	VC02_0.9-1.0	✓	
ES1937554-022	30-Oct-2019 00:00	VC02_1.5-1.6		✓
ES1937554-023	30-Oct-2019 00:00	VC10_0.0-0.1	✓	
ES1937554-024	30-Oct-2019 00:00	VC10_0.5-0.6		✓
ES1937554-025	30-Oct-2019 00:00	VC04_0.0-0.1	✓	
ES1937554-026	30-Oct-2019 00:00	VC04_0.9-1.0		✓
ES1937554-027	30-Oct-2019 00:00	VC06_0.0-0.1		✓
ES1937554-028	31-Oct-2019 00:00	VC06_0.5-0.6	✓	
ES1937554-029	31-Oct-2019 00:00	VC12_0.0-0.1		✓
ES1937554-030	31-Oct-2019 00:00	VC12_0.5-0.6	✓	
ES1937554-031	31-Oct-2019 00:00	VC12_1.0-1.1	✓	
ES1937554-032	31-Oct-2019 00:00	VC08_0.0-0.1	✓	
ES1937554-033	31-Oct-2019 00:00	VC08_0.5-0.6		✓
ES1937554-034	31-Oct-2019 00:00	VC08_1.0-1.1	✓	
ES1937554-035	31-Oct-2019 00:00	VC08_1.5-1.6		✓

			(On Hold) SOIL No analysis requested	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
ES1937554-036	31-Oct-2019 00:00	VC13_0.0-0.1	✓	
ES1937554-037	31-Oct-2019 00:00	VC13_0.5-0.6		✓
ES1937554-038	31-Oct-2019 00:00	VC13_1.0-1.1	✓	
ES1937554-039	31-Oct-2019 00:00	VC14_0.0-0.1		✓
ES1937554-040	31-Oct-2019 00:00	VC14_0.5-0.6	✓	
ES1937554-041	31-Oct-2019 00:00	VC14_1.0-1.1	✓	
ES1937554-042	31-Oct-2019 00:00	VC14_1.3-1.4		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

SARAH ECCLESHALL

- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sarah.eccleshall@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sarah.eccleshall@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	sarah.eccleshall@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	sarah.eccleshall@ghd.com
- EDI Format - XTab (XTAB)	Email	sarah.eccleshall@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	sarah.eccleshall@ghd.com

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES1937554**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: sarah.eccleshall@ghd.com	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 12517046	Page	: 1 of 3
Order number	: ----	Quote number	: ES2019GHDSER0030 (SY/522/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 12-Nov-2019 17:22	Issue Date	: 18-Nov-2019
Client Requested Due Date	: 22-Nov-2019	Scheduled Reporting Date	: **22-Nov-2019**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 4.1'c
Receipt Detail	:	No. of samples received / analysed	: 42 / 22

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **This work order is a split from ES1937483 & ES1990050.**
- **This work order is a rebatch of ES1936029/ES1936183 and a split from ES1937483/ES1990050**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- ***18/11/2019*: SRN has been resent to acknowledge addition of AVS-SEM to samples 'VC07_0.0-0.1', 'VC02_0.5-0.6' & 'VC12_0.0-0.1' received by ALS from Sarah Eccleshall, 15/11/2019. For any further information regarding these adjustments please contact client services at ALSEnviro.Sydney@alsglobal.com.**
- EA033 Analysis to be conducted by ALS Brisbane.
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - EA033 Chromium Suite for Acid Sulphate Soils	SOIL - EA038-AVS_SEM Acid Volatile Sulphides (AVS) and Simultaneously	SOIL - EA055-103 Moisture Content
ES1937554-001	30-Oct-2019 00:00	VC11_0.0-0.1		✓		
ES1937554-002	30-Oct-2019 00:00	VC11_0.5-0.6	✓			
ES1937554-003	30-Oct-2019 00:00	VC11_1.0-1.1		✓		
ES1937554-004	30-Oct-2019 00:00	VC09_0.0-0.1	✓			
ES1937554-005	30-Oct-2019 00:00	VC09_0.5-0.6	✓			
ES1937554-006	30-Oct-2019 00:00	VC09_0.9-1.0		✓		
ES1937554-007	30-Oct-2019 00:00	VC07_0.0-0.1		✓	✓	✓
ES1937554-008	30-Oct-2019 00:00	VC07_0.5-0.6	✓			
ES1937554-009	30-Oct-2019 00:00	VC07_1.0-1.1		✓		
ES1937554-010	30-Oct-2019 00:00	VC05_0.0-0.1		✓		
ES1937554-011	30-Oct-2019 00:00	VC05_0.5-0.6	✓			
ES1937554-012	30-Oct-2019 00:00	VC05_0.8-1.0		✓		
ES1937554-013	30-Oct-2019 00:00	VC03_0.0-0.1	✓			
ES1937554-014	30-Oct-2019 00:00	VC03_0.5-0.6	✓			
ES1937554-015	30-Oct-2019 00:00	VC03_10-1.1		✓		
ES1937554-016	30-Oct-2019 00:00	VC01_0.0-0.1		✓		
ES1937554-017	30-Oct-2019 00:00	vc01_0.5-0.6	✓			
ES1937554-018	30-Oct-2019 00:00	VC01_1.0-1.1		✓		
ES1937554-019	30-Oct-2019 00:00	VC02_0.0-0.1		✓		
ES1937554-020	30-Oct-2019 00:00	VC02_0.5-0.6			✓	✓
ES1937554-021	30-Oct-2019 00:00	VC02_0.9-1.0	✓			
ES1937554-022	30-Oct-2019 00:00	VC02_1.5-1.6		✓		
ES1937554-023	30-Oct-2019 00:00	VC10_0.0-0.1	✓			
ES1937554-024	30-Oct-2019 00:00	VC10_0.5-0.6		✓		
ES1937554-025	30-Oct-2019 00:00	VC04_0.0-0.1	✓			
ES1937554-026	30-Oct-2019 00:00	VC04_0.9-1.0		✓		
ES1937554-027	31-Oct-2019 00:00	VC06_0.0-0.1		✓		
ES1937554-028	31-Oct-2019 00:00	VC06_0.5-0.6	✓			
ES1937554-029	31-Oct-2019 00:00	VC12_0.0-0.1		✓	✓	✓
ES1937554-030	31-Oct-2019 00:00	VC12_0.5-0.6	✓			
ES1937554-031	31-Oct-2019 00:00	VC12_1.0-1.1	✓			
ES1937554-032	31-Oct-2019 00:00	VC08_0.0-0.1	✓			
ES1937554-033	31-Oct-2019 00:00	VC08_0.5-0.6		✓		
ES1937554-034	31-Oct-2019 00:00	VC08_1.0-1.1	✓			
ES1937554-035	31-Oct-2019 00:00	VC08_1.5-1.6		✓		

			(On Hold) SOIL No analysis requested	SOIL - EA033 Chromium Suite for Acid Sulphate Soils	SOIL - EA038-AVS_SEM Acid Volatile Sulphides (AVS) and Simultaneously	SOIL - EA055-103 Moisture Content
ES1937554-036	31-Oct-2019 00:00	VC13_0.0-0.1	✓			
ES1937554-037	31-Oct-2019 00:00	VC13_0.5-0.6		✓		
ES1937554-038	31-Oct-2019 00:00	VC13_1.0-1.1	✓			
ES1937554-039	31-Oct-2019 00:00	VC14_0.0-0.1		✓		
ES1937554-040	31-Oct-2019 00:00	VC14_0.5-0.6	✓			
ES1937554-041	31-Oct-2019 00:00	VC14_1.0-1.1	✓			
ES1937554-042	31-Oct-2019 00:00	VC14_1.3-1.4		✓		

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

Accounts Payable Australia		
- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com
SARAH ECCLESHALL		
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sarah.eccleshall@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sarah.eccleshall@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	sarah.eccleshall@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	sarah.eccleshall@ghd.com
- EDI Format - XTab (XTAB)	Email	sarah.eccleshall@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	sarah.eccleshall@ghd.com

CERTIFICATE OF ANALYSIS

Work Order	: **ES1937554**	Page	: 1 of 7
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 12-Nov-2019 17:22
Order number	: ----	Date Analysis Commenced	: 18-Nov-2019
C-O-C number	: ----	Issue Date	: 10-Dec-2019 11:18
Sampler	: ----		
Site	: ----		
Quote number	: SY/522/19		
No. of samples received	: 42		
No. of samples analysed	: 22		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite):Retained Acidity not required because pH KCl greater than or equal to 4.5
- Amendment (10/12/2019): This report has been amended to allow the distribution of an reports not previously provided. All analysis results are as per the previous report.
- ASS: EA033 (CRS Suite): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime ($CaCO_3$) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC11_0.0-0.1	VC11_1.0-1.1	VC09_0.9-1.0	VC07_0.0-0.1	VC07_1.0-1.1
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937554-001	ES1937554-003	ES1937554-006	ES1937554-007	ES1937554-009
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.2**	**9.2**	**8.9**	**9.2**	**8.9**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.195**	**0.286**	**0.015**	**0.107**	**0.023**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**121**	**178**	<10	**67**	**14**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**35.1**	**22.1**	**0.77**	**28.0**	**1.34**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**7010**	**4410**	**153**	**5590**	**269**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**11.2**	**7.07**	**0.24**	**8.96**	**0.43**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.19**	**0.29**	<0.02	**0.11**	**0.02**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**121**	**178**	<10	**67**	**14**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**9**	**13**	<1	**5**	**1**
EA038 / EG005 (ED093): Simultaneously Extracted Metals								
Copper	7440-50-8	1.0	mg/kg	----	----	----	**48.1**	----
Silver	7440-22-4	1.0	mg/kg	----	----	----	<1.0	----
EA038 / EG005(ED093): Acid Volatile Sulphides & Simultaneously Extracted Metals								
Copper	7440-50-8	0.01	mmol/kg	----	----	----	**0.76**	----
Silver	7440-22-4	0.01	mmol/kg	----	----	----	<0.01	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC05_0.0-0.1	VC05_0.8-1.0	VC03_10-1.1	VC01_0.0-0.1	VC01_1.0-1.1
			Client sampling date / time	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937554-010	ES1937554-012	ES1937554-015	ES1937554-016	ES1937554-018
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.1**	**7.4**	**7.0**	**9.0**	**9.2**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.020**	**0.010**	**0.021**	**0.161**	**0.023**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**12**	<10	**13**	**101**	**14**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.98**	**0.22**	**0.25**	**9.53**	**0.47**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**196**	**45**	**50**	**1900**	**93**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.31**	**0.07**	**0.08**	**3.05**	**0.15**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.02**	<0.02	**0.02**	**0.16**	**0.02**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**12**	<10	**13**	**101**	**14**
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	<1	<1	**8**	**1**

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	VC02_0.0-0.1	VC02_0.5-0.6	VC02_1.5-1.6	VC10_0.5-0.6	VC04_0.9-1.0
Client sampling date / time				30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00	30-Oct-2019 00:00
				ES1937554-019	ES1937554-020	ES1937554-022	ES1937554-024	ES1937554-026
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.9**	----	**8.1**	**6.7**	**7.2**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.274**	----	**0.022**	**0.019**	**0.011**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**171**	----	**14**	**12**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**14.8**	----	**0.76**	**0.35**	**0.43**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**2960**	----	**151**	**69**	**86**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**4.75**	----	**0.24**	**0.11**	**0.14**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	----	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.27**	----	**0.02**	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**171**	----	**14**	**12**	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	**13**	----	**1**	<1	<1
EA038 / EG005 (ED093): Simultaneously Extracted Metals								
Copper	7440-50-8	1.0	mg/kg	----	**7.1**	----	----	----
Silver	7440-22-4	1.0	mg/kg	----	<1.0	----	----	----
EA038 / EG005(ED093): Acid Volatile Sulphides & Simultaneously Extracted Metals								
Copper	7440-50-8	0.01	mmol/kg	----	**0.11**	----	----	----
Silver	7440-22-4	0.01	mmol/kg	----	<0.01	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC06_0.0-0.1	VC12_0.0-0.1	VC08_0.5-0.6	VC08_1.5-1.6	VC13_0.5-0.6
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00	31-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1937554-027	ES1937554-029	ES1937554-033	ES1937554-035	ES1937554-037
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	8.9	9.1	9.2	9.0	9.0
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.610	0.087	0.295	0.056	0.040
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	381	54	184	35	25
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	12.5	16.4	21.2	1.27	1.11
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	2500	3280	4230	254	222
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	4.00	5.26	6.78	0.41	0.36
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	0.61	0.09	0.29	0.06	0.04
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	381	54	184	35	25
Liming Rate excluding ANC	----	1	kg CaCO3/t	28	4	14	3	2
EA038 / EG005 (ED093): Simultaneously Extracted Metals								
Copper	7440-50-8	1.0	mg/kg	----	31.5	----	----	----
Silver	7440-22-4	1.0	mg/kg	----	<1.0	----	----	----
EA038 / EG005(ED093): Acid Volatile Sulphides & Simultaneously Extracted Metals								
Copper	7440-50-8	0.01	mmol/kg	----	0.50	----	----	----
Silver	7440-22-4	0.01	mmol/kg	----	<0.01	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VC14_0.0-0.1	VC14_1.3-1.4	----	----	----
			Client sampling date / time	31-Oct-2019 00:00	31-Oct-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1937554-039	ES1937554-042	--------	--------	--------
				Result	Result	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.1**	**8.9**	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.358**	**0.030**	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**224**	**18**	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**48.0**	**1.65**	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**9590**	**330**	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**15.4**	**0.53**	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	<1	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.36**	**0.03**	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**224**	**18**	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	**17**	**1**	----	----	----

QUALITY CONTROL REPORT

Work Order	: **ES1937554**	Page	: 1 of 6
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 12-Nov-2019
Order number	: ----	Date Analysis Commenced	: 18-Nov-2019
C-O-C number	: ----	Issue Date	: 10-Dec-2019
Sampler	: ----		
Site	: ----		
Quote number	: SY/522/19		
No. of samples received	: 42		
No. of samples analysed	: 22		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Inorganics, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA038 / EG005 (ED093): Simultaneously Extracted Metals (QC Lot: 2719143)									
ES1937554-007	VC07_0.0-0.1	EG005-SEM_1: Copper	7440-50-8	1	mg/kg	48.1	48.2	0.00	0% - 20%
		EG005-SEM_1: Silver	7440-22-4	1	mg/kg	<1.0	<1.0	0.00	No Limit
EA033-A: Actual Acidity (QC Lot: 2705451)									
EB1929789-042	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.7	8.7	0.00	0% - 20%
ES1937554-007	VC07_0.0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.2	9.2	0.00	0% - 20%
EA033-A: Actual Acidity (QC Lot: 2705452)									
ES1937554-027	VC06_0.0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.9	8.9	0.00	0% - 20%
EA033-A: Actual Acidity (QC Lot: 2714262)									
EB1929954-001	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.6	8.6	0.00	0% - 20%
EB1930803-002	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.7	8.7	0.00	0% - 20%
EA033-A: Actual Acidity (QC Lot: 2716904)									
EB1931066-001	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.4	8.4	0.00	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 2716904) - continued									
EM1919394-001	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	10.5	10.5	0.00	0% - 20%
EA033-B: Potential Acidity (QC Lot: 2705451)									
EB1929789-042	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.689	0.705	2.27	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	430	440	2.27	0% - 20%
ES1937554-007	VC07_0.0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.107	0.104	2.51	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	67	65	2.51	No Limit
EA033-B: Potential Acidity (QC Lot: 2705452)									
ES1937554-027	VC06_0.0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.610	0.617	1.05	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	381	385	1.05	0% - 20%
EA033-B: Potential Acidity (QC Lot: 2714262)									
EB1929954-001	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.969	0.938	3.22	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	604	585	3.22	0% - 20%
EB1930803-002	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.021	0.020	7.60	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	13	12	0.00	No Limit
EA033-B: Potential Acidity (QC Lot: 2716904)									
EB1931066-001	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.833	0.834	0.00	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	520	520	0.00	0% - 20%
EM1919394-001	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.125	0.124	0.00	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	78	78	0.00	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 2705451)									
EB1929789-042	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	9.30	9.28	0.268	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	2.98	2.97	0.00	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1860	1850	0.268	0% - 20%
ES1937554-007	VC07_0.0-0.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	28.0	27.9	0.162	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	8.96	8.95	0.162	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	5590	5580	0.162	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 2705452)									

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EA033-C: Acid Neutralising Capacity (QC Lot: 2705452) - continued									
ES1937554-027	VC06_0.0-0.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	12.5	12.5	0.282	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	4.00	4.01	0.282	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	2500	2500	0.282	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 2714262)									
EB1929954-001	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	6.77	6.66	1.63	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	2.17	2.13	1.63	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1350	1330	1.63	0% - 20%
EB1930803-002	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	8.09	7.98	1.36	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	2.59	2.56	1.36	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1620	1600	1.36	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 2716904)									
EB1931066-001	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	4.45	4.42	0.586	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.42	1.42	0.00	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	889	884	0.586	0% - 20%
EM1919394-001	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	2.76	2.75	0.377	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.88	0.88	0.00	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	552	550	0.377	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA038 / EG005 (ED093): Simultaneously Extracted Metals (QCLot: 2719143)								
EG005-SEM_1: Copper	7440-50-8	1	mg/kg	<1.0	14.507 mg/kg	82.3	70.0	130
EG005-SEM_1: Silver	7440-22-4	1	mg/kg	<1.0	2.1 mg/kg	88.6	70.0	130
EA033-A: Actual Acidity (QCLot: 2705451)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.4 pH Unit	102	91.0	107
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	20.1 mole H+ / t	122	70.0	124
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 2705452)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.4 pH Unit	102	91.0	107
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	20.1 mole H+ / t	118	70.0	124
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 2714262)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.4 pH Unit	97.7	91.0	107
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	20.1 mole H+ / t	106	70.0	124
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 2716904)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.4 pH Unit	100	91.0	107
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	20.1 mole H+ / t	89.2	70.0	124
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 2705451)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.256 % S	90.9	77.0	121
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 2705452)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.256 % S	88.0	77.0	121
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 2714262)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.256 % S	92.0	77.0	121
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 2716904)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.256 % S	92.6	77.0	121
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 2705451)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	10 % CaCO3	101	91.0	112
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EA033-C: Acid Neutralising Capacity (QCLot: 2705451) - continued								
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 2705452)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	10 % CaCO3	99.8	91.0	112
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 2714262)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	10 % CaCO3	100	91.0	112
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 2716904)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	10 % CaCO3	100	91.0	112
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1937554**	Page	: 1 of 6
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 12-Nov-2019
Site	: ----	Issue Date	: 10-Dec-2019
Sampler	: ----	No. of samples received	: 42
Order number	: ----	No. of samples analysed	: 22

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033)								
VC11_0.0-0.1,	VC11_1.0-1.1,	**30-Oct-2019**	**18-Nov-2019**	29-Oct-2020	✓	**18-Nov-2019**	16-Feb-2020	✓
VC09_0.9-1.0,	VC07_0.0-0.1,							
VC07_1.0-1.1,	VC05_0.0-0.1,							
VC05_0.8-1.0,	VC03_10-1.1,							
VC01_0.0-0.1,	VC01_1.0-1.1,							
VC02_0.0-0.1,	VC02_1.5-1.6,							
VC10_0.5-0.6								
Snap Lock Bag - frozen (EA033)								
VC04_0.9-1.0		**30-Oct-2019**	**21-Nov-2019**	29-Oct-2020	✓	**21-Nov-2019**	19-Feb-2020	✓
Snap Lock Bag - frozen (EA033)								
VC06_0.0-0.1,	VC08_0.5-0.6,	**31-Oct-2019**	**18-Nov-2019**	30-Oct-2020	✓	**18-Nov-2019**	16-Feb-2020	✓
VC08_1.5-1.6,	VC13_0.5-0.6,							
VC14_0.0-0.1,	VC14_1.3-1.4							
Snap Lock Bag - frozen (EA033)								
VC12_0.0-0.1		**31-Oct-2019**	**22-Nov-2019**	30-Oct-2020	✓	**22-Nov-2019**	20-Feb-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation Date extracted	 Due for extraction	 Evaluation	Analysis Date analysed	 Due for analysis	 Evaluation
EA033-B: Potential Acidity							
Snap Lock Bag - frozen (EA033) VC11_0.0-0.1, VC11_1.0-1.1, VC09_0.9-1.0, VC07_0.0-0.1, VC07_1.0-1.1, VC05_0.0-0.1, VC05_0.8-1.0, VC03_10-1.1, VC01_0.0-0.1, VC01_1.0-1.1, VC02_0.0-0.1, VC02_1.5-1.6, VC10_0.5-0.6	**30-Oct-2019**	**18-Nov-2019**	29-Oct-2020	✓	**18-Nov-2019**	16-Feb-2020	✓
Snap Lock Bag - frozen (EA033) VC04_0.9-1.0	**30-Oct-2019**	**21-Nov-2019**	29-Oct-2020	✓	**21-Nov-2019**	19-Feb-2020	✓
Snap Lock Bag - frozen (EA033) VC06_0.0-0.1, VC08_0.5-0.6, VC08_1.5-1.6, VC13_0.5-0.6, VC14_0.0-0.1, VC14_1.3-1.4	**31-Oct-2019**	**18-Nov-2019**	30-Oct-2020	✓	**18-Nov-2019**	16-Feb-2020	✓
Snap Lock Bag - frozen (EA033) VC12_0.0-0.1	**31-Oct-2019**	**22-Nov-2019**	30-Oct-2020	✓	**22-Nov-2019**	20-Feb-2020	✓
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen (EA033) VC11_0.0-0.1, VC11_1.0-1.1, VC09_0.9-1.0, VC07_0.0-0.1, VC07_1.0-1.1, VC05_0.0-0.1, VC05_0.8-1.0, VC03_10-1.1, VC01_0.0-0.1, VC01_1.0-1.1, VC02_0.0-0.1, VC02_1.5-1.6, VC10_0.5-0.6	**30-Oct-2019**	**18-Nov-2019**	29-Oct-2020	✓	**18-Nov-2019**	16-Feb-2020	✓
Snap Lock Bag - frozen (EA033) VC04_0.9-1.0	**30-Oct-2019**	**21-Nov-2019**	29-Oct-2020	✓	**21-Nov-2019**	19-Feb-2020	✓
Snap Lock Bag - frozen (EA033) VC06_0.0-0.1, VC08_0.5-0.6, VC08_1.5-1.6, VC13_0.5-0.6, VC14_0.0-0.1, VC14_1.3-1.4	**31-Oct-2019**	**18-Nov-2019**	30-Oct-2020	✓	**18-Nov-2019**	16-Feb-2020	✓
Snap Lock Bag - frozen (EA033) VC12_0.0-0.1	**31-Oct-2019**	**22-Nov-2019**	30-Oct-2020	✓	**22-Nov-2019**	20-Feb-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033)								
VC11_0.0-0.1,	VC11_1.0-1.1,	**30-Oct-2019**	**18-Nov-2019**	29-Oct-2020	✓	**18-Nov-2019**	16-Feb-2020	✓
VC09_0.9-1.0,	VC07_0.0-0.1,							
VC07_1.0-1.1,	VC05_0.0-0.1,							
VC05_0.8-1.0,	VC03_10-1.1,							
VC01_0.0-0.1,	VC01_1.0-1.1,							
VC02_0.0-0.1,	VC02_1.5-1.6,							
VC10_0.5-0.6								
Snap Lock Bag - frozen (EA033)								
VC04_0.9-1.0		**30-Oct-2019**	**21-Nov-2019**	29-Oct-2020	✓	**21-Nov-2019**	19-Feb-2020	✓
Snap Lock Bag - frozen (EA033)								
VC06_0.0-0.1,	VC08_0.5-0.6,	**31-Oct-2019**	**18-Nov-2019**	30-Oct-2020	✓	**18-Nov-2019**	16-Feb-2020	✓
VC08_1.5-1.6,	VC13_0.5-0.6,							
VC14_0.0-0.1,	VC14_1.3-1.4							
Snap Lock Bag - frozen (EA033)								
VC12_0.0-0.1		**31-Oct-2019**	**22-Nov-2019**	30-Oct-2020	✓	**22-Nov-2019**	20-Feb-2020	✓
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033)								
VC11_0.0-0.1,	VC11_1.0-1.1,	**30-Oct-2019**	**18-Nov-2019**	29-Oct-2020	✓	**18-Nov-2019**	16-Feb-2020	✓
VC09_0.9-1.0,	VC07_0.0-0.1,							
VC07_1.0-1.1,	VC05_0.0-0.1,							
VC05_0.8-1.0,	VC03_10-1.1,							
VC01_0.0-0.1,	VC01_1.0-1.1,							
VC02_0.0-0.1,	VC02_1.5-1.6,							
VC10_0.5-0.6								
Snap Lock Bag - frozen (EA033)								
VC04_0.9-1.0		**30-Oct-2019**	**21-Nov-2019**	29-Oct-2020	✓	**21-Nov-2019**	19-Feb-2020	✓
Snap Lock Bag - frozen (EA033)								
VC06_0.0-0.1,	VC08_0.5-0.6,	**31-Oct-2019**	**18-Nov-2019**	30-Oct-2020	✓	**18-Nov-2019**	16-Feb-2020	✓
VC08_1.5-1.6,	VC13_0.5-0.6,							
VC14_0.0-0.1,	VC14_1.3-1.4							
Snap Lock Bag - frozen (EA033)								
VC12_0.0-0.1		**31-Oct-2019**	**22-Nov-2019**	30-Oct-2020	✓	**22-Nov-2019**	20-Feb-2020	✓
EA038 / EG005 (ED093): Simultaneously Extracted Metals								
Snap Lock Bag - frozen (EG005-SEM_1)								
VC07_0.0-0.1,	VC02_0.5-0.6	**30-Oct-2019**	**22-Nov-2019**	29-Oct-2020	✓	**22-Nov-2019**	20-Feb-2020	✓
Snap Lock Bag - frozen (EG005-SEM_1)								
VC12_0.0-0.1		**31-Oct-2019**	**22-Nov-2019**	30-Oct-2020	✓	**22-Nov-2019**	20-Feb-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
1M HCl Extractable Metals	EG005-SEM_1	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	7	66	**10.61**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
1M HCl Extractable Metals	EG005-SEM_1	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	4	66	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
1M HCl Extractable Metals	EG005-SEM_1	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils	EA033	4	66	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
1M HCl Extractable Metals	EG005-SEM 1	SOIL	In house: Referenced to Simpson et al. 2005; Handbook for Sediment Quality Assessment. AVS is defined as the fraction of sulfides extracted from sediments by cold digestion using HCl. The remaining solution is then run on the ICP to determine concentration of various metals and SEM is calculated as sum of Cd, Cu, Ni, Pb, Zn in mmol/kg.
Simultaneously Extractable Metals (SEM)	EG005-SEM 2	SOIL	In house: Referenced to Simpson et al. 2005; Handbook for Sediment Quality Assessment. AVS is defined as the fraction of sulfides extracted from sediments by cold digestion using HCl. The remaining solution is then run on the ICP to determine concentration of various metals and SEM is calculated as sum of Cd, Cu, Ni, Pb, Zn in mmol/kg.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
1M HCl Extraction for Metals in Sediments (1 hour)	EN71-SEM	SOIL	In house: Referenced to Simpson et al. 2005; Handbook for Sediment Quality Assessment. 2g of as received sample is leached at room temperature for 1 hour in 1N hydrochloric acid.

