

PORT NOISE POLICY
TECHNICAL RESPONSES TO
SUBMISSIONS

DECEMBER 2020

SPOKE
ACOUSTICS

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PREPARED FOR

PORT AUTHORITY OF NSW

PREPARED BY

SPOKE ACOUSTICS PTY LTD

T +61 405 461821 E simon.kean@spokeacoustics.com.au

ABN 14 619 506 491

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1 INTRODUCTION

Spoke Acoustics Pty Ltd was engaged by Port Authority of NSW (Port Authority) to review and respond to technical comments made by the community and other stakeholders on the draft Glebe Island and White Bay Port Noise Policy (the Policy) and the draft Vessel Noise Operating Protocol (the Protocol). The draft Policy and Protocol were released for stakeholder consultation during July-August 2020.

These comments were received either as written submissions or during online community consultation events.

2 OVERVIEW

A broad range of comments were received. These ranged across the following areas:

- discussion of general approaches adopted in the draft Policy
- specific scientific details around acoustic theory and measurement
- application of policy, planning controls and other international research

Comments generally fell into common themes. This document responds to the general themes rather than attempting to answer every individual comment directly.

The themes addressed in this report include:

- Legislative context
- Determining Vessel Trigger Noise Level (VTNL) and statistical sampling
- Reasonable and feasible mitigation
- Policy vessel trigger and the existing salt ship night time Environment Protection Licence
- Cumulative port noise levels, amenity and the VTNL
- New Zealand standard 6809:1999 for port noise management and land use planning
- Comments relating to dual noise limits for landside and vessels
- Future lower limits
- Comments about how noisy 65 a L_{Amax} appears
- Berth protocols
- Arrival and departure times
- Construction noise from non-port related projects
- Comments making comparison with aircraft
- Evening noise levels
- Noise modelling and measurement

3 NOISE CRITERIA

FEEDBACK

A number of comments received around appropriate noise levels at residences near the port.

OVERVIEW

Environmental noise has the potential to cause annoyance and health impacts. Australia, as with most European countries, sets achievable trigger levels for noise emission which provide a balance between protecting people from noise whilst also allowing development. This means that the noise trigger level do not seek to achieve an outcome where all people are protected from noise at all times. This balance is informed from various sources including annoyance metrics developed in research by Miedema, H.M.E. and Vos).

Miedema, H.M.E. and Vos, H., 2004, Noise annoyance from stationary sources: Relationships with exposure metric day evening night level (DENL) and their confidence intervals, The Journal of the Acoustical Society of America, 116/1, pp 334 - 343

The selected trigger levels are based on balancing community annoyance with development of industry and transport. These types of trigger levels are implemented in NSW through policies and guidelines developed in response to the *Protection of the Environment Operations Act 1997* (POEO Act). The POEO Act does not define trigger levels, but outlines overarching requirements to be met and identifies the appropriate regulatory authority.

In NSW these trigger levels in policies and guidelines are not mandatory noise limits, unless required in specific planning approvals or Environment Protection Licence conditions without feasible and reasonable provisions for noise mitigation.

Where the trigger levels cannot be achieved by a new or upgraded noise source using emission controls and intermediate source controls alone, treatments are generally required to residential properties to mitigate noise impacts.

Recent research conducted by the World Health Organisation (WHO) identifies an aspirational night-time noise goal of 40 dBA L_{Aeq} for outside noise. This goal was derived from the longer term average of multiple individual noisier events from aircraft and vehicle passbys. The WHO's aspirational noise goal is impractical to achieve in many locations and with current technology. For example, a handful of vehicles travelling on roads would exceed this noise aspirational goal at most residences located on these roads. Meeting these aspirational goals, through controlling sources, would require shutdown of roads and industry. As further local illustration the aspirational WHO goal is lower than ambient night time noise levels from ANZAC Bridge traffic at night time and general night time urban noise for many urban and rural locations.

Where existing and planned noise levels from infrastructure is high, and greater residential amenity is required at existing and new residences, both Australia and the EU have developed planning controls to address potential for impacts. These planning controls are developed and define acceptable noise levels for within modified existing dwellings and new dwellings.