Vishal
15/11/2019
1615

Vishal Patel

From: Angus Harding
Sent: Friday, 15 November 2019 4:12 PM
To: Vishal Patel
Cc: Loren Schiavon; Helen Simpson
Subject: FW: [EXTERNAL] - Additional analyses for project 12517046

Hey Vishal,

Could we please organise the compositing of the samples listed below so that we have enough volume to run porewater and elutriates.
I believe samples should be in ES1937483.

Let me know if you need help or more details.

Cheers.

Kind Regards,

Angus Harding

Client Services Officer, Environmental
Sydney

T +61 2 8784 8555
F +61 2 8784 8500
D +61 2 8784 8503
angus.harding@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA

Environmental Division
Sydney
Work Order Reference
ES1938004

Telephone : + 61-2-8784 8555

From: Sarah.Eccleshall@ghd.com [mailto:Sarah.Eccleshall@ghd.com]
Sent: Friday, 15 November 2019 9:43 AM
To: Angus Harding <angus.harding@ALSGlobal.com>; Brenda Hong <Brenda.Hong@alsglobal.com>
Cc: Carmen Yi <Carmen.Yi@ghd.com>; Helen Simpson <helen.simpson@alsglobal.com>
Subject: RE: [EXTERNAL] - Additional analyses for project 12517046

Hi,

Thanks for the extra info.
After our chat on the phone Angus and having reviewed our sample requirements and what we have left in terms of material we have come up with the following plan. The plan would be to take what remaining samples which fall within the same depth intervals as the homogenised samples we have and create composite samples for porewater testing. This would comprise any remaining material the 0.0-0.5 depth intervals already requested plus the additional samples for each core (i.e. VC02. VC07, VC12) as in the table below.

Samples analysed using SEM/AVS should not be homogenised according to the NAGD , so can the material for these please be extracted from FD03, VC120.3-0.4 and VC02_0.0-0.2 prior to homogenisation.

1) Prioritise elutriate for the samples requested for PAH, PCB and copper, mercury and silver, using scaled down elutriation process
2) Porewater for PAH, PCB and copper, mercury and silver

Sample	Samples which can be combined	
VC07_0.0-0.5 #17	FD03, VC07_0.2-0.4, VC07_0.0-0.2	#6, 13 ES1936029 # 82 S-685-690
VC12_0.0-0.5 #29	VC12_0.0-0.1, VC12_0.3-0.4 VC12_0.5-0.6	#62, 63, 64 S-954-961
VC02_0.0-0.5 #53	VC02_0.0-0.2; VC02_0.5-0.6	#38, 39

I hope this makes sense, please give me a call if anything needs clarifying.

Thanks for all your help with this.

Sarah Eccleshall
PhD MSc BSc Hons
Graduate Environmental Scientist
Contamination & Environmental Management

GHD
Proudly employee owned
T: +61 2 9239 7715 | M: +61 459 546 332 | E: sarah.eccleshall@ghd.com
Level 15 133 Castlereagh Street Sydney NSW 2000 Australia | www.ghd.com

From: Angus Harding <angus.harding@ALSGlobal.com>
Sent: Thursday, 14 November 2019 4:30 PM

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1938004**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: sarah.eccleshall@ghd.com	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 12517046	Page	: 1 of 3
Order number	: ----	Quote number	: ES2019GHDSER0030 (SY/522/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 15-Nov-2019 16:15	Issue Date	: 18-Nov-2019
Client Requested Due Date	: 26-Nov-2019	Scheduled Reporting Date	: **26-Nov-2019**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 4.1'C
Receipt Detail	:	No. of samples received / analysed	: 15 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Rebatch of ES1937483 and ES1936029.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

ES1938004-004	: [30-Oct-2019]	: VC07_0.0-0.5 - ELUTRIATE
ES1938004-008	: [31-Oct-2019]	: VC12_0.0-0.5 - ELUTRIATE
ES1938004-011	: [30-Oct-2019]	: VC02_0.0-0.5 - ELUTRIATE
ES1938004-012	: [30-Oct-2019]	: SALTWATER - ELUTRIATE
ES1938004-013	: [30-Oct-2019]	: VC07_0.0-0.5 - PORE WATER
ES1938004-014	: [31-Oct-2019]	: VC12_0.0-0.5 - PORE WATER
ES1938004-015	: [30-Oct-2019]	: VC02_0.0-0.5 - PORE WATER

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EG035T-LL Total Mercury - Low Level	SOIL - EG093-T Total Metals by ORC - Ultra Trace in Saline	SOIL - EN020 Sample Compositing	SOIL - EN68-2/3 Preparation of Elutriates for 2-3 analysis	SOIL - EN82 Porewater Extraction	SOIL - EP131B Ultra Trace PCB's	SOIL - EP132B(PAH) Ultra Trace Polynuclear Aromatic Compounds
ES1938004-001	30-Oct-2019 00:00	FD03			✓				
ES1938004-002	30-Oct-2019 00:00	VC07_0.2-0.4			✓				
ES1938004-003	30-Oct-2019 00:00	VC07_0.0-0.2			✓				
ES1938004-004	30-Oct-2019 00:00	VC07_0.0-0.5 ELUTRI...	✓	✓		✓		✓	✓
ES1938004-005	31-Oct-2019 00:00	VC12_0.0-0.1			✓				
ES1938004-006	31-Oct-2019 00:00	VC12_0.3-0.4			✓				
ES1938004-007	31-Oct-2019 00:00	VC12_0.5-0.6			✓				
ES1938004-008	31-Oct-2019 00:00	VC12_0.0-0.5 ELUTRI...	✓	✓		✓		✓	✓
ES1938004-009	30-Oct-2019 00:00	VC02_0.0-0.2			✓				
ES1938004-010	30-Oct-2019 00:00	VC02_0.5-0.6			✓				
ES1938004-011	30-Oct-2019 00:00	VC02_0.0-0.5 ELUTRI...	✓	✓		✓		✓	✓
ES1938004-012	30-Oct-2019 00:00	SALTWATER ELUTRIATE	✓	✓		✓		✓	✓
ES1938004-013	30-Oct-2019 00:00	VC07_0.0-0.5 PORE W...	✓	✓			✓	✓	✓
ES1938004-014	31-Oct-2019 00:00	VC12_0.0-0.5 PORE W...	✓	✓			✓	✓	✓
ES1938004-015	30-Oct-2019 00:00	VC02_0.0-0.5 PORE W...	✓	✓			✓	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **SOIL**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EN68a: Seawater Elutriate Testing Procedure							
SALTWATER	Non-Volatile Leach: 14 day HT(e	13-Nov-2019	----	15-Nov-2019	✗	----	----
VC02_0.0-0.5	Non-Volatile Leach: 14 day HT(e	13-Nov-2019	----	15-Nov-2019	✗	----	----
VC07_0.0-0.5	Non-Volatile Leach: 14 day HT(e	13-Nov-2019	----	15-Nov-2019	✗	----	----
VC12_0.0-0.5	Non-Volatile Leach: 14 day HT(e	14-Nov-2019	----	15-Nov-2019	✗	----	----
EN82: Porewater Extraction							
VC02_0.0-0.5	Non-Volatile Leach: 14 day HT(e	13-Nov-2019	----	15-Nov-2019	✗	----	----
VC07_0.0-0.5	Non-Volatile Leach: 14 day HT(e	13-Nov-2019	----	15-Nov-2019	✗	----	----

VC12_0.0-0.5	Non-Volatile Leach: 14 day HT(e	14-Nov-2019	----	15-Nov-2019	✘	----	----

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

GHD LAB REPORTS

- A4 - AU Tax Invoice (INV)	Email	ghdlabreports@ghd.com

SARAH ECCLESHALL

- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sarah.eccleshall@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sarah.eccleshall@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sarah.eccleshall@ghd.com
- AU Certificate of Analysis - NATA (With Guidelines) (COA_GL)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	sarah.eccleshall@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	sarah.eccleshall@ghd.com
- EDI Format - XTab (XTAB)	Email	sarah.eccleshall@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	sarah.eccleshall@ghd.com

Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1938004**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: sarah.eccleshall@ghd.com	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 12517046	Page	: 1 of 3
Order number	: ----	Quote number	: ES2019GHDSER0030 (SY/522/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 15-Nov-2019 16:15	Issue Date	: 25-Nov-2019
Client Requested Due Date	: 26-Nov-2019	Scheduled Reporting Date	: **26-Nov-2019**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 4.1'C
Receipt Detail	:	No. of samples received / analysed	: 15 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Rebatch of ES1937483 and ES1936029.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

ES1938004-004	: [30-Oct-2019]	: VC07_0.0-0.5 - ELUTRIATE
ES1938004-008	: [31-Oct-2019]	: VC12_0.0-0.5 - ELUTRIATE
ES1938004-011	: [30-Oct-2019]	: VC02_0.0-0.5 - ELUTRIATE
ES1938004-012	: [30-Oct-2019]	: SALTWATER - ELUTRIATE
ES1938004-013	: [30-Oct-2019]	: VC07_0.0-0.5 - PORE WATER
ES1938004-014	: [31-Oct-2019]	: VC12_0.0-0.5 - PORE WATER
ES1938004-015	: [30-Oct-2019]	: VC02_0.0-0.5 - PORE WATER

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EG035T-LL Total Mercury - Low Level	SOIL - EG093-T Total Metals by ORC - Ultra Trace in Saline	SOIL - EN020 Sample Compositing	SOIL - EN68-2/3 Preparation of Elutriates for 2-3 analysis	SOIL - EN82 Porewater Extraction	SOIL - EP131B Ultra Trace PCB's	SOIL - EP132-LL Super Ultra Trace PAH
ES1938004-001	30-Oct-2019 00:00	FD03			✓				
ES1938004-002	30-Oct-2019 00:00	VC07_0.2-0.4			✓				
ES1938004-003	30-Oct-2019 00:00	VC07_0.0-0.2			✓				
ES1938004-004	30-Oct-2019 00:00	VC07_0.0-0.5 ELUTRI...	✓	✓		✓		✓	✓
ES1938004-005	31-Oct-2019 00:00	VC12_0.0-0.1			✓				
ES1938004-006	31-Oct-2019 00:00	VC12_0.3-0.4			✓				
ES1938004-007	31-Oct-2019 00:00	VC12_0.5-0.6			✓				
ES1938004-008	31-Oct-2019 00:00	VC12_0.0-0.5 ELUTRI...	✓	✓		✓		✓	✓
ES1938004-009	30-Oct-2019 00:00	VC02_0.0-0.2			✓				
ES1938004-010	30-Oct-2019 00:00	VC02_0.5-0.6			✓				
ES1938004-011	30-Oct-2019 00:00	VC02_0.0-0.5 ELUTRI...	✓	✓		✓		✓	✓
ES1938004-012	30-Oct-2019 00:00	SALTWATER ELUTRIATE	✓	✓		✓		✓	✓
ES1938004-013	30-Oct-2019 00:00	VC07_0.0-0.5 PORE W...	✓	✓			✓	✓	✓
ES1938004-014	31-Oct-2019 00:00	VC12_0.0-0.5 PORE W...	✓	✓			✓	✓	✓
ES1938004-015	30-Oct-2019 00:00	VC02_0.0-0.5 PORE W...	✓	✓			✓	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **SOIL**

Evaluation: ✘ = Holding time breach ; ✓ = Within holding time.

Method Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EN68a: Seawater Elutriate Testing Procedure							
SALTWATER	Non-Volatile Leach: 14 day HT(e	13-Nov-2019	----	15-Nov-2019	✘	----	----
VC02_0.0-0.5	Non-Volatile Leach: 14 day HT(e	13-Nov-2019	----	15-Nov-2019	✘	----	----
VC07_0.0-0.5	Non-Volatile Leach: 14 day HT(e	13-Nov-2019	----	15-Nov-2019	✘	----	----
VC12_0.0-0.5	Non-Volatile Leach: 14 day HT(e	14-Nov-2019	----	15-Nov-2019	✘	----	----
EN82: Porewater Extraction							
VC02_0.0-0.5	Non-Volatile Leach: 14 day HT(e	13-Nov-2019	----	15-Nov-2019	✘	----	----
VC07_0.0-0.5	Non-Volatile Leach: 14 day HT(e	13-Nov-2019	----	15-Nov-2019	✘	----	----

VC12_0.0-0.5	Non-Volatile Leach: 14 day HT(ε	14-Nov-2019	----	15-Nov-2019	✘	----	----

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

GHD LAB REPORTS

- A4 - AU Tax Invoice (INV)	Email	ghdlabreports@ghd.com

SARAH ECCLESHALL

- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sarah.eccleshall@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sarah.eccleshall@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sarah.eccleshall@ghd.com
- AU Certificate of Analysis - NATA (With Guidelines) (COA_GL)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	sarah.eccleshall@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	sarah.eccleshall@ghd.com
- EDI Format - XTab (XTAB)	Email	sarah.eccleshall@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	sarah.eccleshall@ghd.com

CERTIFICATE OF ANALYSIS with GUIDELINE COMPARISON

Work Order	: **ES1938004**	Page	: 1 of 6
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12517046		
Order number	: ----		
C-O-C number	: ----	No. of samples received	: 15
Site	: ----	No. of samples analysed	: 4
Sampled by	: ----	Issue Date	: 03-Dec-2019 12:15
Quote number	: ES2019GHDSER0030 (SY/522/19)	Date Samples Received	: 15-Nov-2019 16:15

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to Assist with Quality Review and Sample Receipt Notification.

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position (Accreditation Category)
Celine Conceicao	Senior Spectroscopist (Sydney Inorganics, Smithfield, NSW)
Edwandy Fadjar	Organic Coordinator (Sydney Organics, Smithfield, NSW)

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits, the associated uncertainty **must be** considered. Refer to the ALS Contract Terms and Conditions for details, and EnviroMail 53 for a guide on how to interpret the measurement of uncertainty (MU).

Red shading is applied where the result is equal to or greater than the guideline upper limit or the result is equal to or lower than the guideline lower limit. Any shading applied **does not** take into account measurement uncertainty.

Work Order Specific Comments

- EN68: This analysis in accordance with National Ocean Disposal Guidelines, Commonwealth of Australia, 2002 - (modified). Results reported are those determined on a 1:4 sediment/seawater elutriate without blank correction.
- EG093: Samples containing high levels of sulfate may precipitate barium under the acidic conditions of this method and may therefore bias results low.

Analytical Results

Sub-Matrix: **COMPOSITE**			Client sample ID	**VC07_0.0-0.5 ELUTRIATE**		Guideline comparison not requested for sample		
			Laboratory sample ID	*ES1938004004*				
			Client sampling date / time	30-Oct-2019 15:00				
Parameter	*CAS Number*	*LOR*	----	Result	MU	----	----	----
EN68: Seawater Elutriate Testing Procedure								
Seawater Sampling Date	----	-	-	**2019-11-27**		----	----	----

Sub-Matrix: **COMPOSITE**			Client sample ID	**VC12_0.0-0.5 ELUTRIATE**		Guideline comparison not requested for sample		
			Laboratory sample ID	*ES1938004008*				
			Client sampling date / time	31-Oct-2019 15:00				
Parameter	*CAS Number*	*LOR*	----	Result	MU	----	----	----
EN68: Seawater Elutriate Testing Procedure								
Seawater Sampling Date	----	-	-	**2019-11-27**		----	----	----

Sub-Matrix: **COMPOSITE**			Client sample ID	**VC02_0.0-0.5 ELUTRIATE**		Guideline comparison not requested for sample		
			Laboratory sample ID	*ES1938004011*				
			Client sampling date / time	30-Oct-2019 15:00				
Parameter	*CAS Number*	*LOR*	----	Result	MU	----	----	----
EN68: Seawater Elutriate Testing Procedure								
Seawater Sampling Date	----	-	-	**2019-11-27**		----	----	----

Sub-Matrix: **SEDIMENT**			Client sample ID	**SALTWATER ELUTRIATE**		Guideline comparison not requested for sample		
			Laboratory sample ID	*ES1938004012*				
			Client sampling date / time	30-Oct-2019 15:00				
Parameter	*CAS Number*	*LOR*	----	Result	MU	----	----	----
EN68: Seawater Elutriate Testing Procedure								
Seawater Sampling Date	----	-	-	**2019-11-27**		----	----	----

Analytical Results

Sub-Matrix: **ELUTRIATE**			Client sample ID	VC07_0.0-0.5 ELUTRIATE		Guideline comparison not requested for sample		
			Laboratory sample ID	ES1938004004				
			Client sampling date / time	30-Oct-2019 15:00				
Parameter	CAS Number	LOR	----	Result	MU	----	----	----
EG035T: Total Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00004	--	----	----	----
EG093T: Total Metals in Saline Water by ORC-ICPMS								
Copper	7440-50-8	1	µg/L	<1	--	----	----	----
Silver	7440-22-4	0.1	µg/L	<0.1	--	----	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors)								
Total Polychlorinated biphenyls	----	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1016	12674-11-2	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1221	11104-28-2	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1232	11141-16-5	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1242	53469-21-9	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1248	12672-29-6	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1254	11097-69-1	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1260	11096-82-5	0.10	µg/L	<0.10	--	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.02	µg/L	<0.02	--	----	----	----
Acenaphthylene	208-96-8	0.02	µg/L	<0.02	--	----	----	----
Acenaphthene	83-32-9	0.02	µg/L	<0.02	--	----	----	----
Fluorene	86-73-7	0.02	µg/L	<0.02	--	----	----	----
Phenanthrene	85-01-8	0.02	µg/L	<0.02	--	----	----	----
Anthracene	120-12-7	0.02	µg/L	<0.02	--	----	----	----
Fluoranthene	206-44-0	0.02	µg/L	<0.02	--	----	----	----
Pyrene	129-00-0	0.02	µg/L	<0.02	--	----	----	----
Benz(a)anthracene	56-55-3	0.02	µg/L	<0.02	--	----	----	----
Chrysene	218-01-9	0.02	µg/L	<0.02	--	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.02	µg/L	<0.02	--	----	----	----
Benzo(k)fluoranthene	207-08-9	0.02	µg/L	<0.02	--	----	----	----
Benzo(a)pyrene	50-32-8	0.005	µg/L	<0.005	--	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.02	µg/L	<0.02	--	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.02	µg/L	<0.02	--	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.02	µg/L	<0.02	--	----	----	----
Total PAH	----	0.005	µg/L	<0.005	--	----	----	----
Benzo(a)pyrene TEQ (zero)	----	0.005	µg/L	<0.005	--	----	----	----

Analytical Results

Sub-Matrix: **ELUTRIATE**			Client sample ID	VC12_0.0-0.5 ELUTRIATE		Guideline comparison not requested for sample		
			Laboratory sample ID	ES1938004008				
			Client sampling date / time	31-Oct-2019 15:00				
Parameter	*CAS Number*	*LOR*	----	Result	MU	----	----	----
EG035T: Total Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00004	--	----	----	----
EG093T: Total Metals in Saline Water by ORC-ICPMS								
Copper	7440-50-8	1	µg/L	<1	--	----	----	----
Silver	7440-22-4	0.1	µg/L	<0.1	--	----	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors)								
Total Polychlorinated biphenyls	----	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1016	12674-11-2	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1221	11104-28-2	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1232	11141-16-5	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1242	53469-21-9	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1248	12672-29-6	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1254	11097-69-1	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1260	11096-82-5	0.10	µg/L	<0.10	--	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.02	µg/L	<0.02	--	----	----	----
Acenaphthylene	208-96-8	0.02	µg/L	<0.02	--	----	----	----
Acenaphthene	83-32-9	0.02	µg/L	<0.02	--	----	----	----
Fluorene	86-73-7	0.02	µg/L	<0.02	--	----	----	----
Phenanthrene	85-01-8	0.02	µg/L	<0.02	--	----	----	----
Anthracene	120-12-7	0.02	µg/L	<0.02	--	----	----	----
Fluoranthene	206-44-0	0.02	µg/L	<0.02	--	----	----	----
Pyrene	129-00-0	0.02	µg/L	<0.02	--	----	----	----
Benz(a)anthracene	56-55-3	0.02	µg/L	<0.02	--	----	----	----
Chrysene	218-01-9	0.02	µg/L	<0.02	--	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.02	µg/L	<0.02	--	----	----	----
Benzo(k)fluoranthene	207-08-9	0.02	µg/L	<0.02	--	----	----	----
Benzo(a)pyrene	50-32-8	0.005	µg/L	<0.005	--	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.02	µg/L	<0.02	--	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.02	µg/L	<0.02	--	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.02	µg/L	<0.02	--	----	----	----
Total PAH	----	0.005	µg/L	<0.005	--	----	----	----
Benzo(a)pyrene TEQ (zero)	----	0.005	µg/L	<0.005	--	----	----	----

Analytical Results

Sub-Matrix: **ELUTRIATE**			Client sample ID	VC02_0.0-0.5 ELUTRIATE		Guideline comparison not requested for sample		
			Laboratory sample ID	ES1938004011				
			Client sampling date / time	30-Oct-2019 15:00				
Parameter	CAS Number	LOR	----	Result	MU	----	----	----
EG035T: Total Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00004	--	----	----	----
EG093T: Total Metals in Saline Water by ORC-ICPMS								
Copper	7440-50-8	1	µg/L	<1	--	----	----	----
Silver	7440-22-4	0.1	µg/L	<0.1	--	----	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors)								
Total Polychlorinated biphenyls	----	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1016	12674-11-2	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1221	11104-28-2	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1232	11141-16-5	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1242	53469-21-9	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1248	12672-29-6	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1254	11097-69-1	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1260	11096-82-5	0.10	µg/L	<0.10	--	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.02	µg/L	<0.02	--	----	----	----
Acenaphthylene	208-96-8	0.02	µg/L	<0.02	--	----	----	----
Acenaphthene	83-32-9	0.02	µg/L	<0.02	--	----	----	----
Fluorene	86-73-7	0.02	µg/L	<0.02	--	----	----	----
Phenanthrene	85-01-8	0.02	µg/L	<0.02	--	----	----	----
Anthracene	120-12-7	0.02	µg/L	<0.02	--	----	----	----
Fluoranthene	206-44-0	0.02	µg/L	<0.02	--	----	----	----
Pyrene	129-00-0	0.02	µg/L	<0.02	--	----	----	----
Benz(a)anthracene	56-55-3	0.02	µg/L	<0.02	--	----	----	----
Chrysene	218-01-9	0.02	µg/L	<0.02	--	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.02	µg/L	<0.02	--	----	----	----
Benzo(k)fluoranthene	207-08-9	0.02	µg/L	<0.02	--	----	----	----
Benzo(a)pyrene	50-32-8	0.005	µg/L	<0.005	--	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.02	µg/L	<0.02	--	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.02	µg/L	<0.02	--	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.02	µg/L	<0.02	--	----	----	----
Total PAH	----	0.005	µg/L	<0.005	--	----	----	----
Benzo(a)pyrene TEQ (zero)	----	0.005	µg/L	<0.005	--	----	----	----

Analytical Results

Sub-Matrix: **ELUTRIATE**			Client sample ID	SALTWATER ELUTRIATE		Guideline comparison not requested for sample		
			Laboratory sample ID	ES1938004012				
			Client sampling date / time	30-Oct-2019 15:00				
Parameter	CAS Number	LOR	----	Result	MU	----	----	----
EG035T: Total Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00004	--	----	----	----
EG093T: Total Metals in Saline Water by ORC-ICPMS								
Copper	7440-50-8	1	µg/L	<1	--	----	----	----
Silver	7440-22-4	0.1	µg/L	<0.1	--	----	----	----
EP131B: Polychlorinated Biphenyls (as Aroclors)								
Total Polychlorinated biphenyls	----	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1016	12674-11-2	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1221	11104-28-2	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1232	11141-16-5	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1242	53469-21-9	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1248	12672-29-6	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1254	11097-69-1	0.10	µg/L	<0.10	--	----	----	----
Aroclor 1260	11096-82-5	0.10	µg/L	<0.10	--	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.02	µg/L	<0.02	--	----	----	----
Acenaphthylene	208-96-8	0.02	µg/L	<0.02	--	----	----	----
Acenaphthene	83-32-9	0.02	µg/L	<0.02	--	----	----	----
Fluorene	86-73-7	0.02	µg/L	<0.02	--	----	----	----
Phenanthrene	85-01-8	0.02	µg/L	<0.02	--	----	----	----
Anthracene	120-12-7	0.02	µg/L	<0.02	--	----	----	----
Fluoranthene	206-44-0	0.02	µg/L	<0.02	--	----	----	----
Pyrene	129-00-0	0.02	µg/L	<0.02	--	----	----	----
Benz(a)anthracene	56-55-3	0.02	µg/L	<0.02	--	----	----	----
Chrysene	218-01-9	0.02	µg/L	<0.02	--	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.02	µg/L	<0.02	--	----	----	----
Benzo(k)fluoranthene	207-08-9	0.02	µg/L	<0.02	--	----	----	----
Benzo(a)pyrene	50-32-8	0.005	µg/L	<0.005	--	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.02	µg/L	<0.02	--	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.02	µg/L	<0.02	--	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.02	µg/L	<0.02	--	----	----	----
Total PAH	----	0.005	µg/L	<0.005	--	----	----	----
Benzo(a)pyrene TEQ (zero)	----	0.005	µg/L	<0.005	--	----	----	----

Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
~ = Indicates an estimated value.
ø = ALS is not NATA accredited for these tests.

QUALITY CONTROL REPORT

Work Order	: **ES1938004**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 15-Nov-2019
Order number	: ----	Date Analysis Commenced	: 25-Nov-2019
C-O-C number	: ----	Issue Date	: 03-Dec-2019
Sampler	: ----		
Site	: ----		
Quote number	: SY/522/19		
No. of samples received	: 15		
No. of samples analysed	: 4		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035T: Total Mercury by FIMS (QC Lot: 2729114)									
ES1938004-004	VC07_0.0-0.5 ELUTRIATE	EG035T-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00004	<0.00004	0.00	No Limit
EG093T: Total Metals in Saline Water by ORC-ICPMS (QC Lot: 2734492)									
ES1938004-004	VC07_0.0-0.5 ELUTRIATE	EG093A-T: Silver	7440-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EG093A-T: Copper	7440-50-8	1	µg/L	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG035T: Total Mercury by FIMS (QCLot: 2729114)								
EG035T-LL: Mercury	7439-97-6	0.00004	mg/L	<0.00004	0.0001 mg/L	105	85.0	105
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 2734492)								
EG093A-T: Copper	7440-50-8	1	µg/L	<1	10 µg/L	92.1	84.0	128
EG093A-T: Silver	7440-22-4	0.1	µg/L	<0.1	2 µg/L	90.0	70.0	130
EP131B: Polychlorinated Biphenyls (as Aroclors) (QCLot: 2729028)								
EP131B: Total Polychlorinated biphenyls	----	0.1	µg/L	<0.10	----	----	----	----
EP131B: Aroclor 1254	11097-69-1	----	µg/L	----	1 µg/L	71.5	51.0	133
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 2729031)								
EP132-LL: Naphthalene	91-20-3	0.02	µg/L	<0.02	0.25 µg/L	91.5	62.0	136
EP132-LL: Acenaphthylene	208-96-8	0.02	µg/L	<0.02	0.25 µg/L	87.4	68.0	128
EP132-LL: Acenaphthene	83-32-9	0.02	µg/L	<0.02	0.25 µg/L	91.2	69.0	121
EP132-LL: Fluorene	86-73-7	0.02	µg/L	<0.02	0.25 µg/L	89.2	69.0	131
EP132-LL: Phenanthrene	85-01-8	0.02	µg/L	<0.02	0.25 µg/L	86.0	69.0	137
EP132-LL: Anthracene	120-12-7	0.02	µg/L	<0.02	0.25 µg/L	82.1	64.0	120
EP132-LL: Fluoranthene	206-44-0	0.02	µg/L	<0.02	0.25 µg/L	86.4	63.0	129
EP132-LL: Pyrene	129-00-0	0.02	µg/L	<0.02	0.25 µg/L	80.5	67.0	127
EP132-LL: Benz(a)anthracene	56-55-3	0.02	µg/L	<0.02	0.25 µg/L	87.6	72.0	132
EP132-LL: Chrysene	218-01-9	0.02	µg/L	<0.02	0.25 µg/L	92.0	65.0	125
EP132-LL: Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.02	µg/L	<0.02	0.25 µg/L	92.4	66.0	130
EP132-LL: Benzo(k)fluoranthene	207-08-9	0.02	µg/L	<0.02	0.25 µg/L	84.4	64.0	130
EP132-LL: Benzo(a)pyrene	50-32-8	0.005	µg/L	<0.005	0.25 µg/L	82.3	61.0	125
EP132-LL: Indeno(1.2.3.cd)pyrene	193-39-5	0.02	µg/L	<0.02	0.25 µg/L	90.7	67.0	131
EP132-LL: Dibenz(a.h)anthracene	53-70-3	0.02	µg/L	<0.02	0.25 µg/L	91.4	67.0	135
EP132-LL: Benzo(g.h.i)perylene	191-24-2	0.02	µg/L	<0.02	0.25 µg/L	97.7	66.0	130
EP132-LL: Total PAH	----	0.005	µg/L	<0.005	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EG035T: Total Mercury by FIMS (QCLot: 2729114)							
ES1938004-008	VC12_0.0-0.5 ELUTRIATE	EG035T-LL: Mercury	7439-97-6	0.0001 mg/L	96.0	70.0	130
EG093T: Total Metals in Saline Water by ORC-ICPMS (QCLot: 2734492)							
ES1938004-008	VC12_0.0-0.5 ELUTRIATE	EG093A-T: Copper	7440-50-8	50 µg/L	105	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1938004**	Page	: 1 of 5
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 15-Nov-2019
Site	: ----	Issue Date	: 03-Dec-2019
Sampler	: ----	No. of samples received	: 15
Order number	: ----	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / **Container** / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EN68: Seawater Elutriate Testing Procedure						
Non-Volatile Leach: 14 day HT(e.g. SV organics) VC07_0.0-0.5 - ELUTRIATE, VC02_0.0-0.5 - ELUTRIATE, SALTWATER - ELUTRIATE	26-Nov-2019	13-Nov-2019	**13**	----	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) VC12_0.0-0.5 - ELUTRIATE	26-Nov-2019	14-Nov-2019	**12**	----	----	----

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH Compounds in Water	0	4	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
PCB's (Ultra-trace)	0	4	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH Compounds in Water	0	4	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
PCB's (Ultra-trace)	0	4	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EN68: Seawater Elutriate Testing Procedure							
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN68a) VC07_0.0-0.5 - ELUTRIATE, VC02_0.0-0.5 - ELUTRIATE, SALTWATER - ELUTRIATE	**30-Oct-2019**	**26-Nov-2019**	13-Nov-2019	×	**----**	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN68a) VC12_0.0-0.5 - ELUTRIATE	**31-Oct-2019**	**26-Nov-2019**	14-Nov-2019	×	**----**	----	----

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Mercury by FIMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG035T-LL)							
VC07_0.0-0.5 - ELUTRIATE, VC12_0.0-0.5 - ELUTRIATE, VC02_0.0-0.5 - ELUTRIATE, SALTWATER - ELUTRIATE	**26-Nov-2019**	**----**	----	----	**28-Nov-2019**	24-Dec-2019	✓
EG093T: Total Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG093A-T)							
VC07_0.0-0.5 - ELUTRIATE, VC12_0.0-0.5 - ELUTRIATE, VC02_0.0-0.5 - ELUTRIATE, SALTWATER - ELUTRIATE	**26-Nov-2019**	**30-Nov-2019**	24-May-2020	✓	**30-Nov-2019**	24-May-2020	✓
EP131B: Polychlorinated Biphenyls (as Aroclors)							
Amber Glass Bottle - Unpreserved (EP131B)							
VC07_0.0-0.5 - ELUTRIATE, VC12_0.0-0.5 - ELUTRIATE, VC02_0.0-0.5 - ELUTRIATE, SALTWATER - ELUTRIATE	**26-Nov-2019**	**28-Nov-2019**	03-Dec-2019	✓	**28-Nov-2019**	07-Jan-2020	✓
EP132B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP132-LL)							
VC07_0.0-0.5 - ELUTRIATE, VC12_0.0-0.5 - ELUTRIATE, VC02_0.0-0.5 - ELUTRIATE, SALTWATER - ELUTRIATE	**26-Nov-2019**	**28-Nov-2019**	03-Dec-2019	✓	**28-Nov-2019**	07-Jan-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type *Analytical Methods*	*Method*	*Count* QC	Regular	*Rate (%)* **Actual**	**Expected**	*Evaluation*	*Quality Control Specification*
Laboratory Duplicates (DUP)							
PAH Compounds in Water	EP132-LL	0	4	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
PCB's (Ultra-trace)	EP131B	0	4	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS - Low Level	EG035T-LL	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	1	4	**25.00**	**9.52**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH Compounds in Water	EP132-LL	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB's (Ultra-trace)	EP131B	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS - Low Level	EG035T-LL	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	1	4	**25.00**	**4.76**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH Compounds in Water	EP132-LL	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PCB's (Ultra-trace)	EP131B	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS - Low Level	EG035T-LL	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	1	4	**25.00**	**4.76**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH Compounds in Water	EP132-LL	0	4	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
PCB's (Ultra-trace)	EP131B	0	4	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS - Low Level	EG035T-LL	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	1	4	**25.00**	**4.76**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Total Mercury by FIMS - Low Level	EG035T-LL	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals in Saline Water Suite A by ORC-ICPMS	EG093A-T	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
PCB's (Ultra-trace)	EP131B	SOIL	In house: Referenced to USEPA Method 3640 (GPC cleanup), 3620 (Florisil), 8081/8082 (GC/µECD/µECD). This method is compliant with NEPM (2013) Schedule B(3)
PAH Compounds in Water	EP132-LL	SOIL	In house, Samples are extracted into solvent in original containers. Determination by large volume injection GCMS in selected ion monitoring (SIM) mode.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Sample Compositing	* EN020	SOIL	Equal weights of each original soil are taken, then mixed and homogenised. The combined mixture is labelled as a new sample.
Digestion for Total Recoverable Metals - ORC	EN25-ORC	SOIL	In house: Referenced to USEPA SW846-3005. This is an Ultrapure Nitric acid digestion procedure used to prepare surface and ground water samples for analysis by ORC- ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Seawater Elutriate Testing Procedure	EN68a	SOIL	USEPA Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Guide, 1991, EPA-503/8-91/001, USEPA and US Army Corps of Engineers. ANZECC Interim Ocean Disposal Guidelines, December, 1998 This Procedure outlines the preparation of leachate designed to simulate release of contaminants from sediment during the disposal of dredged material. Release can occur by physical processes or a variety of chemical changes such as oxidation of metal sulphides and release of contaminants adsorbed to particles or organic matter.
Porewater Extraction	EN82	SOIL	Extraction of porewater from sediment samples using centrifuge.
Sep. Funnel Extraction /Acetylation of Phenolic Compounds	ORG14-AC	SOIL	In house: Referenced to USEPA 3510 (Extraction) / In-house (Acetylation): A 1L sample is extracted into dichloromethane and concentrated to 1 mL with echange into cyclohexane. Phenolic compounds are reacted with acetic anhydride to yield phenyl acetates suitable for ultra-trace analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Sep. Funnel Extraction of Liquids (Ultra-trace pesticides.)	ORG14-UTP	SOIL	In house: Referenced to USEPA 3510 Samples are extracted into dichloromethane, concentrated and exchanged into an apporpriate solvent for GPC and florisil cleanup as required. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.

Vishal
19/11/2019
1425

Vishal Patel

From: Alice Carney
Sent: Tuesday, 19 November 2019 2:24 PM
To: Vishal Patel
Subject: RESULTS & EDD for ALS Workorder : ES1936922 | Your Reference: 12517046
Attachments: ES1936922_COC.pdf

Hey Vishal,

Can you please arrange this re-batch for me?

WO: ES1936922
Sample: #1 BH05_4.6-4.7 S-829, 1 Bag in Brisbane
Analysis: TCLP lead, TCLP benzo(a)pyrene, chromium reducible sulfur suite
TAT: Standard

Environmental Division
Sydney
Work Order Reference
ES1938255

Telephone : +61-2-8784 8555

Best regards,

Alice Carney
Client Services Officer, Environmental
Sydney

T +61 2 8784 8555
D +61 2 8784 8504
F +61 2 8784 8500
Alice.carney@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA

We are keen for your feedback! Please click here for your 3 minute survey

EnviroMail™ 00 - All EnviroMails™ in one convenient library.
Recent releases (click to access directly):
EnviroMail™ 124 – PFOS Analysis to Freshwater Species Protection Lvl 99%
EnviroMail™ 127 – Bacterial Diversity Profiling in NGS

See how ALS is making sampling easier! Register your interest here.

Right Solutions · Right Partner
www.alsglobal.com

From: Carmen Yi [mailto:Carmen.Yi@ghd.com]
Sent: Tuesday, 19 November 2019 2:00 PM
To: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Cc: Sarah.Eccleshall@ghd.com
Subject: [EXTERNAL] - RE: RESULTS & EDD for ALS Workorder : ES1936922 | Your Reference: 12517046

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi ALS team,

Could I please have the following additional analysis scheduled in for samples from ES1936922 (refer attached COC)?

BH05_4.6-4.7: TCLP lead, TCLP benzo(a)pyrene, chromium reducible sulfur suite

Please analyse on standard turnaround time and allow for extraction of samples to meet relevant holding time requirements. Any questions please feel free to contact me.

Kind Regards,

Carmen Yi
Senior Environmental Engineer – Contamination and Environment Management

GHD
Proudly employee owned
T: +61 2 9239 7630 | M: +61 451 962 988 | E: carmen.yi@ghd.com
Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia | www.ghd.com

Connect

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

Please consider our environment before printing this email

From: angel-no-reply@alsglobal.com <angel-no-reply@alsglobal.com>
Sent: Friday, 15 November 2019 3:18 PM
To: Sarah Eccleshall <Sarah.Eccleshall@ghd.com>
Subject: RESULTS & EDD for ALS Workorder : ES1936922 | Your Reference: 12517046

Deliverables for ALS Workorder ES1936922

Project: 12517046

Dear SARAH ECCLESHALL,

Please find enclosed the following deliverables for **ES1936922**:

- ES1936922_0_COA.pdf
- ES1936922_0_ENMRG.CSV
- 12517046.ESDAT_ES1936922_0.Chemistry2e.CSV
- 12517046.ESDAT_ES1936922_0.Header.XML
- 12517046.ESDAT_ES1936922_0.Sample2e.CSV
- ES1936922_0_QC.pdf
- ES1936922_0_QCI.pdf
- ES1936922_COC.pdf

Report Recipients

- SARAH ECCLESHALL
    - ES1936922_0_COA.pdf (Email)
    - ES1936922_0_ENMRG.CSV (Email)
    - 12517046.ESDAT_ES1936922_0.Chemistry2e.CSV (Email)
    - 12517046.ESDAT_ES1936922_0.Header.XML (Email)
    - 12517046.ESDAT_ES1936922_0.Sample2e.CSV (Email)
    - ES1936922_0_QC.pdf (Email)
    - ES1936922_0_QCI.pdf (Email)
    - ES1936922_COC.pdf (Email)

www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER

CERTIFICATE OF ANALYSIS

Work Order	: **ES1938255**	Page	: 1 of 5
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Jessica Watson	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 08-Nov-2019 23:30
Order number	: 12517046	Date Analysis Commenced	: 20-Nov-2019
C-O-C number	: ----	Issue Date	: 25-Nov-2019 17:23
Sampler	: CARMEN YI		
Site	: ----		
Quote number	: SY/522/19		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Satishkumar Trivedi	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- ASS: EA033 (CRS Suite):Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime ($CaCO_3$) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH05_4.6-4.7	----	----	----	----
			Client sampling date / time	07-Nov-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1938255-001	--------	--------	--------	--------
				Result	----	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	8.6	----	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	1.20	----	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	746	----	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	16.5	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	3300	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	5.28	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	1.20	----	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	746	----	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	56	----	----	----	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	9.2	----	----	----	----
After HCl pH	----	0.1	pH Unit	5.4	----	----	----	----
Extraction Fluid Number	----	1	-	2	----	----	----	----
Final pH	----	0.1	pH Unit	6.3	----	----	----	----

Analytical Results

Sub-Matrix: **TCLP LEACHATE**
(Matrix: **WATER**)

			Client sample ID	BH05_4.6-4.7	----	----	----	----
			Client sampling date / time	07-Nov-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1938255-001	--------	--------	--------	--------
				Result	----	----	----	----
EG005(ED093)C: Leachable Metals by ICPAES								
Lead	7439-92-1	0.1	mg/L	<0.1	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**29.6**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	**61.5**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	**69.8**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**85.6**	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	**90.4**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	**74.3**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **TCLP LEACHATE**

Compound	*CAS Number*	*Recovery Limits (%)* Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1938255**	Page	: 1 of 3
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Jessica Watson	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 08-Nov-2019
Order number	: 12517046	Date Analysis Commenced	: 20-Nov-2019
C-O-C number	: ----	Issue Date	: 25-Nov-2019
Sampler	: CARMEN YI		
Site	: ----		
Quote number	: SY/522/19		
No. of samples received	: 1		
No. of samples analysed	: 1		

NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Satishkumar Trivedi	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 2719707)									
EM1919404-001	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.4	6.4	0.00	0% - 20%
ES1938255-001	BH05_4.6-4.7	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.6	8.6	0.00	0% - 20%
EA033-B: Potential Acidity (QC Lot: 2719707)									
EM1919404-001	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.010	0.010	0.00	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.00	No Limit
ES1938255-001	BH05_4.6-4.7	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	1.20	1.22	2.17	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	746	762	2.17	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 2719707)									
ES1938255-001	BH05_4.6-4.7	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	16.5	16.5	0.122	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	5.28	5.28	0.00	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	3300	3290	0.122	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)C: Leachable Metals by ICPAES (QC Lot: 2718641)									
EM1919589-003	Anonymous	EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 2719707)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.4 pH Unit	100	91.0	107
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	20.1 mole H+ / t	86.3	70.0	124
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 2719707)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.256 % S	90.7	77.0	121
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 2719707)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	10 % CaCO3	102	91.0	112
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EN33: TCLP Leach (QCLot: 2712544)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)C: Leachable Metals by ICPAES (QCLot: 2718641)								
EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	0.1 mg/L	101	80.0	118
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2716275)								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	79.1	63.3	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)C: Leachable Metals by ICPAES (QCLot: 2718641)							
ES1938255-001	BH05_4.6-4.7	EG005C: Lead	7439-92-1	1 mg/L	101	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1938255**	Page	: 1 of 5
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Jessica Watson	Telephone	: +61-2-8784 8555
Project	: 12517046	Date Samples Received	: 08-Nov-2019
Site	: ----	Issue Date	: 25-Nov-2019
Sampler	: CARMEN YI	No. of samples received	: 1
Order number	: 12517046	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	2	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen (EA033) BH05_4.6-4.7	**07-Nov-2019**	**25-Nov-2019**	06-Nov-2020	✓	**25-Nov-2019**	23-Feb-2020	✓
EA033-B: Potential Acidity							
Snap Lock Bag - frozen (EA033) BH05_4.6-4.7	**07-Nov-2019**	**25-Nov-2019**	06-Nov-2020	✓	**25-Nov-2019**	23-Feb-2020	✓
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen (EA033) BH05_4.6-4.7	**07-Nov-2019**	**25-Nov-2019**	06-Nov-2020	✓	**25-Nov-2019**	23-Feb-2020	✓
EA033-D: Retained Acidity							
Snap Lock Bag - frozen (EA033) BH05_4.6-4.7	**07-Nov-2019**	**25-Nov-2019**	06-Nov-2020	✓	**25-Nov-2019**	23-Feb-2020	✓
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen (EA033) BH05_4.6-4.7	**07-Nov-2019**	**25-Nov-2019**	06-Nov-2020	✓	**25-Nov-2019**	23-Feb-2020	✓
EN33: TCLP Leach							
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a) BH05_4.6-4.7	**07-Nov-2019**	**20-Nov-2019**	21-Nov-2019	✓	**----**	----	----

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005(ED093)C: Leachable Metals by ICPAES							
Clear Plastic Bottle - Nitric Acid; Unspecified (EG005C)							
BH05_4.6-4.7	**20-Nov-2019**	**22-Nov-2019**	18-May-2020	✓	**22-Nov-2019**	18-May-2020	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
BH05_4.6-4.7	**20-Nov-2019**	**21-Nov-2019**	27-Nov-2019	✓	**22-Nov-2019**	31-Dec-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TCLP for Non & Semivolatile Analytes	EN33a	1	10	**10.00**	**9.09**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Leachable Metals by ICPAES	EG005C	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	2	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Leachable Metals by ICPAES	EG005C	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Leachable Metals by ICPAES	EG005C	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Leachable Metals by ICPAES	EG005C	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	2	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Leachable Metals by ICPAES	EG005C	SOIL	In house: referenced to APHA 3120; USEPA SW 846 - 6010: The ICPAES technique ionises leachate sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
Digestion for Total Recoverable Metals in TCLP Leachate	EN25C	SOIL	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.
Separatory Funnel Extraction of Liquids	ORG14	SOIL	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.

98.1119

Kim Phan

From: Loren Schiavon
Sent: Thursday, 7 November 2019 10:26 AM
To: Kim Phan
Subject: FW: [EXTERNAL] - RE: Additional analysis requerst for: ES1936029:
Attachments: image001.png; image002.png; image003.png; image004.png

Environmental Division
Sydney
Work Order
ES1990048

Telephone : +61-2-8784 8555

Hi Kim,

Can I get you to assist with this one?

We need to add in the testing requested below to two active work orders. Please leave the current due dates and email CS to send a prelim - we then need to create the separate batches for the dioxins. Vanessa has confirmed 10 days from receipt for the TBT.

Thanks.

Kind Regards
Loren Schiavon
Sample Administration Coordinator, Environmental

T +61 2 8784 8555
F +61 2 8784 8500
Loren.schiavon@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164
AUSTRALIA

ES1936029

Subcontract / Forward Lab / Split WO
Lab / Analysis: Brisbane
Organised by / Date: Dioxin
Relinquished by / Date: 1-3
Connote / Courier:
WO No: ES1990048
Attach By PO / Internal Sheet:

Right Solutions • Right Partner
https://aus01.safelinks.protection.outlook.com/?url=www.alsglobal.com&data=02%7C01%7CKim.Phan%40alsglobal.com%7C822e6d0d1a2e415fdefc08d76310b269%7C485ca04e6f7440509764cdb4bfa89c25%7C0%7C0%7C637086795685299636&sdata=EyqawOcQknLkqagzwxAPSDeCzRtw1wXYtpWrHbo9C1E%3D&reserved=0

-----Original Message-----
From: Grace White
Sent: Thursday, 7 November 2019 8:52 AM
To: Loren Schiavon <loren.schiavon@alsglobal.com>
Subject: FW: [EXTERNAL] - RE: Additional analysis requerst for: ES1936029:

Hey Loren,

Can you please organise making the below amendments?

Thank you!

Grace White
Client Services Officer, Environmental
Sydney

T +61 2 8784 8555 D +61 2 8784 8531
F +61 2 8784 8500
grace.white@alsglobal.com
277-289 Woodpark Road
Smithfield, NSW, 2164

Subscribe

Right Solutions • Right Partner

https://aus01.safelinks.protection.outlook.com/?url=www.alsglobal.com&data=02%7C01%7CKim.Phan%40alsglobal.com%7C822e6d0d1a2e415fdefc08d76310b269%7C485ca04e6f7440509764cdb4bfa89c25%7C0%7C0%7C637086795685299636&sdata=EyqawOcQknLkqagzwxAPSDeCzRtw1wXYtpWrHbo9C1E%3D&reserved=0

-----Original Message-----
From: Carmen Yi [mailto:Carmen.Yi@ghd.com]
Sent: Wednesday, 6 November 2019 11:07 PM
To: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Cc: Sarah.Eccleshall@ghd.com; Brenda Hong <Brenda.Hong@alsglobal.com>
Subject: [EXTERNAL] - RE: Additional analysis requerst for: ES1936029:

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi ALS team,

We have now received approval to go ahead with the TBT, dioxin and SVOC tests for ES1936183 and ES1936029. Would you please test the following samples on standard turnaround time please?

ES1936183

VC08_1.0-1.5

VC12_0.0-0.5

ES1936029

VC01_0.5-1.0 1

VC04_0.5-1.0 2

VC07_0.0-0.5 3

Kind regards

Carmen Yi

Environmental Division

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **ES1990048**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CARMEN YI	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: carmen.yi@ghd.com	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: +61 02 9239 7100	Telephone	: +61 2 8784 8555
Facsimile	: +61 02 9239 7199	Facsimile	: +61 2 8784 8500
Project	: 12517046	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: ----
Site	: ----		
Sampler	: Sarah Eccleshall	QC Level	: NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received	: 31-OCT-2019	Issue Date	: 14-NOV-2019 18:15
Client Requested Due Date	: 28-NOV-2019	Scheduled Reporting Date	: **28-NOV-2019**

Delivery Details

Mode of Delivery	: Client Drop off	Temperature	: 3.9' C - Ice present
No. of coolers/boxes	: 4	No. of samples received	: 3
Security Seal	: N/A	No. of samples analysed	: 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- Samples received in appropriately pretreated and preserved containers.
- SPLIT WORK ORDER FROM ES1936029.
- **Samples received in appropriately pretreated and preserved containers.**
- **Dioxin analysis will be conducted by ALS Brisbane.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default to 15:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory for processing purposes and will be shown bracketed without a time component.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - HRMS - Combined Dioxins and Furans (SOILS)
ES1990048-001	30-OCT-2019 15:00	VC01_0.5-1.0	✓
ES1990048-002	30-OCT-2019 15:00	VC04_0.5-1.0	✓
ES1990048-003	30-OCT-2019 15:00	VC07_0.0-0.5	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

CARMEN YI

- A4 - AU Sample Receipt Notification - Environmental HT (SRN	Email	carmen.yi@ghd.com
- AU Certificate of Analysis - DIOXINS/HRMS (DIONA)	Email	carmen.yi@ghd.com
- AU QC Report - DIOXINS/HRMS (DQCNA)	Email	carmen.yi@ghd.com
- Chain of Custody (CoC) (COC)	Email	carmen.yi@ghd.com

LAB REPORTS

- A4 - AU Sample Receipt Notification - Environmental HT (SRN	Email	labreports@ghd.com
- AU Certificate of Analysis - DIOXINS/HRMS (DIONA)	Email	labreports@ghd.com
- AU QC Report - DIOXINS/HRMS (DQCNA)	Email	labreports@ghd.com
- Chain of Custody (CoC) (COC)	Email	labreports@ghd.com

SARAH ECCLESHALL

- A4 - AU Sample Receipt Notification - Environmental HT (SRN	Email	sarah.eccleshall@ghd.com
- AU Certificate of Analysis - DIOXINS/HRMS (DIONA)	Email	sarah.eccleshall@ghd.com
- AU QC Report - DIOXINS/HRMS (DQCNA)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com

THE ACCOUNTS PAYABLE (Brisbane)

- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com

CERTIFICATE OF ANALYSIS

Client	GHD PTY LTD	**Laboratory :**	Environmental Division Sydney		
Contact	CARMEN YI	**Contact**	CUSTOMER.SERVICES.ES	**Work Order:**	**ES1990048**
Address:	LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	**Address:**	277-289 Woodpark Road Smithfield NSW 2164 Australia		
Project	12517046	**Quote #**	----	**Received:**	31 Oct 2019
Order #	- Not provided -			**Issued**	22 Nov 2019
C-O-C #	- Not provided -				
Site	- Not provided -				
E-mail	carmen.yi@ghd.com	**E-mail**	ALSEnviro.Sydney@alsglobal.com	**Number of Samples**	
Phone	9239 7100	**Phone**	+61-2-8784 8555	**Received:**	3
Fax	9239 7199	**Fax**	+61-2-8784 8500	**Analysed:**	3

Notes
LOR = Limit of reporting
I-TEF = International toxic equivalency factor
I-TEQ = International toxic equivalence
WHO-TEF = World Health Organistaion toxic equivalency factor
WHO-TEQ = World Health Organisation toxic equivalence

1 I -TEQ(zero) and WHO-TEQ(zero) calculated treating <LOR as zero concentration
2 I -TEQ(0.5 LOR) and WHO-TEQ(0.5 zero) calculated treating <LOR as 0.5 LoR concentration
3 I-TEQ(LOR) and WHO-TEQ(LOR) calculated treating <LOR as LoR concentration
4 Totals LORs are calculated by multiplying the number of peaks by the individual LOR per compound
5 13C12 Rec(%) = The absolute recovery of Isotopically labelled compound added by the Laboratory to both quantitate and measure extraction efficiency.

T = tetra
Pe = penta
Hx = hexa
Hp =hepta
O = octa
CDD, dioxin = chlorinated dibenzo-p-dioxin
CDF, furan = chlorinated dibenzofuran

Samples analysed 'as received', results reported on 'dry weight' basis.

ALSE - Excellence in Analytical Testing

NATA Accredited Laboratory - 825

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IED 17025

WORLD RECOGNISED ACCREDITATION

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory	Position	Department
Peter Blow	HRMS Chemist	GC/HR-MS - NATA 825 (818 - Brisbane)

Client	: GHD PTY LTD	**Work Order**	:	ES1990048
Project	: 12517046	**ALS Quote Reference**	:	----

ANALYTICAL RESULTS FOR DIOXINS AND FURANS

Method Code EP300	**Laboratory Sample ID:**	ES1990048001	**Qc Lot Number:**	4539274	**Date Sampled:**	30-Oct-2019
	Client Sample ID:	VC01_0.5-1.0	**Sample Matrix:**	SOIL	**Date Extracted:**	21-Nov-2019
					Date Analysed:	21-Nov-2019

Compound	Conc pg/g	LOR pg/g	WHO-TEF	WHO-TEQ1 (zero)	WHO-TEQ2 (0.5 LOR)	WHO-TEQ3 (LOR)	I-TEF	I-TEQ1 (zero)	I-TEQ2 (0.5 LOR)	I-TEQ3 (LOR)	$^{13}C_{12}$ Rec(%)
2378-TCDD	<0.5	0.5	1	0.00	0.25	0.50	1	0.00	0.25	0.50	103.7
12378-PeCDD	<2.5	2.5	1	0.00	1.25	2.50	0.5	0.00	0.62	1.25	102.1
123478-HxCDD	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	66.5
123678-HxCDD	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	75.8
123789-HxCDD	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	-
1234678-HpCDD	67.0	2.5	0.01	0.67	0.67	0.67	0.01	0.67	0.67	0.67	79.7
OCDD	23300.0	10.0	0.0003	6.99	6.99	6.99	0.001	23.30	23.30	23.30	75.0
2378-TCDF	<0.5	0.5	0.1	0.00	0.02	0.05	0.1	0.00	0.02	0.05	85.5
12378-PeCDF	<2.5	2.5	0.03	0.00	0.04	0.07	0.05	0.00	0.06	0.12	98.1
23478-PeCDF	<2.5	2.5	0.3	0.00	0.37	0.75	0.5	0.00	0.62	1.25	103.5
123478-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	57.6
123678-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	77.4
234678-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	74.1
123789-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	88.7
1234678-HpCDF	<2.5	2.5	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.02	61.6
1234789-HpCDF	<2.5	2.5	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.02	90.1
OCDF	<5.0	5.0	0.0003	0.00	0.00	0.00	0.001	0.00	0.00	0.00	-
Total TEQ	-	-	-	7.66	10.50	13.33	-	23.97	26.46	28.95	-

Group Totals	Conc pg/g	LOR4 pg/g	No. of Peaks
Tetra-Dioxins	<6.5	6.5	13
Penta-Dioxins	<15.0	15.0	6
Hexa-Dioxins	19.7	7.5	3
Hepta-Dioxins	144.0	5.0	2
Octa-Dioxin	23300.0	10.0	1
Tetra-Furans	<0.5	0.5	1
Penta-Furans	<2.5	2.5	1
Hexa-Furans	<2.5	2.5	1
Hepta-Furans	<2.5	2.5	1
Octa-Furan	<5.0	5.0	1

S **PCDD/Fs**	23463.7

ANALYTICAL RESULTS FOR DIOXINS AND FURANS

Method Code EP300

Laboratory Sample ID: ES1990048002
Client Sample ID: VC04_0.5-1.0
Qc Lot Number: 4539274
Sample Matrix: SOIL
Date Sampled: 30-Oct-2019
Date Extracted: 21-Nov-2019
Date Analysed: 21-Nov-2019

Compound	Conc pg/g	LOR pg/g	WHO-TEF	WHO-TEQ[1] (zero)	WHO-TEQ[2] (0.5 LOR)	WHO-TEQ[3] (LOR)	I-TEF	I-TEQ[1] (zero)	I-TEQ[2] (0.5 LOR)	I-TEQ[3] (LOR)	$^{13}C_{12}$ Rec(%)
2378-TCDD	<0.5	0.5	1	0.00	0.25	0.50	1	0.00	0.25	0.50	87.2
12378-PeCDD	<2.5	2.5	1	0.00	1.25	2.50	0.5	0.00	0.62	1.25	92.8
123478-HxCDD	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	51.5
123678-HxCDD	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	69.7
123789-HxCDD	5.3	2.5	0.1	0.53	0.53	0.53	0.1	0.53	0.53	0.53	-
1234678-HpCDD	111.0	2.5	0.01	1.11	1.11	1.11	0.01	1.11	1.11	1.11	64.8
OCDD	34600.0	10.0	0.0003	10.38	10.38	10.38	0.001	34.60	34.60	34.60	64.2
2378-TCDF	<0.5	0.5	0.1	0.00	0.02	0.05	0.1	0.00	0.02	0.05	75.1
12378-PeCDF	<2.5	2.5	0.03	0.00	0.04	0.07	0.05	0.00	0.06	0.12	91.9
23478-PeCDF	<2.5	2.5	0.3	0.00	0.37	0.75	0.5	0.00	0.62	1.25	92.9
123478-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	45.4
123678-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	61.8
234678-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	64.9
123789-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	78.4
1234678-HpCDF	<2.5	2.5	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.02	46.1
1234789-HpCDF	<2.5	2.5	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.02	73.1
OCDF	<5.0	5.0	0.0003	0.00	0.00	0.00	0.001	0.00	0.00	0.00	-
Total TEQ	-	-	-	12.02	14.73	17.44	-	36.24	38.61	40.97	-

Group Totals	Conc pg/g	LOR[4] pg/g	No. of Peaks
Tetra-Dioxins	27.4	3.0	6
Penta-Dioxins	<17.5	17.5	7
Hexa-Dioxins	115.0	15.0	6
Hepta-Dioxins	252.0	5.0	2
Octa-Dioxin	34600.0	10.0	1
Tetra-Furans	<0.5	0.5	1
Penta-Furans	<2.5	2.5	1
Hexa-Furans	<2.5	2.5	1
Hepta-Furans	<2.5	2.5	1
Octa-Furan	<5.0	5.0	1

S **PCDD/Fs**	**34994.4**

Client : GHD PTY LTD
Project : 12517046

Work Order : ES1990048
ALS Quote Reference : ----

ANALYTICAL RESULTS FOR DIOXINS AND FURANS

Method Code EP300

Laboratory Sample ID: ES1990048003
Client Sample ID: VC07_0.0-0.5

Qc Lot Number: 4539274
Sample Matrix: SOIL

Date Sampled: 30-Oct-2019
Date Extracted: 21-Nov-2019
Date Analysed: 21-Nov-2019

Compound	Conc pg/g	LOR pg/g	WHO-TEF	WHO-TEQ1 (zero)	WHO-TEQ2 (0.5 LOR)	WHO-TEQ3 (LOR)	I-TEF	I-TEQ1 (zero)	I-TEQ2 (0.5 LOR)	I-TEQ3 (LOR)	13C12 Rec(%)
2378-TCDD	6.5	0.5	1	6.49	6.49	6.49	1	6.49	6.49	6.49	100.8
12378-PeCDD	7.8	2.5	1	7.83	7.83	7.83	0.5	3.92	3.92	3.92	109.9
123478-HxCDD	8.8	2.5	0.1	0.88	0.88	0.88	0.1	0.88	0.88	0.88	52.4
123678-HxCDD	31.0	2.5	0.1	3.10	3.10	3.10	0.1	3.10	3.10	3.10	71.9
123789-HxCDD	29.7	2.5	0.1	2.97	2.97	2.97	0.1	2.97	2.97	2.97	-
1234678-HpCDD	708.0	2.5	0.01	7.08	7.08	7.08	0.01	7.08	7.08	7.08	71.7
OCDD	19200.0	10.0	0.0003	5.76	5.76	5.76	0.001	19.20	19.20	19.20	61.7
2378-TCDF	4.6	0.5	0.1	0.46	0.46	0.46	0.1	0.46	0.46	0.46	85.7
12378-PeCDF	4.4	2.5	0.03	0.13	0.13	0.13	0.05	0.22	0.22	0.22	94.0
23478-PeCDF	5.7	2.5	0.3	1.71	1.71	1.71	0.5	2.86	2.86	2.86	99.8
123478-HxCDF	11.2	2.5	0.1	1.12	1.12	1.12	0.1	1.12	1.12	1.12	47.1
123678-HxCDF	5.6	2.5	0.1	0.56	0.56	0.56	0.1	0.56	0.56	0.56	66.3
234678-HxCDF	8.1	2.5	0.1	0.81	0.81	0.81	0.1	0.81	0.81	0.81	60.9
123789-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	74.8
1234678-HpCDF	123.0	2.5	0.01	1.23	1.23	1.23	0.01	1.23	1.23	1.23	52.1
1234789-HpCDF	8.8	2.5	0.01	0.09	0.09	0.09	0.01	0.09	0.09	0.09	78.3
OCDF	363.0	5.0	0.0003	0.11	0.11	0.11	0.001	0.36	0.36	0.36	-
Total TEQ	-	-	-	40.32	40.45	40.57	-	51.33	51.46	51.58	-

Group Totals	Conc pg/g	LOR4 pg/g	No. of Peaks
Tetra-Dioxins	118.0	6.5	13
Penta-Dioxins	208.0	20.0	8
Hexa-Dioxins	1240.0	17.5	7
Hepta-Dioxins	2230.0	5.0	2
Octa-Dioxin	19200.0	10.0	1
Tetra-Furans	68.5	9.0	18
Penta-Furans	75.9	27.5	11
Hexa-Furans	151.0	27.5	11
Hepta-Furans	344.0	10.0	4
Octa-Furan	363.0	5.0	1
S **PCDD/Fs**	23998.4		

QUALITY CONTROL REPORT

Client	**GHD PTY LTD**	**Laboratory :**	Environmental Division Sydney		
Contact	CARMEN YI	**Contact**	CUSTOMER.SERVICES.ES	**Work Order:**	**ES1990048**
Address:	LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	**Address:**	Smithfield NSW 2164 Australia		

Project	12517046	**Quote #**	----	**Received:**	31 Oct 2019
Order #	- Not provided -			**Issued**	22 Nov 2019
C-O-C #	- Not provided -				
Site	- Not provided -				
E-mail	carmen.yi@ghd.com	**E-mail**	ALSEnviro.Sydney@alsglobal.co	**Number of Samples**	
Phone	9239 7100	**Phone**	+61-2-8784 8555	**Received:**	3
Fax	9239 7199	**Fax**	+61-2-8784 8500	**Analysed:**	4

Samples analysed 'as received', results reported on 'dry weight' basis.

ALSE - Excellence in Analytical Testing

NATA Accredited Laboratory - 825

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IED 17025

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory	Position	Department
Peter Blow	HRMS Chemist	GC/HR-MS - NATA 825 (818 - Brisbane)

Quality Control Report
Laboratory Duplicates (DUP)

	Original Result	Duplicate Result
Laboratory Sample Id :	EP1990013001	5592649-026
Client Sample Id :	Anonymous	Anonymous
Sample Mass (g) :	10.0	10.0
Qc Lot Number :	4539275	4539275
Moisture Content (%) :		

Compound	Conc pg/g	LOR pg/g	Conc pg/g	LOR pg/g	RPD (%)
2378-TCDD	<0.5	0.5	<0.5	0.5	-
12378-PeCDD	<2.5	2.5	<2.5	2.5	-
123478-HxCDD	<2.5	2.5	<2.5	2.5	-
123678-HxCDD	<2.5	2.5	<2.5	2.5	-
123789-HxCDD	<2.5	2.5	<2.5	2.5	-
1234678-HpCDD	20.8	2.5	20.7	2.5	0.5
OCDD	196.0	10.0	192.0	10.0	2.1
2378-TCDF	1.3	0.5	0.7	0.5	60.0
12378-PeCDF	<2.5	2.5	<2.5	2.5	-
23478-PeCDF	<2.5	2.5	<2.5	2.5	-
123478-HxCDF	<2.5	2.5	<2.5	2.5	-
123678-HxCDF	<2.5	2.5	<2.5	2.5	-
234678-HxCDF	<2.5	2.5	<2.5	2.5	-
123789-HxCDF	<2.5	2.5	<2.5	2.5	-
1234678-HpCDF	4.2	2.5	4.0	2.5	4.9
1234789-HpCDF	<2.5	2.5	<2.5	2.5	-
OCDF	9.3	5.0	8.4	5.0	10.2

Group Totals	Conc pg/g	LOR pg/g	Conc pg/g	LOR pg/g	RPD (%)
Tetra-Dioxins	<0.5	0.5	<0.5	0.5	-
Penta-Dioxins	<15.0	15.0	<20.0	20.0	-
Hexa-Dioxins	<17.5	17.5	<20.0	20.0	-
Hepta-Dioxins	38.3	5.0	39.9	5.0	4.1
Octa-Dioxin	196.0	10.0	192.0	10.0	2.1
Tetra-Furans	34.5	9.0	16.5	9.0	70.6
Penta-Furans	<25.0	25.0	<29.9	29.9	-
Hexa-Furans	<30.0	30.0	<27.4	27.4	-
Hepta-Furans	10.1	10.0	10.2	10.0	1.0
Octa-Furan	9.3	5.0	8.4	5.0	10.2
S **PCDD/Fs**	**288.2**		**267.0**		**7.6**

Notes
LOR = Limit of reporting
T = tetra
Pe = penta
Hx = hexa
Hp = hepta
O = octa
CDD, dioxin = chlorinated debenzo-p-dioxin
CDF, furan = chlorinated debenzofuran
RPD = relative per cent difference
Permitted ranges for RPD are depencant upon the magnitude of the result in comparison to the LOR.
Result < 10x LOR, no limit, result between 10x and 20x LOR, 50%; result > 20x LOR, 20%
- = Where results are less than the LOR, no RPD is reported.

Client	: GHD PTY LTD		Work Order	:	ES1990048
Project	: 12517046		ALS Quote Reference	:	----

Quality Control Report
Laboratory Duplicates (DUP)

	Original Result	Duplicate Result
Laboratory Sample Id :	ES1990048001	5592649-007
Client Sample Id :	VC01_0.5-1.0	VC01_0.5-1.0
Sample Mass (g) :	10.0	10.0
Qc Lot Number :	4539275	4539275
Moisture Content (%) :		

Compound	Conc pg/g	LOR pg/g	Conc pg/g	LOR pg/g	RPD (%)
2378-TCDD	<0.5	0.5	<0.5	0.5	-
12378-PeCDD	<2.5	2.5	<2.5	2.5	-
123478-HxCDD	<2.5	2.5	<2.5	2.5	-
123678-HxCDD	<2.5	2.5	<2.5	2.5	-
123789-HxCDD	<2.5	2.5	<2.5	2.5	-
1234678-HpCDD	67.0	2.5	64.3	2.5	4.1
OCDD	23300.0	10.0	23100.0	10.0	0.9
2378-TCDF	<0.5	0.5	<0.5	0.5	-
12378-PeCDF	<2.5	2.5	<2.5	2.5	-
23478-PeCDF	<2.5	2.5	<2.5	2.5	-
123478-HxCDF	<2.5	2.5	<2.5	2.5	-
123678-HxCDF	<2.5	2.5	<2.5	2.5	-
234678-HxCDF	<2.5	2.5	<2.5	2.5	-
123789-HxCDF	<2.5	2.5	<2.5	2.5	-
1234678-HpCDF	<2.5	2.5	<2.5	2.5	-
1234789-HpCDF	<2.5	2.5	<2.5	2.5	-
OCDF	<5.0	5.0	<5.0	5.0	-

Group Totals	Conc pg/g	LOR pg/g	Conc pg/g	LOR pg/g	RPD (%)
Tetra-Dioxins	<6.5	6.5	<6.5	6.5	-
Penta-Dioxins	<15.0	15.0	<20.0	20.0	-
Hexa-Dioxins	19.7	7.5	23.7	17.5	18.4
Hepta-Dioxins	144.0	5.0	133.0	5.0	7.9
Octa-Dioxin	23300.0	10.0	23100.0	10.0	0.9
Tetra-Furans	<0.5	0.5	<0.5	0.5	-
Penta-Furans	<2.5	2.5	<2.5	2.5	-
Hexa-Furans	<2.5	2.5	<2.5	2.5	-
Hepta-Furans	<2.5	2.5	<2.5	2.5	-
Octa-Furan	<5.0	5.0	<5.0	5.0	-
S **PCDD/Fs**	**23463.7**		**23256.7**		**0.9**

Notes
LOR = Limit of reporting
T = tetra
Pe = penta
Hx = hexa
Hp = hepta
O = octa
CDD, dioxin = chlorinated debenzo-p-dioxin
CDF, furan = chlorinated debenzofuran
RPD = relative per cent difference
Permitted ranges for RPD are depencant upon the magnitude of the result in comparison to the LOR.
Result < 10x LOR, no limit, result between 10x and 20x LOR, 50%; result > 20x LOR, 20%
- = Where results are less than the LOR, no RPD is reported.

Quality Control Results
Laboratory Control Samples(LCS)

Laboratory Sample Id : 5592649-010
QC Lot Number : 4539275
Sample Name : BCR 529 Sandy soil

Compound	Conc pg/g	Lower 1 pg/g	Upper 1 pg/g	13C12 Rec(%)	Lower 2 (%)	Upper 2 (%)
2378-TCDD	4130.0	3900	5100	95.8	25	164
12378-PeCDD	470.0	390	490	96.5	25	181
123478-HxCDD	1390.0	900	1500	65.7	32	141
123678-HxCDD	5820.0	4500	6300	68.3	28	130
123789-HxCDD	3380.0	2600	3400	-	-	-
2378-TCDF	70.6	65	91	85.6	24	169
12378-PeCDF	158.0	110	170	99.3	24	185
23478-PeCDF	360.0	290	430	102.5	21	178
123478-HxCDF	3630.0	2900	3900	62.4	26	152
123678-HxCDF	1220.0	940	1240	85.0	26	123
234678-HxCDF	401.0	330	410	85.2	28	136
123789-HxCDF	566.0	12	32	102.3	29	147

Notes
1. Acceptable concentration limits are as quoted on the analytical certificate for the cerified reference material
2. Acceptable recovery limits are derived from EPA1613 Revision B
T = tetra
Pe = penta
Hx = hexa
Hp = hepta
O = octa

Quality Control Report
Method Blank (MB)

Laboratory Sample ID: 5592649-001
Qc Lot Number : 4539275

Sample Matrix: SOIL
Date Extracted: 21-Nov-2019
Date Analysed: 21-Nov-2019

Compound	Conc pg/g	LOR pg/g	WHO-TEF	WHO-TEQ1 (zero)	WHO-TEQ2 (0.5 LOR)	WHO-TEQ3 (LOR)	I-TEF	I-TEQ1 (zero)	I-TEQ2 (0.5 LOR)	I-TEQ3 (LOR)	13C12 Rec(%)
2378-TCDD	<0.5	0.5	1	0.00	0.25	0.50	1	0.00	0.25	0.50	90.7
12378-PeCDD	<2.5	2.5	1	0.00	1.25	2.50	0.5	0.00	0.63	1.25	107.4
123478-HxCDD	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	57.1
123678-HxCDD	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	79.6
123789-HxCDD	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	-
1234678-HpCD	<2.5	2.5	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.03	66.6
OCDD	<10.0	10.0	0.0003	0.00	0.00	0.00	0.001	0.00	0.01	0.01	38.6
2378-TCDF	<0.5	0.5	0.1	0.00	0.03	0.05	0.1	0.00	0.03	0.05	95.6
12378-PeCDF	<2.5	2.5	0.03	0.00	0.04	0.08	0.05	0.00	0.06	0.13	102.0
23478-PeCDF	<2.5	2.5	0.3	0.00	0.38	0.75	0.5	0.00	0.63	1.25	104.1
123478-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	50.5
123678-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	81.5
234678-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	73.9
123789-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	69.5
1234678-HpCD	<2.5	2.5	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.03	50.8
1234789-HpCD	<2.5	2.5	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.03	65.1
OCDF	<5.0	5.0	0.0003	0.00	0.00	0.00	0.001	0.00	0.00	0.01	-
			S **TEQ(WHO)**	0.00	2.89	5.72	S **TEQ(I)**	0.00	2.55	5.04	

Group Totals	Conc pg/g	LOR4 pg/g	No. of Peaks
Tetra-Dioxins	<0.5	0.5	1
Penta-Dioxins	<2.5	2.5	1
Hexa-Dioxins	<2.5	2.5	1
Hepta-Dioxins	<2.5	2.5	1
Octa-Dioxin	<10.0	10.0	1
Tetra-Furans	<0.5	0.5	1
Penta-Furans	<2.5	2.5	1
Hexa-Furans	<2.5	2.5	1
Hepta-Furans	<2.5	2.5	1
Octa-Furan	<5.0	5.0	1
S **PCDD/Fs**	0.00		

Notes
LOR = Limit of reporting
I-TEF = International toxic equivalency factor
I-TEQ = International toxic equivalence (pg/g)
WHO-TEF = World Health Organistaion toxic equivalency factor
WHO-TEQ = World Health Organisation toxic equivalence (pg/g)
T = tetra
Pe = penta
Hx = hexa
Hp =hepta
O = octa
CDD, dioxin = chlorinated dibenzo-p-dioxin
CDF, furan = chlorinated dibenzofuran
1 I -TEQ(zero) and WHO-TEQ(zero) calculated treating <LOR as zero concentration (pg/g)
2 I-TEQ(0.5 LOR) and WHO-TEQ(0.5 LOR) calculated treating <LOR as 50% LoR concentration (pg/g)
3 I-TEQ(LOR) and WHO-TEQ(LOR) calculated treating <LOR as LoR concentration (pg/g)
4 Totals LORs are calculated by mutiplying the number of peaks by the individual LOR per compound

26.11.19

Kim Phan

Environmental Division
Sydney
Work Order
ES1990049

Telephone : +61-2-8784 8555

From: Loren Schiavon
Sent: Thursday, 7 November 2019 10:26 AM
To: Kim Phan
Subject: FW: [EXTERNAL] - RE: Additional analysis requerst for: ES1936029:
Attachments: image001.png; image002.png; image003.png; image004.png

Hi Kim,

Can I get you to assist with this one?

We need to add in the testing requested below to two active work orders. Please leave the current due dates and email CS to send a prelim - we then need to create the separate batches for the dioxins. Vanessa has confirmed 10 days from receipt for the TBT.

Thanks.

ES1936183

Subcon / Forward Lab / Split WO
Lab / Analysis: Brisbane
Organised By / Date: Dioxin
Relinquished By / Date: 1-2
Connote / Courier:
WO No: ES1990049
Attach By PO / Internal Sheet:

Kind Regards
Loren Schiavon
Sample Administration Coordinator, Environmental

T +61 2 8784 8555
F +61 2 8784 8500
Loren.schiavon@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164
AUSTRALIA

Right Solutions • Right Partner
https://aus01.safelinks.protection.outlook.com/?url=www.alsglobal.com&data=02%7C01%7CKim.Phan%40alsglobal.com%7C822e6d0d1a2e415fdefc08d76310b269%7C485ca04e6f7440509764cdb4bfa89c25%7C0%7C0%7C637086795685299636&sdata=EyqawOcQknLkqagzwxAPSDeCzRtw1wXYtpWrHbo9C1E%3D&reserved=0

-----Original Message-----
From: Grace White
Sent: Thursday, 7 November 2019 8:52 AM
To: Loren Schiavon <loren.schiavon@alsglobal.com>
Subject: FW: [EXTERNAL] - RE: Additional analysis requerst for: ES1936029:

Hey Loren,

Can you please organise making the below amendments?

Thank you!

Grace White
Client Services Officer, Environmental
Sydney

T +61 2 8784 8555 D +61 2 8784 8531
F +61 2 8784 8500
grace.white@alsglobal.com
277-289 Woodpark Road
Smithfield, NSW, 2164

https://aus01.safelinks.protection.outlook.com/?url=www.alsglobal.com&data=02%7C01%7CKim.Phan%40alsglobal.com%7C822e6d0d1a2e415fdefc08d76310b269%7C485ca04e6f7440509764cdb4bfa89c25%7C0%7C0%7C637086795685299636&sdata=EyqawOcQknLkqagzwxAPSDeCzRtw1wXYtpWrHbo9C1E%3D&reserved=0

-----Original Message-----
From: Carmen Yi [mailto:Carmen.Yi@ghd.com]
Sent: Wednesday, 6 November 2019 11:07 PM
To: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Cc: Sarah.Eccleshall@ghd.com; Brenda Hong <Brenda.Hong@alsglobal.com>
Subject: [EXTERNAL] - RE: Additional analysis requerst for: ES1936029:

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi ALS team,

We have now received approval to go ahead with the TBT, dioxin and SVOC tests for ES1936183 and ES1936029. Would you please test the following samples on standard turnaround time please?

ES1936183

VC08_1.0-1.5 1

VC12_0.0-0.5 2

ES1936029

VC01_0.5-1.0

VC04_0.5-1.0

VC07_0.0-0.5

Kind regards

Carmen Yi

ALS Group

Environmental Division

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **ES1990049**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CARMEN YI	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: carmen.yi@ghd.com	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: +61 02 9239 7100	Telephone	: +61 2 8784 8555
Facsimile	: +61 02 9239 7199	Facsimile	: +61 2 8784 8500
Project	: 12517046	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: ----
Site	: ----		
Sampler	: Sarah Eccleshall	QC Level	: NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received	: 01-NOV-2019	Issue Date	: 14-NOV-2019 18:11
Client Requested Due Date	: 28-NOV-2019	Scheduled Reporting Date	: **28-NOV-2019**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 3.3' C - Ice present
No. of coolers/boxes	: 6	No. of samples received	: 2
Security Seal	: N/A	No. of samples analysed	: 2

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Dioxin analysis will be conducted by ALS Brisbane.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Split work order from ES1936183.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default to 15:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory for processing purposes and will be shown bracketed without a time component.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - HRMS - Combined Dioxins and Furans (SOILS)
ES1990049-001	31-OCT-2019 20:45	VC08_1.0-1.5	✓
ES1990049-002	31-OCT-2019 20:30	VC12_0.0-0.5	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

CARMEN YI		
- A4 - AU Sample Receipt Notification - Environmental HT (SRN	Email	carmen.yi@ghd.com
- AU Certificate of Analysis - DIOXINS/HRMS (DIONA)	Email	carmen.yi@ghd.com
- AU QC Report - DIOXINS/HRMS (DQCNA)	Email	carmen.yi@ghd.com
- Chain of Custody (CoC) (COC)	Email	carmen.yi@ghd.com
LAB REPORTS		
- A4 - AU Sample Receipt Notification - Environmental HT (SRN	Email	labreports@ghd.com
- AU Certificate of Analysis - DIOXINS/HRMS (DIONA)	Email	labreports@ghd.com
- AU QC Report - DIOXINS/HRMS (DQCNA)	Email	labreports@ghd.com
- Chain of Custody (CoC) (COC)	Email	labreports@ghd.com
SARAH ECCLESHALL		
- A4 - AU Sample Receipt Notification - Environmental HT (SRN	Email	sarah.eccleshall@ghd.com
- AU Certificate of Analysis - DIOXINS/HRMS (DIONA)	Email	sarah.eccleshall@ghd.com
- AU QC Report - DIOXINS/HRMS (DQCNA)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com
THE ACCOUNTS PAYABLE (Brisbane)		
- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com

ALS Group

Environmental Food& Pharmaceutical

ALS Life Sciences

CERTIFICATE OF ANALYSIS

Client	**GHD PTY LTD**	**Laboratory :**	Environmental Division Sydney		
Contact	CARMEN YI	**Contact**	CUSTOMER.SERVICES.ES	**Work Order:**	**ES1990049**
Address:	LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	**Address:**	277-289 Woodpark Road Smithfield NSW 2164 Australia		

Project	12517046	**Quote #**	----	**Received:**	1 Nov 2019
Order #	- Not provided -			**Issued**	22 Nov 2019
C-O-C #	- Not provided -				
Site	- Not provided -				
E-mail	carmen.yi@ghd.com	**E-mail**	ALSEnviro.Sydney@alsglobal.com	**Number of Samples**	
Phone	9239 7100	**Phone**	+61-2-8784 8555	**Received:**	2
Fax	9239 7199	**Fax**	+61-2-8784 8500	**Analysed:**	4

Notes

LOR = Limit of reporting

I-TEF = International toxic equivalency factor

I-TEQ = International toxic equivalence

WHO-TEF = World Health Organistaion toxic equivalency factor

WHO-TEQ = World Health Organisation toxic equivalence

Samples analysed 'as received', results reported on 'dry weight' basis.

1 I -TEQ(zero) and WHO-TEQ(zero) calculated treating <LOR as zero concentration

2 I -TEQ(0.5 LOR) and WHO-TEQ(0.5 zero) calculated treating <LOR as 0.5 LoR concentration

3 I-TEQ(LOR) and WHO-TEQ(LOR) calculated treating <LOR as LoR concentration

4 Totals LORs are calculated by multiplying the number of peaks by the individual LOR per compound

5 13C12 Rec(%) = The absolute recovery of Isotopically labelled compound added by the Laboratory to both quantitate and measure extraction efficiency.

T = tetra

Pe = penta

Hx = hexa

Hp =hepta

O = octa

CDD, dioxin = chlorinated dibenzo-p-dioxin

CDF, furan = chlorinated dibenzofuran

ALSE - Excellence in Analytical Testing

NATA

WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory - 825

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IED 17025

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory	Position	Department
Peter Blow	HRMS Chemist	GC/HR-MS - NATA 825 (818 - Brisbane)

Client	: GHD PTY LTD	Work Order	: ES1990049
Project	: 12517046	ALS Quote Reference	: ----

ANALYTICAL RESULTS FOR DIOXINS AND FURANS

Method Code EP300

Laboratory Sample ID: ES1990049001
Client Sample ID: VC08_1.0-1.5

Qc Lot Number: 4539275
Sample Matrix: SOIL

Date Sampled: 31-Oct-2019
Date Extracted: 21-Nov-2019
Date Analysed: 21-Nov-2019

Compound	Conc pg/g	LOR pg/g	WHO-TEF	WHO-TEQ1 (zero)	WHO-TEQ2 (0.5 LOR)	WHO-TEQ3 (LOR)	I-TEF	I-TEQ1 (zero)	I-TEQ2 (0.5 LOR)	I-TEQ3 (LOR)	13C12 Rec(%)
2378-TCDD	<0.5	0.5	1	0.00	0.25	0.50	1	0.00	0.25	0.50	102.8
12378-PeCDD	3.0	2.5	1	3.04	3.04	3.04	0.5	1.52	1.52	1.52	127.3
123478-HxCDD	3.8	2.5	0.1	0.38	0.38	0.38	0.1	0.38	0.38	0.38	58.5
123678-HxCDD	6.0	2.5	0.1	0.60	0.60	0.60	0.1	0.60	0.60	0.60	77.5
123789-HxCDD	11.3	2.5	0.1	1.13	1.13	1.13	0.1	1.13	1.13	1.13	-
1234678-HpCDD	170.0	2.5	0.01	1.70	1.70	1.70	0.01	1.70	1.70	1.70	80.8
OCDD	19100.0	10.0	0.0003	5.73	5.73	5.73	0.001	19.10	19.10	19.10	84.5
2378-TCDF	<0.5	0.5	0.1	0.00	0.02	0.05	0.1	0.00	0.02	0.05	87.0
12378-PeCDF	<2.5	2.5	0.03	0.00	0.04	0.07	0.05	0.00	0.06	0.12	113.3
23478-PeCDF	<2.5	2.5	0.3	0.00	0.37	0.75	0.5	0.00	0.62	1.25	116.1
123478-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	57.5
123678-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	79.4
234678-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	77.5
123789-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	91.4
1234678-HpCDF	<2.5	2.5	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.02	60.6
1234789-HpCDF	<2.5	2.5	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.02	97.0
OCDF	<5.0	5.0	0.0003	0.00	0.00	0.00	0.001	0.00	0.00	0.00	-
Total TEQ	-	-	-	12.58	13.79	15.01	-	24.43	25.92	27.41	-

Group Totals	Conc pg/g	LOR4 pg/g	No. of Peaks
Tetra-Dioxins	474.0	1.5	3
Penta-Dioxins	129.0	15.0	6
Hexa-Dioxins	708.0	17.5	7
Hepta-Dioxins	1160.0	5.0	2
Octa-Dioxin	19100.0	10.0	1
Tetra-Furans	<0.5	0.5	1
Penta-Furans	<2.5	2.5	1
Hexa-Furans	<2.5	2.5	1
Hepta-Furans	<7.5	7.5	3
Octa-Furan	<5.0	5.0	1

S **PCDD/Fs**	21571.0

Client	: GHD PTY LTD		**Work Order**	: ES1990049
Project	: 12517046		**ALS Quote Reference**	: ----

ANALYTICAL RESULTS FOR DIOXINS AND FURANS

Method Code EP300	**Laboratory Sample ID:**	ES1990049002	**Qc Lot Number:**	4539275	**Date Sampled:** 31-Oct-2019
	Client Sample ID:	VC12_0.0-0.5	**Sample Matrix:**	SOIL	**Date Extracted:** 21-Nov-2019
					Date Analysed: 21-Nov-2019

Compound	Conc pg/g	LOR pg/g	WHO-TEF	WHO-TEQ1 (zero)	WHO-TEQ2 (0.5 LOR)	WHO-TEQ3 (LOR)	I-TEF	I-TEQ1 (zero)	I-TEQ2 (0.5 LOR)	I-TEQ3 (LOR)	$^{13}C_{12}$ Rec(%)
2378-TCDD	**1.8**	**0.5**	**1**	**1.78**	**1.78**	**1.78**	**1**	**1.78**	**1.78**	**1.78**	**98.9**
12378-PeCDD	**3.4**	**2.5**	**1**	**3.42**	**3.42**	**3.42**	**0.5**	**1.71**	**1.71**	**1.71**	**106.7**
123478-HxCDD	**4.4**	**2.5**	**0.1**	**0.44**	**0.44**	**0.44**	**0.1**	**0.44**	**0.44**	**0.44**	**58.7**
123678-HxCDD	**13.1**	**2.5**	**0.1**	**1.31**	**1.31**	**1.31**	**0.1**	**1.31**	**1.31**	**1.31**	**73.8**
123789-HxCDD	**13.4**	**2.5**	**0.1**	**1.34**	**1.34**	**1.34**	**0.1**	**1.34**	**1.34**	**1.34**	**-**
1234678-HpCDD	**301.0**	**2.5**	**0.01**	**3.01**	**3.01**	**3.01**	**0.01**	**3.01**	**3.01**	**3.01**	**79.9**
OCDD	**15300.0**	**10.0**	**0.0003**	**4.59**	**4.59**	**4.59**	**0.001**	**15.30**	**15.30**	**15.30**	**78.8**
2378-TCDF	**1.9**	**0.5**	**0.1**	**0.19**	**0.19**	**0.19**	**0.1**	**0.19**	**0.19**	**0.19**	**85.3**
12378-PeCDF	**<2.5**	**2.5**	**0.03**	**0.00**	**0.04**	**0.08**	**0.05**	**0.00**	**0.06**	**0.13**	**94.2**
23478-PeCDF	**<2.5**	**2.5**	**0.3**	**0.00**	**0.38**	**0.75**	**0.5**	**0.00**	**0.63**	**1.25**	**103.6**
123478-HxCDF	**3.9**	**2.5**	**0.1**	**0.39**	**0.39**	**0.39**	**0.1**	**0.39**	**0.39**	**0.39**	**52.4**
123678-HxCDF	**<2.5**	**2.5**	**0.1**	**0.00**	**0.13**	**0.25**	**0.1**	**0.00**	**0.13**	**0.25**	**74.9**
234678-HxCDF	**<2.5**	**2.5**	**0.1**	**0.00**	**0.13**	**0.25**	**0.1**	**0.00**	**0.13**	**0.25**	**72.6**
123789-HxCDF	**<2.5**	**2.5**	**0.1**	**0.00**	**0.13**	**0.25**	**0.1**	**0.00**	**0.13**	**0.25**	**83.7**
1234678-HpCDF	**47.5**	**2.5**	**0.01**	**0.48**	**0.48**	**0.48**	**0.01**	**0.48**	**0.48**	**0.48**	**58.6**
1234789-HpCDF	**2.8**	**2.5**	**0.01**	**0.03**	**0.03**	**0.03**	**0.01**	**0.03**	**0.03**	**0.03**	**86.3**
OCDF	**137.0**	**5.0**	**0.0003**	**0.04**	**0.04**	**0.04**	**0.001**	**0.14**	**0.14**	**0.14**	**-**
Total TEQ	**-**	**-**	**-**	**17.01**	**17.79**	**18.58**	**-**	**26.10**	**27.16**	**28.23**	**-**

Group Totals	Conc pg/g	LOR4 pg/g	No. of Peaks
Tetra-Dioxins	**95.8**	**6.5**	**13**
Penta-Dioxins	**96.5**	**20.0**	**8**
Hexa-Dioxins	**459.0**	**17.5**	**7**
Hepta-Dioxins	**894.0**	**5.0**	**2**
Octa-Dioxin	**15300.0**	**10.0**	**1**
Tetra-Furans	**18.7**	**9.0**	**18**
Penta-Furans	**<25.0**	**25.0**	**10**
Hexa-Furans	**54.1**	**27.5**	**11**
Hepta-Furans	**128.0**	**10.0**	**4**
Octa-Furan	**137.0**	**5.0**	**1**

S **PCDD/Fs**	**17183.1**

QUALITY CONTROL REPORT

Client	**GHD PTY LTD**	**Laboratory :**	Environmental Division Sydney		
Contact	SARAH ECCLESHALL	**Contact**	CUSTOMER.SERVICES.ES	**Work Order:**	**ES1990049**
Address:	LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	**Address:**	Smithfield NSW 2164 Australia		

Project	12517046	**Quote #**	----	**Received:**	1 Nov 2019
Order #	- Not provided -			**Issued**	22 Nov 2019
C-O-C #	- Not provided -				
Site	- Not provided -				
E-mail	sarah.eccleshall@ghd.com	**E-mail**	ALSEnviro.Sydney@alsglobal.co	**Number of Samples**	
Phone	9239 7100	**Phone**	+61-2-8784 8555	**Received:**	2
Fax	9239 7199	**Fax**	+61-2-8784 8500	**Analysed:**	4

Samples analysed 'as received', results reported on 'dry weight' basis.

ALSE - Excellence in Analytical Testing

NATA Accredited Laboratory - 825

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IED 17025

WORLD RECOGNISED ACCREDITATION

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory	Position	Department
Peter Blow	HRMS Chemist	GC/HR-MS - NATA 825 (818 - Brisbane)

Client	: GHD PTY LTD	**Work Order**	:	ES1990049
Project	: 12517046	**ALS Quote Reference**	:	----

Quality Control Report
Laboratory Duplicates (DUP)

	Original Result	**Duplicate Result**
Laboratory Sample Id :	EP1990013001	5592649-026
Client Sample Id :	Anonymous	Anonymous
Sample Mass (g) :	10.0	10.0
Qc Lot Number :	4539275	4539275
Moisture Content (%) :		

Compound	**Conc pg/g**	**LOR pg/g**	**Conc pg/g**	**LOR pg/g**	**RPD (%)**
2378-TCDD	<0.5	0.5	<0.5	0.5	-
12378-PeCDD	<2.5	2.5	<2.5	2.5	-
123478-HxCDD	<2.5	2.5	<2.5	2.5	-
123678-HxCDD	<2.5	2.5	<2.5	2.5	-
123789-HxCDD	<2.5	2.5	<2.5	2.5	-
1234678-HpCDD	20.8	2.5	20.7	2.5	0.5
OCDD	196.0	10.0	192.0	10.0	2.1
2378-TCDF	1.3	0.5	0.7	0.5	60.0
12378-PeCDF	<2.5	2.5	<2.5	2.5	-
23478-PeCDF	<2.5	2.5	<2.5	2.5	-
123478-HxCDF	<2.5	2.5	<2.5	2.5	-
123678-HxCDF	<2.5	2.5	<2.5	2.5	-
234678-HxCDF	<2.5	2.5	<2.5	2.5	-
123789-HxCDF	<2.5	2.5	<2.5	2.5	-
1234678-HpCDF	4.2	2.5	4.0	2.5	4.9
1234789-HpCDF	<2.5	2.5	<2.5	2.5	-
OCDF	9.3	5.0	8.4	5.0	10.2

Group Totals	**Conc pg/g**	**LOR pg/g**	**Conc pg/g**	**LOR pg/g**	**RPD (%)**
Tetra-Dioxins	<0.5	0.5	<0.5	0.5	-
Penta-Dioxins	<15.0	15.0	<20.0	20.0	-
Hexa-Dioxins	<17.5	17.5	<20.0	20.0	-
Hepta-Dioxins	38.3	5.0	39.9	5.0	4.1
Octa-Dioxin	196.0	10.0	192.0	10.0	2.1
Tetra-Furans	34.5	9.0	16.5	9.0	70.6
Penta-Furans	<25.0	25.0	<29.9	29.9	-
Hexa-Furans	<30.0	30.0	<27.4	27.4	-
Hepta-Furans	10.1	10.0	10.2	10.0	1.0
Octa-Furan	9.3	5.0	8.4	5.0	10.2
S **PCDD/Fs**	**288.2**		**267.0**		**7.6**

Notes
LOR = Limit of reporting
T = tetra
Pe = penta
Hx = hexa
Hp = hepta
O = octa
CDD, dioxin = chlorinated debenzo-p-dioxin
CDF, furan = chlorinated debenzofuran
RPD = relative per cent difference
Permitted ranges for RPD are depencant upon the magnitude of the result in comparison to the LOR.
Result < 10x LOR, no limit, result between 10x and 20x LOR, 50%; result > 20x LOR, 20%
- = Where results are less than the LOR, no RPD is reported.

Client	: GHD PTY LTD	**Work Order**	:	ES1990049
Project	: 12517046	**ALS Quote Reference**	:	----

Quality Control Report
Laboratory Duplicates (DUP)

	Original Result	Duplicate Result
Laboratory Sample Id :	ES1990048001	5592649-007
Client Sample Id :	Anonymous	Anonymous
Sample Mass (g) :	10.0	10.0
Qc Lot Number :	4539275	4539275
Moisture Content (%) :		

Compound	**Conc pg/g**	**LOR pg/g**	**Conc pg/g**	**LOR pg/g**	**RPD (%)**
2378-TCDD	<0.5	0.5	<0.5	0.5	-
12378-PeCDD	<2.5	2.5	<2.5	2.5	-
123478-HxCDD	<2.5	2.5	<2.5	2.5	-
123678-HxCDD	<2.5	2.5	<2.5	2.5	-
123789-HxCDD	<2.5	2.5	<2.5	2.5	-
1234678-HpCDD	67.0	2.5	64.3	2.5	4.1
OCDD	23300.0	10.0	23100.0	10.0	0.9
2378-TCDF	<0.5	0.5	<0.5	0.5	-
12378-PeCDF	<2.5	2.5	<2.5	2.5	-
23478-PeCDF	<2.5	2.5	<2.5	2.5	-
123478-HxCDF	<2.5	2.5	<2.5	2.5	-
123678-HxCDF	<2.5	2.5	<2.5	2.5	-
234678-HxCDF	<2.5	2.5	<2.5	2.5	-
123789-HxCDF	<2.5	2.5	<2.5	2.5	-
1234678-HpCDF	<2.5	2.5	<2.5	2.5	-
1234789-HpCDF	<2.5	2.5	<2.5	2.5	-
OCDF	<5.0	5.0	<5.0	5.0	-

Group Totals	**Conc pg/g**	**LOR pg/g**	**Conc pg/g**	**LOR pg/g**	**RPD (%)**
Tetra-Dioxins	<6.5	6.5	<6.5	6.5	-
Penta-Dioxins	<15.0	15.0	<20.0	20.0	-
Hexa-Dioxins	19.7	7.5	23.7	17.5	18.4
Hepta-Dioxins	144.0	5.0	133.0	5.0	7.9
Octa-Dioxin	23300.0	10.0	23100.0	10.0	0.9
Tetra-Furans	<0.5	0.5	<0.5	0.5	-
Penta-Furans	<2.5	2.5	<2.5	2.5	-
Hexa-Furans	<2.5	2.5	<2.5	2.5	-
Hepta-Furans	<2.5	2.5	<2.5	2.5	-
Octa-Furan	<5.0	5.0	<5.0	5.0	-
S **PCDD/Fs**	**23463.7**		**23256.7**		**0.9**

Notes
LOR = Limit of reporting
T = tetra
Pe = penta
Hx = hexa
Hp = hepta
O = octa
CDD, dioxin = chlorinated debenzo-p-dioxin
CDF, furan = chlorinated debenzofuran
RPD = relative per cent difference
Permitted ranges for RPD are depencant upon the magnitude of the result in comparison to the LOR.
Result < 10x LOR, no limit, result between 10x and 20x LOR, 50%; result > 20x LOR, 20%
- = Where results are less than the LOR, no RPD is reported.

Quality Control Results
Laboratory Control Samples(LCS)

Laboratory Sample Id : 5592649-010
QC Lot Number : 4539275
Sample Name : BCR 529 Sandy soil

Compound	Conc pg/g	Lower 1 pg/g	Upper 1 pg/g	13C12 Rec(%)	Lower 2 (%)	Upper 2 (%)
2378-TCDD	4130.0	3900	5100	95.8	25	164
12378-PeCDD	470.0	390	490	96.5	25	181
123478-HxCDD	1390.0	900	1500	65.7	32	141
123678-HxCDD	5820.0	4500	6300	68.3	28	130
123789-HxCDD	3380.0	2600	3400	-	-	-
2378-TCDF	70.6	65	91	85.6	24	169
12378-PeCDF	158.0	110	170	99.3	24	185
23478-PeCDF	360.0	290	430	102.5	21	178
123478-HxCDF	3630.0	2900	3900	62.4	26	152
123678-HxCDF	1220.0	940	1240	85.0	26	123
234678-HxCDF	401.0	330	410	85.2	28	136
123789-HxCDF	566.0	12	32	102.3	29	147

Notes
1. Acceptable concentration limits are as quoted on the analytical certificate for the cerified reference material
2. Acceptable recovery limits are derived from EPA1613 Revision B

T = tetra
Pe = penta
Hx = hexa
Hp = hepta
O = octa

Client	:	GHD PTY LTD	Work Order	:	ES1990049
Project	:	12517046	ALS Quote Reference	:	----

Quality Control Report
Method Blank (MB)

Laboratory Sample ID: 5592649-001
Qc Lot Number : 4539275

Sample Matrix: SOIL
Date Extracted: 21-Nov-2019
Date Analysed: 21-Nov-2019

Compound	Conc pg/g	LOR pg/g	WHO-TEF	WHO-TEQ1 (zero)	WHO-TEQ2 (0.5 LOR)	WHO-TEQ3 (LOR)	I-TEF	I-TEQ1 (zero)	I-TEQ2 (0.5 LOR)	I-TEQ3 (LOR)	13C12 Rec(%)
2378-TCDD	<0.5	0.5	1	0.00	0.25	0.50	1	0.00	0.25	0.50	90.7
12378-PeCDD	<2.5	2.5	1	0.00	1.25	2.50	0.5	0.00	0.63	1.25	107.4
123478-HxCDD	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	57.1
123678-HxCDD	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	79.6
123789-HxCDD	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	-
1234678-HpCD	<2.5	2.5	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.03	66.6
OCDD	<10.0	10.0	0.0003	0.00	0.00	0.00	0.001	0.00	0.01	0.01	38.6
2378-TCDF	<0.5	0.5	0.1	0.00	0.03	0.05	0.1	0.00	0.03	0.05	95.6
12378-PeCDF	<2.5	2.5	0.03	0.00	0.04	0.08	0.05	0.00	0.06	0.13	102.0
23478-PeCDF	<2.5	2.5	0.3	0.00	0.38	0.75	0.5	0.00	0.63	1.25	104.1
123478-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	50.5
123678-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	81.5
234678-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	73.9
123789-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	69.5
1234678-HpCD	<2.5	2.5	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.03	50.8
1234789-HpCD	<2.5	2.5	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.03	65.1
OCDF	<5.0	5.0	0.0003	0.00	0.00	0.00	0.001	0.00	0.00	0.01	-
			S **TEQ(WHO)**	0.00	2.89	5.72	S **TEQ(I)**	0.00	2.55	5.04	

Group Totals	Conc pg/g	LOR4 pg/g	No. of Peaks
Tetra-Dioxins	<0.5	0.5	1
Penta-Dioxins	<2.5	2.5	1
Hexa-Dioxins	<2.5	2.5	1
Hepta-Dioxins	<2.5	2.5	1
Octa-Dioxin	<10.0	10.0	1
Tetra-Furans	<0.5	0.5	1
Penta-Furans	<2.5	2.5	1
Hexa-Furans	<2.5	2.5	1
Hepta-Furans	<2.5	2.5	1
Octa-Furan	<5.0	5.0	1
S **PCDD/Fs**	0.00		

Notes
LOR = Limit of reporting
I-TEF = International toxic equivalency factor
I-TEQ = International toxic equivalence (pg/g)
WHO-TEF = World Health Organistaion toxic equivalency factor
WHO-TEQ = World Health Organisation toxic equivalence (pg/g)
T = tetra
Pe = penta
Hx = hexa
Hp =hepta
O = octa
CDD, dioxin = chlorinated dibenzo-p-dioxin
CDF, furan = chlorinated dibenzofuran
1 I -TEQ(zero) and WHO-TEQ(zero) calculated treating <LOR as zero concentration (pg/g)
2 I-TEQ(0.5 LOR) and WHO-TEQ(0.5 LOR) calculated treating <LOR as 50% LoR concentration (pg/g)
3 I-TEQ(LOR) and WHO-TEQ(LOR) calculated treating <LOR as LoR concentration (pg/g)
4 Totals LORs are calculated by mutiplying the number of peaks by the individual LOR per compound

From: Sarah.Eccleshall@ghd.com [mailto:Sarah.Eccleshall@ghd.com]
Sent: Thursday, 12 December 2019 5:56 AM
To: Angus Harding <angus.harding@ALSGlobal.com>
Subject: RE: [EXTERNAL] - Additional analyses for project 12517046

Hi Angus,

One more analysis request.
Can the following three samples which had dioxin extract as part of work order attached please be analysed for dioxins.

VC03_0.0-0.5
VC10_0.0-0.5
VC02_0.0-0.5

Environmental Division
Brisbane
Work Order
EB1990410

Telephone : + 61-7-3243 7222

Thanks,

Sarah Eccleshall
PhD MSc BSc Hons
Graduate Environmental Scientist
Contamination & Environmental Management

ALS Group

Environmental Division

Food & Environmental Pharmaceutical

ALS Life Sciences

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB1990410**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: CARMEN YI	Contact	: Customer Services Brisbane
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: carmen.yi@ghd.com	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 02 9239 7100	Telephone	: +61 7 3243 7222
Facsimile	: +61 02 9239 7199	Facsimile	: +61 7 3243 7218
Project	: 12517046	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: ----
Site	: ----		
Sampler	: Sarah Eccleshall	QC Level	: NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received	: 12-DEC-2019	Issue Date	: 18-DEC-2019 08:17
Client Requested Due Date	: 27-DEC-2019	Scheduled Reporting Date	: **27-DEC-2019**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: ----
No. of coolers/boxes	: Rebatch	No. of samples received	: 1
Security Seal	: Intact.	No. of samples analysed	: 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **This work order has been created to rebatch samples from ES1936029**
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' etc. suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to John Pickering (Samples.Brisbane@alsglobal.com)
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958),
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EB1990410-001 : 30-OCT-2019 22:15 : VC03_0.0-0.5 - ES1936029_055

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default to 15:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory for processing purposes and will be shown bracketed without a time component.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - HRMS - Combined Dioxins and Furans (SOILS)
EB1990410-001	30-OCT-2019 22:15	VC03_0.0-0.5 ES1936...	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

CARMEN YI		
- A4 - AU Sample Receipt Notification - Environmental HT (SRN	Email	carmen.yi@ghd.com
- A4 - AU Tax Invoice (INV)	Email	carmen.yi@ghd.com
- AU QC Report - DIOXINS/HRMS (DQCNA)	Email	carmen.yi@ghd.com
- Chain of Custody (CoC) (COC)	Email	carmen.yi@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	carmen.yi@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	carmen.yi@ghd.com
LAB REPORTS		
- A4 - AU Sample Receipt Notification - Environmental HT (SRN	Email	labreports@ghd.com
- AU QC Report - DIOXINS/HRMS (DQCNA)	Email	labreports@ghd.com
- Chain of Custody (CoC) (COC)	Email	labreports@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	labreports@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	labreports@ghd.com
SARAH ECCLESHALL		
- A4 - AU Sample Receipt Notification - Environmental HT (SRN	Email	sarah.eccleshall@ghd.com
- AU QC Report - DIOXINS/HRMS (DQCNA)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	sarah.eccleshall@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	sarah.eccleshall@ghd.com
THE ACCOUNTS PAYABLE (Brisbane)		
- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com

CERTIFICATE OF ANALYSIS

Client	**GHD PTY LTD**	**Laboratory :**	Environmental Division Brisbane		
Contact	LAB REPORTS	**Contact**	CUSTOMER.SERVICES.EB	**Work Order:**	**EB1990410**
Address:	LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	**Address:**	2 Byth Street Stafford QLD 4053 Australia		

Project	12517046	**Quote #**	----	**Received:**	11 Dec 2019
Order #	- Not provided -			**Issued**	20 Dec 2019
C-O-C #	- Not provided -				
Site	- Not provided -				
E-mail	labreports@ghd.com	**E-mail**	ALSEnviro.Brisbane@alsglobal.com	**Number of Samples**	
Phone	9239 7100	**Phone**	+61-7-3243 7222	**Received:**	1
Fax	9239 7199	**Fax**	+61-7-3243 7218	**Analysed:**	2

Notes

LOR = Limit of reporting
I-TEF = International toxic equivalency factor
I-TEQ = International toxic equivalence
WHO-TEF = World Health Organistaion toxic equivalency factor
WHO-TEQ = World Health Organisation toxic equivalence

1 I -TEQ(zero) and WHO-TEQ(zero) calculated treating <LOR as zero concentration
2 I -TEQ(0.5 LOR) and WHO-TEQ(0.5 zero) calculated treating <LOR as 0.5 LoR concentration
3 I-TEQ(LOR) and WHO-TEQ(LOR) calculated treating <LOR as LoR concentration
4 Totals LORs are calculated by multiplying the number of peaks by the individual LOR per compound
5 13C12 Rec(%) = The absolute recovery of Isotopically labelled compound added by the Laboratory to both quantitate and measure extraction efficiency.

T = tetra
Pe = penta
Hx = hexa
Hp =hepta
O = octa
CDD, dioxin = chlorinated dibenzo-p-dioxin
CDF, furan = chlorinated dibenzofuran

Samples analysed 'as received', results reported on 'dry weight' basis.

ALSE - Excellence in Analytical Testing

NATA Accredited Laboratory - 825

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IED 17025

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory	Position	Department
Peter Blow	HRMS Chemist	GC/HR-MS - NATA 825 (818 - Brisbane)

ANALYTICAL RESULTS FOR DIOXINS AND FURANS

Method Code EP300

Laboratory Sample ID: EB1990410001
Client Sample ID: VC03 0.0-0.5ES1936029 055

Qc Lot Number: 4539552
Sample Matrix: SOIL

Date Sampled: 30-Oct-2019
Date Extracted: 18-Dec-2019
Date Analysed: 18-Dec-2019

Compound	Conc pg/g	LOR pg/g	WHO-TEF	WHO-TEQ[1] (zero)	WHO-TEQ[2] (0.5 LOR)	WHO-TEQ[3] (LOR)	I-TEF	I-TEQ[1] (zero)	I-TEQ[2] (0.5 LOR)	I-TEQ[3] (LOR)	$^{13}C_{12}$ Rec(%)
2378-TCDD	0.9	0.5	1	0.94	0.94	0.94	1	0.94	0.94	0.94	87.9
12378-PeCDD	<2.5	2.5	1	0.00	1.23	2.45	0.5	0.00	0.61	1.23	103.2
123478-HxCDD	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	58.1
123678-HxCDD	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	78.8
123789-HxCDD	6.1	2.5	0.1	0.61	0.61	0.61	0.1	0.61	0.61	0.61	-
1234678-HpCDD	192.0	2.5	0.01	1.92	1.92	1.92	0.01	1.92	1.92	1.92	79.4
OCDD	63600.0	9.8	0.0003	19.08	19.08	19.08	0.001	63.60	63.60	63.60	82.7
2378-TCDF	<0.5	0.5	0.1	0.00	0.02	0.05	0.1	0.00	0.02	0.05	72.2
12378-PeCDF	<2.5	2.5	0.03	0.00	0.04	0.07	0.05	0.00	0.06	0.12	94.3
23478-PeCDF	<2.5	2.5	0.3	0.00	0.37	0.74	0.5	0.00	0.61	1.23	97.9
123478-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	48.7
123678-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	80.6
234678-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	67.5
123789-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	72.6
1234678-HpCDF	<2.5	2.5	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.02	59.5
1234789-HpCDF	<2.5	2.5	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.02	77.6
OCDF	<4.9	4.9	0.0003	0.00	0.00	0.00	0.001	0.00	0.00	0.00	-
Total TEQ	-	-	-	22.55	24.96	27.38	-	67.07	69.14	71.22	-

Group Totals	Conc pg/g	LOR[4] pg/g	No. of Peaks
Tetra-Dioxins	71.0	2.0	4
Penta-Dioxins	67.7	14.7	6
Hexa-Dioxins	388.0	12.3	5
Hepta-Dioxins	525.0	4.9	2
Octa-Dioxin	63600.0	9.8	1
Tetra-Furans	<0.5	0.5	1
Penta-Furans	<2.5	2.5	1
Hexa-Furans	<2.5	2.5	1
Hepta-Furans	<2.5	2.5	1
Octa-Furan	<4.9	4.9	1

S **PCDD/Fs**	**64651.7**

QUALITY CONTROL REPORT

Client	**GHD PTY LTD**	**Laboratory :**	Environmental Division Brisbane		
Contact	LAB REPORTS	**Contact**	CUSTOMER.SERVICES.EB	**Work Order:**	**EB1990410**
Address:	LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	**Address:**	Stafford QLD 4053 Australia		
Project	12517046	**Quote #**	----	**Received:**	11 Dec 2019
Order #	- Not provided -			**Issued**	20 Dec 2019
C-O-C #	- Not provided -				
Site	- Not provided -				
E-mail	labreports@ghd.com	**E-mail**	ALSEnviro.Brisbane@alsglobal.	**Number of Samples**	
Phone	9239 7100	**Phone**	+61-7-3243 7222	**Received:**	1
Fax	9239 7199	**Fax**	+61-7-3243 7218	**Analysed:**	2

Samples analysed 'as received', results reported on 'dry weight' basis.

ALSE - Excellence in Analytical Testing

NATA Accredited Laboratory - 825

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IED 17025

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory	Position	Department
Peter Blow	HRMS Chemist	GC/HR-MS - NATA 825 (818 - Brisbane)

Client	: GHD PTY LTD	Work Order	: EB1990410
Project	: 12517046	ALS Quote Reference	: ----

Quality Control Report
Laboratory Duplicates (DUP)

	Original Result	Duplicate Result
Laboratory Sample Id :	EM1990042001	5593336-007
Client Sample Id :	Anonymous	Anonymous
Sample Mass (g) :	10.0	10.0
Qc Lot Number :	4539553	4539553
Moisture Content (%) :		

Compound	Conc pg/g	LOR pg/g	Conc pg/g	LOR pg/g	RPD (%)
2378-TCDD	<0.5	0.5	<0.5	0.5	-
12378-PeCDD	<2.5	2.5	<2.5	2.5	-
123478-HxCDD	<2.5	2.5	<2.5	2.5	-
123678-HxCDD	<2.5	2.5	<2.5	2.5	-
123789-HxCDD	<2.5	2.5	<2.5	2.5	-
1234678-HpCDD	4.9	2.5	5.8	2.5	16.8
OCDD	160.0	9.9	169.0	9.9	5.5
2378-TCDF	<0.5	0.5	<0.5	0.5	-
12378-PeCDF	<2.5	2.5	<2.5	2.5	-
23478-PeCDF	<2.5	2.5	<2.5	2.5	-
123478-HxCDF	<2.5	2.5	<2.5	2.5	-
123678-HxCDF	<2.5	2.5	<2.5	2.5	-
234678-HxCDF	<2.5	2.5	<2.5	2.5	-
123789-HxCDF	<2.5	2.5	<2.5	2.5	-
1234678-HpCDF	<2.5	2.5	<2.5	2.5	-
1234789-HpCDF	<2.5	2.5	<2.5	2.5	-
OCDF	<5.0	5.0	<5.0	5.0	-

Group Totals	Conc pg/g	LOR pg/g	Conc pg/g	LOR pg/g	RPD (%)
Tetra-Dioxins	4.4	1.5	4.3	1.5	2.3
Penta-Dioxins	43.6	2.5	45.5	2.5	4.3
Hexa-Dioxins	25.7	14.9	24.5	12.4	4.8
Hepta-Dioxins	14.5	5.0	17.3	5.0	17.6
Octa-Dioxin	160.0	9.9	169.0	9.9	5.5
Tetra-Furans	8.2	5.5	6.9	5.5	17.2
Penta-Furans	<2.5	2.5	<2.5	2.5	-
Hexa-Furans	<2.5	2.5	<2.5	2.5	-
Hepta-Furans	<2.5	2.5	<2.5	2.5	-
Octa-Furan	<5.0	5.0	<5.0	5.0	-
S PCDD/Fs	**256.4**		**267.5**		**4.2**

Notes
LOR = Limit of reporting
T = tetra
Pe = penta
Hx = hexa
Hp = hepta
O = octa
CDD, dioxin = chlorinated debenzo-p-dioxin
CDF, furan = chlorinated debenzofuran
RPD = relative per cent difference
Permitted ranges for RPD are depencant upon the magnitude of the result in comparison to the LOR.
Result < 10x LOR, no limit, result between 10x and 20x LOR, 50%; result > 20x LOR, 20%

Quality Control Results
Laboratory Control Samples(LCS)

Laboratory Sample Id : 5593336-010
QC Lot Number : 4539553
Sample Name : BCR 529 Sandy soil

Compound	Conc pg/g	Lower 1 pg/g	Upper 1 pg/g	13C12 Rec(%)	Lower 2 (%)	Upper 2 (%)
2378-TCDD	4130.0	3900	5100	95.8	25	164
12378-PeCDD	470.0	390	490	96.5	25	181
123478-HxCDD	1390.0	900	1500	65.7	32	141
123678-HxCDD	5820.0	4500	6300	68.3	28	130
123789-HxCDD	3380.0	2600	3400	-	-	-
2378-TCDF	70.6	65	91	85.6	24	169
12378-PeCDF	158.0	110	170	99.3	24	185
23478-PeCDF	360.0	290	430	102.5	21	178
123478-HxCDF	3630.0	2900	3900	62.4	26	152
123678-HxCDF	1220.0	940	1240	85.0	26	123
234678-HxCDF	401.0	330	410	85.2	28	136
123789-HxCDF	566.0	12	32	102.3	29	147

Notes
1. Acceptable concentration limits are as quoted on the analytical certificate for the cerified reference material
2. Acceptable recovery limits are derived from EPA1613 Revision B

T = tetra
Pe = penta
Hx = hexa
Hp = hepta

Client	: GHD PTY LTD	Work Order	: EB1990410
Project	: 12517046	ALS Quote Reference	: ----

Quality Control Report
Method Blank (MB)

Laboratory Sample ID: 5593336-001
Qc Lot Number : 4539553

Sample Matrix: SOIL
Date Extracted: 18-Dec-2019
Date Analysed: 18-Dec-2019

Compound	Conc pg/g	LOR pg/g	WHO-TEF	WHO-TEQ 1	WHO-TEQ 2	WHO-TEQ 3	I-TEF	I-TEQ1 (zero)	I-TEQ2 (0.5 LOR)	I-TEQ3 (LOR)	13C12 Rec(%)
2378-TCDD	<0.5	0.5	1	0.00	0.25	0.50	1	0.00	0.25	0.50	90.7
12378-PeCDD	<2.5	2.5	1	0.00	1.25	2.50	0.5	0.00	0.63	1.25	107.4
123478-HxCDD	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	57.1
123678-HxCDD	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	79.6
123789-HxCDD	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	-
1234678-HpCD	<2.5	2.5	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.03	66.6
OCDD	<10.0	10.0	0.0003	0.00	0.00	0.00	0.001	0.00	0.01	0.01	38.6
2378-TCDF	<0.5	0.5	0.1	0.00	0.03	0.05	0.1	0.00	0.03	0.05	95.6
12378-PeCDF	<2.5	2.5	0.03	0.00	0.04	0.08	0.05	0.00	0.06	0.13	102.0
23478-PeCDF	<2.5	2.5	0.3	0.00	0.38	0.75	0.5	0.00	0.63	1.25	104.1
123478-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	50.5
123678-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	81.5
234678-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	73.9
123789-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	69.5
1234678-HpCD	<2.5	2.5	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.03	50.8
1234789-HpCD	<2.5	2.5	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.03	65.1
OCDF	<5.0	5.0	0.0003	0.00	0.00	0.00	0.001	0.00	0.00	0.01	-
			S **TEQ(WHO)**	0.00	2.89	5.72	S **TEQ(I)**	0.00	2.55	5.04	

Group Totals	Conc pg/g	LOR4 pg/g	No. of Peaks
Tetra-Dioxins	<0.5	0.5	1
Penta-Dioxins	<2.5	2.5	1
Hexa-Dioxins	<2.5	2.5	1
Hepta-Dioxins	<2.5	2.5	1
Octa-Dioxin	<10.0	10.0	1
Tetra-Furans	<0.5	0.5	1
Penta-Furans	<2.5	2.5	1
Hexa-Furans	<2.5	2.5	1
Hepta-Furans	<2.5	2.5	1
Octa-Furan	<5.0	5.0	1
S **PCDD/Fs**	0.00		

Notes
LOR = Limit of reporting
I-TEF = International toxic equivalency factor
I-TEQ = International toxic equivalence (pg/g)
WHO-TEF = World Health Organistaion toxic equivalency factor
WHO-TEQ = World Health Organisation toxic equivalence (pg/g)
T = tetra
Pe = penta
Hx = hexa
Hp =hepta
O = octa
CDD, dioxin = chlorinated dibenzo-p-dioxin
CDF, furan = chlorinated dibenzofuran
1 I -TEQ(zero) and WHO-TEQ(zero) calculated treating <LOR as zero concentration (pg/g)
2 I-TEQ(0.5 LOR) and WHO-TEQ(0.5 LOR) calculated treating <LOR as 50% LoR concentration (pg/g)
3 I-TEQ(LOR) and WHO-TEQ(LOR) calculated treating <LOR as LoR concentration (pg/g)
4 Totals LORs are calculated by mutiplying the number of peaks by the individual LOR per compound

ALS Group

Environmental Division

Food& Environmental Pharmaceutical

ALS Life Sciences

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **ES1990050**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SARAH ECCLESHALL	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: sarah.eccleshall@ghd.com	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: +61 02 9239 7100	Telephone	: +61 2 8784 8555
Facsimile	: +61 02 9239 7199	Facsimile	: +61 2 8784 8500
Project	: 19517046	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: ----
Site	: ----		
Sampler	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received	: 12-NOV-2019	Issue Date	: 21-NOV-2019 12:25
Client Requested Due Date	: 29-NOV-2019	Scheduled Reporting Date	: **29-NOV-2019**

Delivery Details

Mode of Delivery	: Carrier	Temperature	:
No. of coolers/boxes	: ----	No. of samples received	: 3
Security Seal	: Intact.	No. of samples analysed	: 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Dioxin analysis to be conducted at ALS Brisbane**
- **This work order is a split from ES1937554 & ES1937483.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default to 15:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory for processing purposes and will be shown bracketed without a time component.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - HRMS - Combined Dioxins and Furans (SOILS)
ES1990050-001	30-OCT-2019 15:00	VC12_0.0-0.5	✓
ES1990050-002	31-OCT-2019 15:00	VC10_0.0-0.5	✓
ES1990050-003	30-OCT-2019 15:00	VC02_0.5-1.0	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

SARAH ECCLESHALL

- A4 - AU Sample Receipt Notification - Environmental HT (SRN	Email	sarah.eccleshall@ghd.com
- AU Certificate of Analysis - DIOXINS/HRMS (DIONA)	Email	sarah.eccleshall@ghd.com
- AU QC Report - DIOXINS/HRMS (DQCNA)	Email	sarah.eccleshall@ghd.com
- Chain of Custody (CoC) (COC)	Email	sarah.eccleshall@ghd.com

THE ACCOUNTS PAYABLE (Brisbane)

- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com

CERTIFICATE OF ANALYSIS

Client	GHD PTY LTD	**Laboratory :**	Environmental Division Sydney		
Contact	SARAH ECCLESHALL	**Contact**	CUSTOMER.SERVICES.ES	**Work Order:**	**ES1990050**
Address:	LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	**Address:**	277-289 Woodpark Road Smithfield NSW 2164 Australia		
Project	19517046	**Quote #**	----	**Received:**	12 Nov 2019
Order #	- Not provided -			**Issued**	27 Nov 2019
C-O-C #	- Not provided -				
Site	- Not provided -				
E-mail	sarah.eccleshall@ghd.com	**E-mail**	ALSEnviro.Sydney@alsglobal.com	**Number of Samples**	
Phone	9239 7100	**Phone**	+61-2-8784 8555	**Received:**	3
Fax	9239 7199	**Fax**	+61-2-8784 8500	**Analysed:**	3

Notes

LOR = Limit of reporting
I-TEF = International toxic equivalency factor
I-TEQ = International toxic equivalence
WHO-TEF = World Health Organistaion toxic equivalency factor
WHO-TEQ = World Health Organisation toxic equivalence

1 I -TEQ(zero) and WHO-TEQ(zero) calculated treating <LOR as zero concentration
2 I -TEQ(0.5 LOR) and WHO-TEQ(0.5 zero) calculated treating <LOR as 0.5 LoR concentration
3 I-TEQ(LOR) and WHO-TEQ(LOR) calculated treating <LOR as LoR concentration
4 Totals LORs are calculated by multiplying the number of peaks by the individual LOR per compound
5 13C12 Rec(%) = The absolute recovery of Isotopically labelled compound added by the Laboratory to both quantitate and measure extraction efficiency.

T = tetra
Pe = penta
Hx = hexa
Hp =hepta
O = octa
CDD, dioxin = chlorinated dibenzo-p-dioxin
CDF, furan = chlorinated dibenzofuran

Samples analysed 'as received', results reported on 'dry weight' basis.

ALSE - Excellence in Analytical Testing

NATA Accredited Laboratory - 825

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IED 17025

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory	Position	Department
Peter Blow	HRMS Chemist	GC/HR-MS - NATA 825 (818 - Brisbane)

ANALYTICAL RESULTS FOR DIOXINS AND FURANS

Method Code EP300

Laboratory Sample ID: ES1990050001
Client Sample ID: VC12_0.0-0.5

Qc Lot Number: 4539274
Sample Matrix: SOIL

Date Sampled: 30-Oct-2019
Date Extracted: 21-Nov-2019
Date Analysed: 21-Nov-2019

Compound	Conc pg/g	LOR pg/g	WHO-TEF	WHO-TEQ$_1$ (zero)	WHO-TEQ$_2$ (0.5 LOR)	WHO-TEQ$_3$ (LOR)	I-TEF	I-TEQ$_1$ (zero)	I-TEQ$_2$ (0.5 LOR)	I-TEQ$_3$ (LOR)	$^{13}C_{12}$ Rec(%)
2378-TCDD	1.4	0.5	1	1.36	1.36	1.36	1	1.36	1.36	1.36	100.9
12378-PeCDD	2.9	2.5	1	2.93	2.93	2.93	0.5	1.47	1.47	1.47	100.3
123478-HxCDD	2.7	2.5	0.1	0.27	0.27	0.27	0.1	0.27	0.27	0.27	61.0
123678-HxCDD	11.3	2.5	0.1	1.13	1.13	1.13	0.1	1.13	1.13	1.13	79.2
123789-HxCDD	10.4	2.5	0.1	1.04	1.04	1.04	0.1	1.04	1.04	1.04	-
1234678-HpCDD	269.0	2.5	0.01	2.69	2.69	2.69	0.01	2.69	2.69	2.69	79.6
OCDD	14700.0	10.0	0.0003	4.41	4.41	4.41	0.001	14.70	14.70	14.70	67.1
2378-TCDF	1.7	0.5	0.1	0.17	0.17	0.17	0.1	0.17	0.17	0.17	81.7
12378-PeCDF	<2.5	2.5	0.03	0.00	0.04	0.07	0.05	0.00	0.06	0.12	95.4
23478-PeCDF	<2.5	2.5	0.3	0.00	0.37	0.75	0.5	0.00	0.62	1.25	101.9
123478-HxCDF	3.3	2.5	0.1	0.33	0.33	0.33	0.1	0.33	0.33	0.33	52.8
123678-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	77.1
234678-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	73.2
123789-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	85.0
1234678-HpCDF	40.2	2.5	0.01	0.40	0.40	0.40	0.01	0.40	0.40	0.40	55.2
1234789-HpCDF	<2.5	2.5	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.02	88.3
OCDF	111.0	5.0	0.0003	0.03	0.03	0.03	0.001	0.11	0.11	0.11	-
Total TEQ	-	-	-	14.76	15.56	16.36	-	23.66	24.74	25.81	-

Group Totals	Conc pg/g	LOR$_4$ pg/g	No. of Peaks
Tetra-Dioxins	58.1	6.0	12
Penta-Dioxins	85.8	17.5	7
Hexa-Dioxins	403.0	20.0	8
Hepta-Dioxins	811.0	5.0	2
Octa-Dioxin	14700.0	10.0	1
Tetra-Furans	18.7	9.0	18
Penta-Furans	<29.9	29.9	12
Hexa-Furans	45.4	29.9	12
Hepta-Furans	113.0	10.0	4
Octa-Furan	111.0	5.0	1

S **PCDD/Fs**	**16346.0**

ANALYTICAL RESULTS FOR DIOXINS AND FURANS

Method Code EP300

Laboratory Sample ID: ES1990050002
Client Sample ID: VC10_0.0-0.5

Qc Lot Number: 4539274
Sample Matrix: SOIL

Date Sampled: 31-Oct-2019
Date Extracted: 21-Nov-2019
Date Analysed: 21-Nov-2019

Compound	Conc pg/g	LOR pg/g	WHO-TEF	WHO-TEQ$_1$ (zero)	WHO-TEQ$_2$ (0.5 LOR)	WHO-TEQ$_3$ (LOR)	I-TEF	I-TEQ$_1$ (zero)	I-TEQ$_2$ (0.5 LOR)	I-TEQ$_3$ (LOR)	$^{13}C_{12}$ Rec(%)
2378-TCDD	<0.5	0.5	1	0.00	0.25	0.50	1	0.00	0.25	0.50	93.3
12378-PeCDD	<2.5	2.5	1	0.00	1.25	2.49	0.5	0.00	0.62	1.25	93.3
123478-HxCDD	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	56.3
123678-HxCDD	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	82.4
123789-HxCDD	5.8	2.5	0.1	0.58	0.58	0.58	0.1	0.58	0.58	0.58	-
1234678-HpCDD	283.0	2.5	0.01	2.83	2.83	2.83	0.01	2.83	2.83	2.83	72.8
OCDD	73500.0	10.0	0.0003	22.05	22.05	22.05	0.001	73.50	73.50	73.50	72.6
2378-TCDF	<0.5	0.5	0.1	0.00	0.02	0.05	0.1	0.00	0.02	0.05	77.5
12378-PeCDF	<2.5	2.5	0.03	0.00	0.04	0.07	0.05	0.00	0.06	0.12	99.6
23478-PeCDF	<2.5	2.5	0.3	0.00	0.37	0.75	0.5	0.00	0.62	1.25	99.9
123478-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	56.1
123678-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	94.2
234678-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	82.6
123789-HxCDF	<2.5	2.5	0.1	0.00	0.12	0.25	0.1	0.00	0.12	0.25	96.0
1234678-HpCDF	<2.5	2.5	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.02	62.8
1234789-HpCDF	<2.5	2.5	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.02	101.7
OCDF	<5.0	5.0	0.0003	0.00	0.00	0.00	0.001	0.00	0.00	0.00	-
Total TEQ	-	-	-	25.46	28.16	30.87	-	76.91	79.27	81.62	-

Group Totals	Conc pg/g	LOR$_4$ pg/g	No. of Peaks
Tetra-Dioxins	269.0	1.5	3
Penta-Dioxins	85.1	12.5	5
Hexa-Dioxins	518.0	17.4	7
Hepta-Dioxins	1090.0	5.0	2
Octa-Dioxin	73500.0	10.0	1
Tetra-Furans	<0.5	0.5	1
Penta-Furans	<2.5	2.5	1
Hexa-Furans	<2.5	2.5	1
Hepta-Furans	<2.5	2.5	1
Octa-Furan	<5.0	5.0	1

S **PCDD/Fs**	**75462.1**

ANALYTICAL RESULTS FOR DIOXINS AND FURANS

Method Code EP300

Laboratory Sample ID: ES1990050003
Client Sample ID: VC02_0.5-1.0

Qc Lot Number: 4539274
Sample Matrix: SOIL

Date Sampled: 30-Oct-2019
Date Extracted: 21-Nov-2019
Date Analysed: 21-Nov-2019

Compound	Conc pg/g	LOR pg/g	WHO-TEF	WHO-TEQ$_1$ (zero)	WHO-TEQ$_2$ (0.5 LOR)	WHO-TEQ$_3$ (LOR)	I-TEF	I-TEQ$_1$ (zero)	I-TEQ$_2$ (0.5 LOR)	I-TEQ$_3$ (LOR)	$^{13}C_{12}$ Rec(%)
2378-TCDD	**18.4**	**0.5**	**1**	**18.40**	**18.40**	**18.40**	**1**	**18.40**	**18.40**	**18.40**	**110.7**
12378-PeCDD	**33.1**	**2.5**	**1**	**33.10**	**33.10**	**33.10**	**0.5**	**16.55**	**16.55**	**16.55**	**109.3**
123478-HxCDD	**35.1**	**2.5**	**0.1**	**3.51**	**3.51**	**3.51**	**0.1**	**3.51**	**3.51**	**3.51**	**77.8**
123678-HxCDD	**128.0**	**2.5**	**0.1**	**12.80**	**12.80**	**12.80**	**0.1**	**12.80**	**12.80**	**12.80**	**69.1**
123789-HxCDD	**93.0**	**2.5**	**0.1**	**9.30**	**9.30**	**9.30**	**0.1**	**9.30**	**9.30**	**9.30**	**-**
1234678-HpCDD	**2400.0**	**2.5**	**0.01**	**24.00**	**24.00**	**24.00**	**0.01**	**24.00**	**24.00**	**24.00**	**82.5**
OCDD	**48000.0**	**10.0**	**0.0003**	**14.40**	**14.40**	**14.40**	**0.001**	**48.00**	**48.00**	**48.00**	**73.5**
2378-TCDF	**16.7**	**0.5**	**0.1**	**1.67**	**1.67**	**1.67**	**0.1**	**1.67**	**1.67**	**1.67**	**95.0**
12378-PeCDF	**13.4**	**2.5**	**0.03**	**0.40**	**0.40**	**0.40**	**0.05**	**0.67**	**0.67**	**0.67**	**94.2**
23478-PeCDF	**20.5**	**2.5**	**0.3**	**6.15**	**6.15**	**6.15**	**0.5**	**10.25**	**10.25**	**10.25**	**109.2**
123478-HxCDF	**36.8**	**2.5**	**0.1**	**3.68**	**3.68**	**3.68**	**0.1**	**3.68**	**3.68**	**3.68**	**59.7**
123678-HxCDF	**17.9**	**2.5**	**0.1**	**1.79**	**1.79**	**1.79**	**0.1**	**1.79**	**1.79**	**1.79**	**72.1**
234678-HxCDF	**<2.5**	**2.5**	**0.1**	**0.00**	**0.13**	**0.25**	**0.1**	**0.00**	**0.13**	**0.25**	**76.6**
123789-HxCDF	**<2.5**	**2.5**	**0.1**	**0.00**	**0.13**	**0.25**	**0.1**	**0.00**	**0.13**	**0.25**	**79.4**
1234678-HpCDF	**440.0**	**2.5**	**0.01**	**4.40**	**4.40**	**4.40**	**0.01**	**4.40**	**4.40**	**4.40**	**57.7**
1234789-HpCDF	**37.0**	**2.5**	**0.01**	**0.37**	**0.37**	**0.37**	**0.01**	**0.37**	**0.37**	**0.37**	**86.6**
OCDF	**1300.0**	**5.0**	**0.0003**	**0.39**	**0.39**	**0.39**	**0.001**	**1.30**	**1.30**	**1.30**	**-**
Total TEQ	**-**	**-**	**-**	**134.36**	**134.61**	**134.86**	**-**	**156.69**	**156.94**	**157.19**	**-**

Group Totals	Conc pg/g	LOR$_4$ pg/g	No. of Peaks
Tetra-Dioxins	**343.0**	**5.5**	**11**
Penta-Dioxins	**627.0**	**25.0**	**10**
Hexa-Dioxins	**3030.0**	**17.5**	**7**
Hepta-Dioxins	**7140.0**	**5.0**	**2**
Octa-Dioxin	**48000.0**	**10.0**	**1**
Tetra-Furans	**234.0**	**9.0**	**18**
Penta-Furans	**258.0**	**30.0**	**12**
Hexa-Furans	**509.0**	**25.0**	**10**
Hepta-Furans	**1350.0**	**10.0**	**4**
Octa-Furan	**1300.0**	**5.0**	**1**
S **PCDD/Fs**	**62791.0**		

QUALITY CONTROL REPORT

Client	**GHD PTY LTD**	**Laboratory :**	Environmental Division Sydney		
Contact	SARAH ECCLESHALL	**Contact**	CUSTOMER.SERVICES.ES	**Work Order:**	**ES1990050**
Address:	LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	**Address:**	Smithfield NSW 2164 Australia		

Project	19517046	**Quote #**	----	**Received:**	12 Nov 2019
Order #	- Not provided -			**Issued**	27 Nov 2019
C-O-C #	- Not provided -				
Site	- Not provided -				
E-mail	sarah.eccleshall@ghd.com	**E-mail**	ALSEnviro.Sydney@alsglobal.co	**Number of Samples**	
Phone	9239 7100	**Phone**	+61-2-8784 8555	**Received:**	3
Fax	9239 7199	**Fax**	+61-2-8784 8500	**Analysed:**	5

Samples analysed 'as received', results reported on 'dry weight' basis.

ALSE - Excellence in Analytical Testing

NATA Accredited Laboratory - 825

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IED 17025

WORLD RECOGNISED ACCREDITATION

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory	Position	Department
Peter Blow	HRMS Chemist	GC/HR-MS - NATA 825 (818 - Brisbane)

Quality Control Report
Laboratory Duplicates (DUP)

	Original Result	Duplicate Result
Laboratory Sample Id :	EP1990013001	5592649-026
Client Sample Id :	Anonymous	Anonymous
Sample Mass (g) :	10.0	10.0
Qc Lot Number :	4539275	4539275
Moisture Content (%) :		

Compound	Conc pg/g	LOR pg/g	Conc pg/g	LOR pg/g	RPD (%)
2378-TCDD	<0.5	0.5	<0.5	0.5	-
12378-PeCDD	<2.5	2.5	<2.5	2.5	-
123478-HxCDD	<2.5	2.5	<2.5	2.5	-
123678-HxCDD	<2.5	2.5	<2.5	2.5	-
123789-HxCDD	<2.5	2.5	<2.5	2.5	-
1234678-HpCDD	20.8	2.5	20.7	2.5	0.5
OCDD	196.0	10.0	192.0	10.0	2.1
2378-TCDF	1.3	0.5	0.7	0.5	60.0
12378-PeCDF	<2.5	2.5	<2.5	2.5	-
23478-PeCDF	<2.5	2.5	<2.5	2.5	-
123478-HxCDF	<2.5	2.5	<2.5	2.5	-
123678-HxCDF	<2.5	2.5	<2.5	2.5	-
234678-HxCDF	<2.5	2.5	<2.5	2.5	-
123789-HxCDF	<2.5	2.5	<2.5	2.5	-
1234678-HpCDF	4.2	2.5	4.0	2.5	4.9
1234789-HpCDF	<2.5	2.5	<2.5	2.5	-
OCDF	9.3	5.0	8.4	5.0	10.2

Group Totals	Conc pg/g	LOR pg/g	Conc pg/g	LOR pg/g	RPD (%)
Tetra-Dioxins	<0.5	0.5	<0.5	0.5	-
Penta-Dioxins	<15.0	15.0	<20.0	20.0	-
Hexa-Dioxins	<17.5	17.5	<20.0	20.0	-
Hepta-Dioxins	38.3	5.0	39.9	5.0	4.1
Octa-Dioxin	196.0	10.0	192.0	10.0	2.1
Tetra-Furans	34.5	9.0	16.5	9.0	70.6
Penta-Furans	<25.0	25.0	<29.9	29.9	-
Hexa-Furans	<30.0	30.0	<27.4	27.4	-
Hepta-Furans	10.1	10.0	10.2	10.0	1.0
Octa-Furan	9.3	5.0	8.4	5.0	10.2
S **PCDD/Fs**	**288.2**		**267.0**		**7.6**

Notes
LOR = Limit of reporting
T = tetra
Pe = penta
Hx = hexa
Hp = hepta
O = octa
CDD, dioxin = chlorinated debenzo-p-dioxin
CDF, furan = chlorinated debenzofuran
RPD = relative per cent difference
Permitted ranges for RPD are depencant upon the magnitude of the result in comparison to the LOR.
Result < 10x LOR, no limit, result between 10x and 20x LOR, 50%; result > 20x LOR, 20%
- = Where results are less than the LOR, no RPD is reported.

Client	: GHD PTY LTD	**Work Order**	: ES1990050
Project	: 19517046	**ALS Quote Reference**	: ----

Quality Control Report
Laboratory Duplicates (DUP)

	Original Result	Duplicate Result
Laboratory Sample Id :	ES1990048001	5592649-007
Client Sample Id :	Anonymous	Anonymous
Sample Mass (g) :	10.0	10.0
Qc Lot Number :	4539275	4539275
Moisture Content (%) :		

Compound	Conc pg/g	LOR pg/g	Conc pg/g	LOR pg/g	RPD (%)
2378-TCDD	<0.5	0.5	<0.5	0.5	-
12378-PeCDD	<2.5	2.5	<2.5	2.5	-
123478-HxCDD	<2.5	2.5	<2.5	2.5	-
123678-HxCDD	<2.5	2.5	<2.5	2.5	-
123789-HxCDD	<2.5	2.5	<2.5	2.5	-
1234678-HpCDD	67.0	2.5	64.3	2.5	4.1
OCDD	23300.0	10.0	23100.0	10.0	0.9
2378-TCDF	<0.5	0.5	<0.5	0.5	-
12378-PeCDF	<2.5	2.5	<2.5	2.5	-
23478-PeCDF	<2.5	2.5	<2.5	2.5	-
123478-HxCDF	<2.5	2.5	<2.5	2.5	-
123678-HxCDF	<2.5	2.5	<2.5	2.5	-
234678-HxCDF	<2.5	2.5	<2.5	2.5	-
123789-HxCDF	<2.5	2.5	<2.5	2.5	-
1234678-HpCDF	<2.5	2.5	<2.5	2.5	-
1234789-HpCDF	<2.5	2.5	<2.5	2.5	-
OCDF	<5.0	5.0	<5.0	5.0	-

Group Totals	Conc pg/g	LOR pg/g	Conc pg/g	LOR pg/g	RPD (%)
Tetra-Dioxins	<6.5	6.5	<6.5	6.5	-
Penta-Dioxins	<15.0	15.0	<20.0	20.0	-
Hexa-Dioxins	19.7	7.5	23.7	17.5	18.4
Hepta-Dioxins	144.0	5.0	133.0	5.0	7.9
Octa-Dioxin	23300.0	10.0	23100.0	10.0	0.9
Tetra-Furans	<0.5	0.5	<0.5	0.5	-
Penta-Furans	<2.5	2.5	<2.5	2.5	-
Hexa-Furans	<2.5	2.5	<2.5	2.5	-
Hepta-Furans	<2.5	2.5	<2.5	2.5	-
Octa-Furan	<5.0	5.0	<5.0	5.0	-
S **PCDD/Fs**	**23463.7**		**23256.7**		**0.9**

Notes
LOR = Limit of reporting
T = tetra
Pe = penta
Hx = hexa
Hp = hepta
O = octa
CDD, dioxin = chlorinated debenzo-p-dioxin
CDF, furan = chlorinated debenzofuran
RPD = relative per cent difference
Permitted ranges for RPD are depencant upon the magnitude of the result in comparison to the LOR.
Result < 10x LOR, no limit, result between 10x and 20x LOR, 50%; result > 20x LOR, 20%
- = Where results are less than the LOR, no RPD is reported.

Quality Control Results
Laboratory Control Samples(LCS)

Laboratory Sample Id : 5592649-010
QC Lot Number : 4539275
Sample Name : BCR 529 Sandy soil

Compound	Conc pg/g	Lower 1 pg/g	Upper 1 pg/g	13C12 Rec(%)	Lower 2 (%)	Upper 2 (%)
2378-TCDD	4130.0	3900	5100	95.8	25	164
12378-PeCDD	470.0	390	490	96.5	25	181
123478-HxCDD	1390.0	900	1500	65.7	32	141
123678-HxCDD	5820.0	4500	6300	68.3	28	130
123789-HxCDD	3380.0	2600	3400	-	-	-
2378-TCDF	70.6	65	91	85.6	24	169
12378-PeCDF	158.0	110	170	99.3	24	185
23478-PeCDF	360.0	290	430	102.5	21	178
123478-HxCDF	3630.0	2900	3900	62.4	26	152
123678-HxCDF	1220.0	940	1240	85.0	26	123
234678-HxCDF	401.0	330	410	85.2	28	136
123789-HxCDF	566.0	12	32	102.3	29	147

Notes
1. Acceptable concentration limits are as quoted on the analytical certificate for the cerified reference material
2. Acceptable recovery limits are derived from EPA1613 Revision B

T = tetra
Pe = penta
Hx = hexa
Hp = hepta
O = octa

Client	: GHD PTY LTD	Work Order	: ES1990050
Project	: 19517046	ALS Quote Reference	: ----

Quality Control Report
Method Blank (MB)

Laboratory Sample ID: 5592649-001
Qc Lot Number : 4539275

Sample Matrix: SOIL
Date Extracted: 21-Nov-2019
Date Analysed: 21-Nov-2019

Compound	Conc pg/g	LOR pg/g	WHO-TEF	WHO-TEQ1 (zero)	WHO-TEQ2 (0.5 LOR)	WHO-TEQ3 (LOR)	I-TEF	I-TEQ1 (zero)	I-TEQ2 (0.5 LOR)	I-TEQ3 (LOR)	13C12 Rec(%)
2378-TCDD	<0.5	0.5	1	0.00	0.25	0.50	1	0.00	0.25	0.50	90.7
12378-PeCDD	<2.5	2.5	1	0.00	1.25	2.50	0.5	0.00	0.63	1.25	107.4
123478-HxCDD	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	57.1
123678-HxCDD	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	79.6
123789-HxCDD	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	-
1234678-HpCD	<2.5	2.5	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.03	66.6
OCDD	<10.0	10.0	0.0003	0.00	0.00	0.00	0.001	0.00	0.01	0.01	38.6
2378-TCDF	<0.5	0.5	0.1	0.00	0.03	0.05	0.1	0.00	0.03	0.05	95.6
12378-PeCDF	<2.5	2.5	0.03	0.00	0.04	0.08	0.05	0.00	0.06	0.13	102.0
23478-PeCDF	<2.5	2.5	0.3	0.00	0.38	0.75	0.5	0.00	0.63	1.25	104.1
123478-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	50.5
123678-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	81.5
234678-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	73.9
123789-HxCDF	<2.5	2.5	0.1	0.00	0.13	0.25	0.1	0.00	0.13	0.25	69.5
1234678-HpCD	<2.5	2.5	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.03	50.8
1234789-HpCD	<2.5	2.5	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.03	65.1
OCDF	<5.0	5.0	0.0003	0.00	0.00	0.00	0.001	0.00	0.00	0.01	-
			S **TEQ(WHO)**	0.00	2.89	5.72	S **TEQ(I)**	0.00	2.55	5.04	

Group Totals	Conc pg/g	LOR4 pg/g	No. of Peaks
Tetra-Dioxins	<0.5	0.5	1
Penta-Dioxins	<2.5	2.5	1
Hexa-Dioxins	<2.5	2.5	1
Hepta-Dioxins	<2.5	2.5	1
Octa-Dioxin	<10.0	10.0	1
Tetra-Furans	<0.5	0.5	1
Penta-Furans	<2.5	2.5	1
Hexa-Furans	<2.5	2.5	1
Hepta-Furans	<2.5	2.5	1
Octa-Furan	<5.0	5.0	1
S **PCDD/Fs**	0.00		

Notes
LOR = Limit of reporting
I-TEF = International toxic equivalency factor
I-TEQ = International toxic equivalence (pg/g)
WHO-TEF = World Health Organistaion toxic equivalency factor
WHO-TEQ = World Health Organisation toxic equivalence (pg/g)
T = tetra
Pe = penta
Hx = hexa
Hp =hepta
O = octa
CDD, dioxin = chlorinated dibenzo-p-dioxin
CDF, furan = chlorinated dibenzofuran
1 I -TEQ(zero) and WHO-TEQ(zero) calculated treating <LOR as zero concentration (pg/g)
2 I-TEQ(0.5 LOR) and WHO-TEQ(0.5 LOR) calculated treating <LOR as 50% LoR concentration (pg/g)
3 I-TEQ(LOR) and WHO-TEQ(LOR) calculated treating <LOR as LoR concentration (pg/g)
4 Totals LORs are calculated by mutiplying the number of peaks by the individual LOR per compound

#685895

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENT ☐ Standard TAT (List due date):		FOR LABORATORY USE ONLY (Circle)
OFFICE: level 15, 133 Castlereagh St, Sydney	(Standard TAT may be longer for some tests e.g.. Ultra Trace) ☐ Non Standard or urgent TAT (List due date):		Custody Seal Intact? Yes No N/A
PROJECT: 12517046	ALS QUOTE NO.: SY-552-19	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 3.9 °C
PROJECT MANAGER: Carmen Yi — CONTACT PH: 0451 962 988		OF: 1 2 3 4 5 6 7	Other comment:

SAMPLER: Sarah Eccleshall — SAMPLER MOBILE: 0459 546 332	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES / NO) — EDD FORMAT (or default):	S. Eccleshall	Sp- ALS Crows Nest		[illegible]
Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com	DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed):	31/10/19 5:15 pm	31/10/19 1715		31/10/19 1845

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Suzanne Lord 1/11/19 2:52AM

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	ASS Field Screen (pH field ad pHfox)	Phenols	TRH	BTEXN	TOC	TCN	OC/OP/PCB	PAH	Total Fluoride	VOCs	Particle Size distribution	ICMPS Metals (15 metals + low level Hg)			Hold
1	VC09_0.0-0.2	30/10/2019 20:45	S	Jar	1		x	x	x	x	x	x	x				x			
2	VC09_0.4-0.6	30/10/2019 20:45	S	Jar	1															x
3	VC09_0.7-0.8	30/10/2019 20:45	S	Jar	1															x
4	VC09_0.8-1.0	30/10/2019 20:45	S	Jar	1															x
5	VC09_0.0-0.5	30/10/2019 20:45	S	Jar	2															x
6	VC09_0.5-1.0	30/10/2019 20:45	S	Jar	2															x
7	VC07_0.0-0.2	30/10/2019 21:00	S	Jar	1		x	x	x	x	x	x	x	x	x		x			
8	VC07_0.5-0.6	30/10/2019 21:00	S	Jar	1															x
9	VC07_0.7-0.8	30/10/2019 21:00	S	Jar	1															x
10	VC07_1.0-1.2	30/10/2019 21:00	S	Jar	1															x
11	VC07_0.0-0.5	30/10/2019 21:00	S	jar and B	4		x	x	x	x	x	x	x			x	x			
12	VC07_0.5-1.0	30/10/2019 21:00	S	Jar	3															x
				TOTAL																

Subcon / Forward Lab / Split WO
Lab / Analysis: NEWCASTLE
Organised By / Date: FLUORIDE & PSD
Relinquished By / Date:
Connote / Courier:
WO No:
Attach By PO / Internal Sheet:

Environmental Division
Sydney
Work Order Reference
ES1936029

Telephone : + 61-2-8784 8555

Subcon / Forward Lab / Split WO
Lab / Analysis: BRISBANE
Organised By / Date: ASS FIELD
Relinquished By / Date:
Connote / Courier:
WO No:
Attach By PO / Internal Sheet:

Subcon / Forward Lab / Split WO
Lab / Analysis: EUROFINS
Organised By / Date: F002
Relinquished By / Date:
Connote / Courier:
WO No:
Attach By PO / Internal Sheet:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD Pty Ltd

OFFICE: level 15, 133 Castlereagh St, Sydney

PROJECT: 12517046

ORDER NUMBER:

PROJECT MANAGER: Carmen Yi **CONTACT PH:** 0451 962 988

SAMPLER: Sarah Eccleshall **SAMPLER MOBILE:** 0459 546 332

COC emailed to ALS? (YES / NO) **EDD FORMAT (or default):**

Email Reports to: sarah.eccleshall@ghd.com; carmen.yi@ghd.com; labreprots@ghd.com

Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENT (Standard TAT may be longer for some tests e.g.. Ultra Trace)
☐ Standard TAT (**List due date):**
☐ Non Standard or urgent TAT (**List due date):**

ALS QUOTE NO.: SY-552-19

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: 3.9 °C
Other comment:

RELINQUISHED BY: S. Eccleshall
DATE/TIME:

RECEIVED BY: Sep M.
DATE/TIME:

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY: Soysbglu AW
DATE/TIME: 31/10/19 1845

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

Suzanne Ford 1/11/19 2:52AM

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price)
Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION																	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	AS3 Field Screen (pH field ad pHfox)	Phenols	TRH	BTEXN	TOC	TCN	OC/OP/PCB	PAH	Total Fluoride	VOCs	Particle Size distribution	ICMPS Metals (15 metals + low level Hg)	8 metals	TRH C6-C10	BTEX	Hold
81	FD01	30/10/2019	S	JAR	1		x	x	x	x	x	x	x				x				
—	FD02	30/10/2019	S	JAR	1		x	x	x	x	x	x	x				x	Please forward to eurofins			
82	FD03	30/10/2019	S	JAR																	x
83	FD05	31/10/2019	S	Jar	1		x	x	x	x	x	x	x				x				
84	RIN_01	30/10/2019 0:00	W		4			x	x				x					x			
85	TS1	30/10/2019 0:00	S	jar					x												
86	TB1	30/10/2019 0:00	S	jar															x	x	
87	TSC																				
				TOTAL																	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Sample Receipt Advice

Company name:	**GHD Pty Ltd NSW**
Contact name:	Carmen Yi
Project name:	12517046
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Nov 1, 2019 2:52 PM
Eurofins reference:	**685895**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ Sample Temperature of a random sample selected from the batch as recorded by Eurofins Sample Receipt : 17.8 degrees Celsius.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Alena Bounkeua on Phone : or by e.mail: AlenaBounkeua@eurofins.com

Results will be delivered electronically via e.mail to Carmen Yi - carmen.yi@ghd.com.

eurofins

Environment Testing

ABN – 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name: GHD Pty Ltd NSW
Address: Level 15, 133 Castlereagh Street
Sydney
NSW 2000

Project Name: 12517046

Order No.:
Report #: 685895
Phone: 02 9239 7100
Fax: 02 9239 7199

Received: Nov 1, 2019 2:52 PM
Due: Nov 8, 2019
Priority: 5 Day
Contact Name: Carmen Yi

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Total Combined Nitrogen (as N)	Total Organic Carbon	Eurofins | mgt Suite B15	Moisture Set	Eurofins | mgt Suite B4A
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	FD02	Oct 30, 2019		Soil	S19-No01404	X	X	X	X	X
Test Counts						1	1	1	1	1

eurofins | Environment Testing

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

GHD Pty Ltd NSW
Level 15, 133 Castlereagh Street
Sydney
NSW 2000

Attention: **Carmen Yi**

Report **685895-S**
Project name 12517046
Received Date Nov 01, 2019

Client Sample ID			**FD02**
Sample Matrix			**Soil**
Eurofins Sample No.			**S19-No01404**
Date Sampled			**Oct 30, 2019**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	< 50
TRH C29-C36	50	mg/kg	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50
BTEX			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3
4-Bromofluorobenzene (surr.)	1	%	86
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.5	mg/kg	< 0.5
TRH C6-C10	20	mg/kg	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20
TRH >C10-C16	50	mg/kg	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	< 100
TRH >C34-C40	100	mg/kg	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5

eurofins Environment Testing

Client Sample ID			FD02
Sample Matrix			Soil
Eurofins Sample No.			S19-No01404
Date Sampled			Oct 30, 2019
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH*	0.5	mg/kg	< 0.5
2-Fluorobiphenyl (surr.)	1	%	66
p-Terphenyl-d14 (surr.)	1	%	60
Organochlorine Pesticides			
Chlordanes - Total	0.1	mg/kg	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05
a-BHC	0.05	mg/kg	< 0.05
Aldrin	0.05	mg/kg	< 0.05
b-BHC	0.05	mg/kg	< 0.05
d-BHC	0.05	mg/kg	< 0.05
Dieldrin	0.05	mg/kg	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05
Endrin	0.05	mg/kg	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05
Heptachlor	0.05	mg/kg	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05
Toxaphene	1	mg/kg	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1
Dibutylchlorendate (surr.)	1	%	83
Tetrachloro-m-xylene (surr.)	1	%	64
Organophosphorus Pesticides			
Azinphos-methyl	0.2	mg/kg	< 0.2
Bolstar	0.2	mg/kg	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2
Coumaphos	2	mg/kg	< 2
Demeton-S	0.2	mg/kg	< 0.2
Demeton-O	0.2	mg/kg	< 0.2
Diazinon	0.2	mg/kg	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2
Dimethoate	0.2	mg/kg	< 0.2

eurofins Environment Testing

Client Sample ID			FD02
Sample Matrix			Soil
Eurofins Sample No.			S19-No01404
Date Sampled			Oct 30, 2019
Test/Reference	LOR	Unit	
Organophosphorus Pesticides			
Disulfoton	0.2	mg/kg	< 0.2
EPN	0.2	mg/kg	< 0.2
Ethion	0.2	mg/kg	< 0.2
Ethoprop	0.2	mg/kg	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2
Fenthion	0.2	mg/kg	< 0.2
Malathion	0.2	mg/kg	< 0.2
Merphos	0.2	mg/kg	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2
Mevinphos	0.2	mg/kg	< 0.2
Monocrotophos	2	mg/kg	< 2
Naled	0.2	mg/kg	< 0.2
Omethoate	2	mg/kg	< 2
Phorate	0.2	mg/kg	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2
Ronnel	0.2	mg/kg	< 0.2
Terbufos	0.2	mg/kg	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2
Tokuthion	0.2	mg/kg	< 0.2
Trichloronate	0.2	mg/kg	< 0.2
Triphenylphosphate (surr.)	1	%	66
Polychlorinated Biphenyls			
Aroclor-1016	0.1	mg/kg	< 0.1
Aroclor-1221	0.1	mg/kg	< 0.1
Aroclor-1232	0.1	mg/kg	< 0.1
Aroclor-1242	0.1	mg/kg	< 0.1
Aroclor-1248	0.1	mg/kg	< 0.1
Aroclor-1254	0.1	mg/kg	< 0.1
Aroclor-1260	0.1	mg/kg	< 0.1
Total PCB*	0.1	mg/kg	< 0.1
Dibutylchlorendate (surr.)	1	%	83
Tetrachloro-m-xylene (surr.)	1	%	64
Phenols (Halogenated)			
2-Chlorophenol	0.5	mg/kg	< 0.5
2.4-Dichlorophenol	0.5	mg/kg	< 0.5
2.4.5-Trichlorophenol	1	mg/kg	< 1
2.4.6-Trichlorophenol	1	mg/kg	< 1
2.6-Dichlorophenol	0.5	mg/kg	< 0.5
4-Chloro-3-methylphenol	1	mg/kg	< 1
Pentachlorophenol	1	mg/kg	< 1
Tetrachlorophenols - Total	10	mg/kg	< 10
Total Halogenated Phenol*	1	mg/kg	< 1

eurofins | Environment Testing

Client Sample ID			FD02
Sample Matrix			Soil
Eurofins Sample No.			S19-No01404
Date Sampled			Oct 30, 2019
Test/Reference	LOR	Unit	
Phenols (non-Halogenated)			
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	< 20
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2
2-Nitrophenol	1.0	mg/kg	< 1
2.4-Dimethylphenol	0.5	mg/kg	< 0.5
2.4-Dinitrophenol	5	mg/kg	< 5
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.4
4-Nitrophenol	5	mg/kg	< 5
Dinoseb	20	mg/kg	< 20
Phenol	0.5	mg/kg	< 0.5
Total Non-Halogenated Phenol*	20	mg/kg	< 20
Phenol-d6 (surr.)	1	%	60
Cyanide (total)	5	mg/kg	< 5
Total Organic Carbon	0.1	%	< 0.1
% Moisture	1	%	15

eurofins | Environment Testing

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B4A			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Nov 07, 2019	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Nov 07, 2019	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 07, 2019	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 07, 2019	
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Melbourne	Nov 07, 2019	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Phenols (Halogenated)	Melbourne	Nov 07, 2019	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Phenols (non-Halogenated)	Melbourne	Nov 07, 2019	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Eurofins | mgt Suite B15			
Organochlorine Pesticides	Melbourne	Nov 07, 2019	14 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)			
Organophosphorus Pesticides	Melbourne	Nov 07, 2019	14 Days
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS (USEPA 8081)			
Polychlorinated Biphenyls	Melbourne	Nov 07, 2019	28 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8082)			
Cyanide (total)	Melbourne	Nov 11, 2019	14 Days
- Method: LTM-INO-4020 Total Free WAD Cyanide by CFA			
Total Organic Carbon	Melbourne	Nov 08, 2019	28 Days
- Method: LTM-INO-4060 Total Organic Carbon in water and soil			
% Moisture	Melbourne	Nov 01, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

ABN – 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name: GHD Pty Ltd NSW
Address: Level 15, 133 Castlereagh Street
Sydney
NSW 2000

Project Name: 12517046

Order No.:
Report #: 685895
Phone: 02 9239 7100
Fax: 02 9239 7199

Received: Nov 1, 2019 2:52 PM
Due: Nov 8, 2019
Priority: 5 Day
Contact Name: Carmen Yi

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Cyanide (total)	Total Organic Carbon	Eurofins | mgt Suite B15	Moisture Set	Eurofins | mgt Suite B4A
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	FD02	Oct 30, 2019		Soil	S19-No01404	X	X	X	X	X
Test Counts						1	1	1	1	1

eurofins

Environment Testing

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ug/L:** micrograms per litre
ppm: Parts per million	**ppb:** Parts per billion	**%:** Percentage
org/100mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

eurofins | Environment Testing

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	

eurofins

Environment Testing

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Malathion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Monocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.1			0.1	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.1			0.1	Pass	
Aroclor-1242	mg/kg	< 0.1			0.1	Pass	
Aroclor-1248	mg/kg	< 0.1			0.1	Pass	
Aroclor-1254	mg/kg	< 0.1			0.1	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Aroclor-1260	mg/kg	< 0.1			0.1	Pass	
Total PCB*	mg/kg	< 0.1			0.1	Pass	
Method Blank							
Phenols (Halogenated)							
2-Chlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4.5-Trichlorophenol	mg/kg	< 1			1	Pass	
2.4.6-Trichlorophenol	mg/kg	< 1			1	Pass	
2.6-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
4-Chloro-3-methylphenol	mg/kg	< 1			1	Pass	
Pentachlorophenol	mg/kg	< 1			1	Pass	
Tetrachlorophenols - Total	mg/kg	< 10			10	Pass	
Method Blank							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	mg/kg	< 20			20	Pass	
2-Methyl-4.6-dinitrophenol	mg/kg	< 5			5	Pass	
2-Methylphenol (o-Cresol)	mg/kg	< 0.2			0.2	Pass	
2-Nitrophenol	mg/kg	< 1			1.0	Pass	
2.4-Dimethylphenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dinitrophenol	mg/kg	< 5			5	Pass	
3&4-Methylphenol (m&p-Cresol)	mg/kg	< 0.4			0.4	Pass	
4-Nitrophenol	mg/kg	< 5			5	Pass	
Dinoseb	mg/kg	< 20			20	Pass	
Phenol	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Total Organic Carbon	%	< 0.1			0.1	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	124			70-130	Pass	
TRH C10-C14	%	83			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	106			70-130	Pass	
Toluene	%	104			70-130	Pass	
Ethylbenzene	%	101			70-130	Pass	
m&p-Xylenes	%	103			70-130	Pass	
Xylenes - Total	%	104			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	95			70-130	Pass	
TRH C6-C10	%	124			70-130	Pass	
TRH >C10-C16	%	78			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	116			70-130	Pass	
Acenaphthylene	%	120			70-130	Pass	
Anthracene	%	109			70-130	Pass	
Benz(a)anthracene	%	105			70-130	Pass	
Benzo(a)pyrene	%	119			70-130	Pass	
Benzo(b&j)fluoranthene	%	115			70-130	Pass	
Benzo(g.h.i)perylene	%	80			70-130	Pass	
Benzo(k)fluoranthene	%	92			70-130	Pass	
Chrysene	%	121			70-130	Pass	
Dibenz(a.h)anthracene	%	129			70-130	Pass	

eurofins

Environment Testing

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Fluoranthene	%	108			70-130	Pass	
Fluorene	%	92			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	78			70-130	Pass	
Naphthalene	%	102			70-130	Pass	
Phenanthrene	%	109			70-130	Pass	
Pyrene	%	112			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	87			70-130	Pass	
4.4'-DDD	%	93			70-130	Pass	
4.4'-DDE	%	96			70-130	Pass	
4.4'-DDT	%	92			70-130	Pass	
a-BHC	%	94			70-130	Pass	
Aldrin	%	96			70-130	Pass	
b-BHC	%	92			70-130	Pass	
d-BHC	%	106			70-130	Pass	
Dieldrin	%	102			70-130	Pass	
Endosulfan I	%	97			70-130	Pass	
Endosulfan II	%	91			70-130	Pass	
Endosulfan sulphate	%	77			70-130	Pass	
Endrin	%	83			70-130	Pass	
Endrin aldehyde	%	92			70-130	Pass	
Endrin ketone	%	102			70-130	Pass	
g-BHC (Lindane)	%	101			70-130	Pass	
Heptachlor	%	95			70-130	Pass	
Heptachlor epoxide	%	102			70-130	Pass	
Hexachlorobenzene	%	106			70-130	Pass	
Methoxychlor	%	80			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	82			70-130	Pass	
Dimethoate	%	78			70-130	Pass	
Ethion	%	72			70-130	Pass	
Fenitrothion	%	100			70-130	Pass	
Methyl parathion	%	103			70-130	Pass	
Mevinphos	%	73			70-130	Pass	
LCS - % Recovery							
Polychlorinated Biphenyls							
Aroclor-1260	%	96			70-130	Pass	
LCS - % Recovery							
Phenols (Halogenated)							
2-Chlorophenol	%	109			30-130	Pass	
2.4-Dichlorophenol	%	102			30-130	Pass	
2.4.5-Trichlorophenol	%	104			30-130	Pass	
2.4.6-Trichlorophenol	%	100			30-130	Pass	
2.6-Dichlorophenol	%	110			30-130	Pass	
4-Chloro-3-methylphenol	%	114			30-130	Pass	
Pentachlorophenol	%	64			30-130	Pass	
Tetrachlorophenols - Total	%	101			30-130	Pass	
LCS - % Recovery							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	%	59			30-130	Pass	
2-Methyl-4.6-dinitrophenol	%	60			30-130	Pass	
2-Methylphenol (o-Cresol)	%	111			30-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2-Nitrophenol			%	115			30-130	Pass	
2.4-Dimethylphenol			%	85			30-130	Pass	
2.4-Dinitrophenol			%	34			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)			%	117			30-130	Pass	
4-Nitrophenol			%	84			30-130	Pass	
Dinoseb			%	83			30-130	Pass	
Phenol			%	110			30-130	Pass	
LCS - % Recovery									
Total Organic Carbon			%	104			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M19-No01888	NCP	%	104			70-130	Pass	
TRH C10-C14	M19-No00059	NCP	%	109			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M19-No01888	NCP	%	105			70-130	Pass	
Toluene	M19-No01888	NCP	%	110			70-130	Pass	
Ethylbenzene	M19-No01888	NCP	%	110			70-130	Pass	
m&p-Xylenes	M19-No01888	NCP	%	115			70-130	Pass	
o-Xylene	M19-No01888	NCP	%	114			70-130	Pass	
Xylenes - Total	M19-No01888	NCP	%	115			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M19-No01888	NCP	%	94			70-130	Pass	
TRH C6-C10	M19-No01888	NCP	%	117			70-130	Pass	
TRH >C10-C16	M19-No00059	NCP	%	103			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M19-No00942	NCP	%	98			70-130	Pass	
Acenaphthylene	M19-No00942	NCP	%	102			70-130	Pass	
Anthracene	M19-No00942	NCP	%	98			70-130	Pass	
Benz(a)anthracene	M19-No00942	NCP	%	86			70-130	Pass	
Benzo(a)pyrene	M19-No00942	NCP	%	99			70-130	Pass	
Benzo(b&j)fluoranthene	M19-No00942	NCP	%	118			70-130	Pass	
Benzo(g.h.i)perylene	M19-No00942	NCP	%	92			70-130	Pass	
Benzo(k)fluoranthene	M19-No00942	NCP	%	126			70-130	Pass	
Chrysene	M19-No00942	NCP	%	93			70-130	Pass	
Dibenz(a.h)anthracene	M19-No00942	NCP	%	83			70-130	Pass	
Fluoranthene	M19-No00942	NCP	%	80			70-130	Pass	
Fluorene	M19-No00942	NCP	%	109			70-130	Pass	
Indeno(1.2.3-cd)pyrene	M19-No00942	NCP	%	86			70-130	Pass	
Naphthalene	M19-No00942	NCP	%	111			70-130	Pass	
Phenanthrene	M19-No00942	NCP	%	89			70-130	Pass	
Pyrene	M19-No00942	NCP	%	75			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	S19-No00985	NCP	%	81			70-130	Pass	
4.4'-DDD	S19-No00985	NCP	%	80			70-130	Pass	
4.4'-DDE	S19-No00985	NCP	%	76			70-130	Pass	
4.4'-DDT	S19-No00985	NCP	%	80			70-130	Pass	
a-BHC	S19-No00985	NCP	%	95			70-130	Pass	
Aldrin	S19-No00985	NCP	%	104			70-130	Pass	
b-BHC	S19-No00985	NCP	%	82			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
d-BHC	S19-No00985	NCP	%	93			70-130	Pass	
Dieldrin	S19-No00985	NCP	%	73			70-130	Pass	
Endosulfan I	S19-No00985	NCP	%	107			70-130	Pass	
Endosulfan II	S19-No00985	NCP	%	101			70-130	Pass	
Endosulfan sulphate	S19-No00985	NCP	%	87			70-130	Pass	
Endrin	S19-No00985	NCP	%	93			70-130	Pass	
Endrin aldehyde	S19-No00985	NCP	%	102			70-130	Pass	
Endrin ketone	S19-No00985	NCP	%	100			70-130	Pass	
g-BHC (Lindane)	S19-No00985	NCP	%	110			70-130	Pass	
Heptachlor	S19-No00985	NCP	%	91			70-130	Pass	
Heptachlor epoxide	S19-No00985	NCP	%	79			70-130	Pass	
Hexachlorobenzene	S19-No00985	NCP	%	76			70-130	Pass	
Methoxychlor	S19-No00985	NCP	%	71			70-130	Pass	
Spike - % Recovery									
Organophosphorus Pesticides				Result 1					
Diazinon	Z19-Oc47469	NCP	%	106			70-130	Pass	
Dimethoate	W19-Oc31011	NCP	%	79			70-130	Pass	
Ethion	Z19-Oc47469	NCP	%	81			70-130	Pass	
Fenitrothion	Z19-Oc47469	NCP	%	97			70-130	Pass	
Methyl parathion	Z19-Oc47469	NCP	%	109			70-130	Pass	
Mevinphos	Z19-Oc47469	NCP	%	78			70-130	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1016	M19-Oc49034	NCP	%	110			70-130	Pass	
Aroclor-1260	S19-Oc36566	NCP	%	90			70-130	Pass	
Spike - % Recovery									
Phenols (Halogenated)				Result 1					
2-Chlorophenol	M19-No00942	NCP	%	91			30-130	Pass	
2.4-Dichlorophenol	M19-No00942	NCP	%	89			30-130	Pass	
2.4.5-Trichlorophenol	M19-No00942	NCP	%	93			30-130	Pass	
2.4.6-Trichlorophenol	M19-No00942	NCP	%	84			30-130	Pass	
2.6-Dichlorophenol	M19-No00942	NCP	%	89			30-130	Pass	
4-Chloro-3-methylphenol	M19-No00942	NCP	%	100			30-130	Pass	
Pentachlorophenol	M19-No00942	NCP	%	61			30-130	Pass	
Tetrachlorophenols - Total	M19-No00942	NCP	%	84			30-130	Pass	
Spike - % Recovery									
Phenols (non-Halogenated)				Result 1					
2-Cyclohexyl-4.6-dinitrophenol	M19-No00942	NCP	%	46			30-130	Pass	
2-Methyl-4.6-dinitrophenol	M19-No00942	NCP	%	55			30-130	Pass	
2-Methylphenol (o-Cresol)	M19-No00942	NCP	%	92			30-130	Pass	
2-Nitrophenol	M19-No00942	NCP	%	85			30-130	Pass	
2.4-Dimethylphenol	M19-No00942	NCP	%	77			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	M19-No00942	NCP	%	99			30-130	Pass	
4-Nitrophenol	M19-No00942	NCP	%	112			30-130	Pass	
Dinoseb	M19-No00942	NCP	%	86			30-130	Pass	
Phenol	M19-No00942	NCP	%	91			30-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M19-No01887	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	M19-No00058	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M19-No00058	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M19-No00058	NCP	mg/kg	< 50	< 50	<1	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M19-No01887	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M19-No01887	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M19-No01887	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M19-No01887	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M19-No01887	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	M19-No01887	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M19-No01887	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M19-No01887	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	M19-No00058	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M19-No02371	NCP	mg/kg	1.3	0.6	70	30%	Fail	Q15
Acenaphthylene	M19-No02371	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M19-No02371	NCP	mg/kg	1.3	< 0.5	110	30%	Fail	Q15
Benz(a)anthracene	M19-No02371	NCP	mg/kg	1.5	< 0.5	120	30%	Fail	Q15
Benzo(a)pyrene	M19-No02371	NCP	mg/kg	1.1	< 0.5	100	30%	Fail	Q15
Benzo(b&j)fluoranthene	M19-No02371	NCP	mg/kg	1.1	< 0.5	110	30%	Fail	Q15
Benzo(g.h.i)perylene	M19-No02371	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	M19-No02371	NCP	mg/kg	1.5	< 0.5	110	30%	Fail	Q15
Chrysene	M19-No02371	NCP	mg/kg	1.4	< 0.5	110	30%	Fail	Q15
Dibenz(a.h)anthracene	M19-No02371	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	M19-No02371	NCP	mg/kg	4.2	1.3	110	30%	Fail	Q15
Fluorene	M19-No02371	NCP	mg/kg	0.9	< 0.5	82	30%	Fail	Q15
Indeno(1.2.3-cd)pyrene	M19-No02371	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	M19-No02371	NCP	mg/kg	2.5	1.8	35	30%	Fail	Q15
Phenanthrene	M19-No02371	NCP	mg/kg	3.1	1.1	98	30%	Fail	Q15
Pyrene	M19-No02371	NCP	mg/kg	3.6	1.1	110	30%	Fail	Q15
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M19-No02371	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	M19-No02371	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	M19-Oc30269	NCP	mg/kg	< 1	< 1	<1	30%	Pass	

Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	M19-No02371	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	M19-No02371	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	M19-No02371	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	M19-No02371	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1221	M19-No02371	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	M19-No02371	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1242	M19-No02371	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1248	M19-No02371	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1254	M19-No02371	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1260	M19-No02371	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Total PCB*	M19-No02371	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Phenols (Halogenated)				Result 1	Result 2	RPD			
2-Chlorophenol	M19-No02371	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dichlorophenol	M19-No02371	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-Trichlorophenol	M19-No02371	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4.6-Trichlorophenol	M19-No02371	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.6-Dichlorophenol	M19-No02371	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chloro-3-methylphenol	M19-No02371	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Pentachlorophenol	M19-No02371	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Tetrachlorophenols - Total	M19-No02371	NCP	mg/kg	< 10	< 10	<1	30%	Pass	

Duplicate									
Phenols (non-Halogenated)				Result 1	Result 2	RPD			
2-Cyclohexyl-4.6-dinitrophenol	M19-No02371	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
2-Methyl-4.6-dinitrophenol	M19-No02371	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Methylphenol (o-Cresol)	M19-No02371	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
2-Nitrophenol	M19-No02371	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4-Dimethylphenol	M19-No02371	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dinitrophenol	M19-No02371	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	M19-No02371	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
4-Nitrophenol	M19-No02371	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Dinoseb	M19-No02371	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Phenol	M19-No02371	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Organic Carbon	S19-No01404	CP	%	< 0.1	< 0.1	<1	30%	Pass	
% Moisture	M19-No01150	NCP	%	12	11	9.0	30%	Pass	

eurofins | Environment Testing

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Alena Bounkeua	Analytical Services Manager
Harry Bacalis	Senior Analyst-Volatile (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)
Julie Kay	Senior Analyst-Inorganic (VIC)

Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Appendix F - Calibration certificates

PID Calibration Certificate

Instrument PhoCheck Tiger
Serial No. T-111087

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments			
Battery	Charge Condition	✓				
	Fuses	✓				
	Capacity	✓				
	Recharge OK?	✓				
Switch/keypad	Operation	✓				
Display	Intensity	✓				
	Operation (segments)	✓				
Grill Filter	Condition	✓				
	Seal	✓				
Pump	Operation	✓				
	Filter	✓				
	Flow	✓				
	Valves, Diaphragm	✓				
PCB	Condition	✓				
Connectors	Condition	✓				
Sensor	PID	✓	10.6 ev			
Alarms	Beeper	✓	Low	High	TWA	STEL
	Settings	✓	50ppm	100ppm		
Software	Version	✓				
Data logger	Operation	✓				
Download	Operation	✓				
Other tests:						

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No		Instrument Reading
PID Lamp		92ppm Isobutylene	NATA	SY245		91.3ppm

Calibrated by: Sarah Lian Sarah Lian

Calibration date: 30/10/2019

Next calibration due: 27/04/2020

30/10/2019

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 12D100012

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		324189	pH 9.48
2. pH 7.00		pH 7.00		320613	pH 6.98
3. pH 4.00		pH 4.00		330734	pH 4.25
4. mV		229.6mV		338782/337308	229.9mV
5. EC		2.76mS		333787	2.75mS
6. D.O		0.00ppm		329994	0.00ppm
7. Temp		21.6°C		MultiTherm	21.2°C

Calibrated by: Sarah Lian Sarah Lian

Calibration date: 30/10/2019

Next calibration due: 30/11/2019

GHD

Level 15
133 Castlereagh Street
Sydney NSW Australia
T: 61 2 9239 7100   F: 61 2 9239 7199   E: sydmail@ghd.com

12517046-52284/https://projectsportal.ghd.com/sites/pp15_04/circularquayinvestig/ProjectDocs/12517046-REP-0 Sediment assessment_Rev0.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	S.Eccleshall	J. Hallchurch	JHallchurch	J Hallchurch	JHallchurch	03/08/2020

www.ghd.com