NSW PLANNING CONTROLS

The *Environmental Planning and Assessment Act 1979* (EP&A Act) sets out the laws under which planning in NSW takes place. Under Part 3 of the EP&A Act, environmental planning instruments are made to guide and control development and land use. Environmental planning instruments, which include State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs), can

specify planning controls for certain areas and/or types of development (note: Regional Environmental Plans (REPs) are deemed to be SEPPs). Development Control Plans (DCPs) provide detailed planning and design guidelines to support the planning controls in the LEPs developed by councils.

The requirement for residences to be designed to meet internal noise goals is common under these various planning controls. It is particularly common for higher density dwellings, such as multi-storey buildings, which are frequently constructed near industry, busy roads and railway and mass transit lines.

PLANNING CONTROLS FOR BAYS WEST

Of direct relevance to the Policy is [Sydney Regional and Environmental Plan – 26](#) (SREP-26), which is the relevant environmental planning instrument for the land identified as 'City West', including the Bays Precinct. The current version, dated February 2020 was originally gazetted in 1992 and deemed as a SEPP from July 2009. The aims of SREP-26 are to:

- establish planning principles of regional significance for City West, as a whole, with which development in City West should be consistent
- establish planning principles and development controls of regional significance for development in each Precinct created within City West by this plan and by subsequent amendment of this plan, and
- promote the orderly and economic use and development of land within City West.

This environmental planning instrument identifies port functions as a key planning principle for the area, stating that the operation, concentration and rationalisation of commercial shipping facilities is to be supported to meet the changing needs of Sydney Harbour as a commercial port. In regards to the Bays Precinct, SREP-26 sets out a number of planning principles including that development should recognise that the port operates 24 hours a day and that the generation of noise, lighting and traffic movements are necessarily associated with its operation.

Consistent with SREP-26 (SEPP), the following controls were developed which include specific components to address noise from external sources such as roads and the port:

- Glebe Island and White Bay Masterplan 2000
- Leichhardt DCP 2000 (superseded), which was applied up to the time of being superseded by Leichhardt DCP 2013
- Urban Development Plan (UDP) for Ultimo-Pyrmont Precinct (1995 and 1999 updates) (superseded but applied at time of development)
- Lend Lease Master Plan 1997 (Jackson's Landing) (superseded but applied at time of development)
- Sydney DCP 2012
- Specific development consents for Pyrmont requiring buildings to be designed so that noise from the port and ANZAC Bridge do not result in internal noise levels exceeding those consistent with Australian Standard 2107 - *Recommended design sound levels and reverberation times for building interiors*.

The *Glebe Island and White Bay Masterplan* identifies 24/7 port noise levels at residential receiver locations ranging between 53dBA and 57dBA L_{Aeq} . Subsequent work completed in accordance with the *Lend Lease Masterplan* identified 24/7 noise levels up to 64dBA L_{Aeq} at residences at Jackson's Landing. The former Urban Development Plan (UDP) for Ultimo-Pyrmont Precinct, adopted by the Minister of Urban Affairs and Planning in 1995 and 1999 included noise attenuation requirements for development near major noise sources such as the port facility and elevated arterial roads.

In summary, many of the above DCPs, Plans and development consents required or still require buildings around the port to be designed so that external noise levels from roads and industry (including the Port) do not produce internal noise levels greater than Australian Standard 2107.

An example of a development consent condition for Jackson's Landing where external noise levels were assessed as being up to 64dBA L_{Aeq} is outlined below:

The Development shall address the noise impacts from traffic and operations of the port. Prior to lodgement of the Building Application a report shall be submitted to City West Planning indicating compliance with the noise attenuation measures required to satisfy the criteria indicated in the Lend Lease Master Plan 1997. This criteria being: (a) That the building will be acoustically treated, such that the mean logarithmic L_{Aeq} (1h) level will not exceed 35 dB(A) in sleeping areas at night time and 40 dB(A) in other internal areas (not including garages, kitchens, bathrooms and hallways) during day time (night time meaning between 10pm and 6am on the following day)

OTHER EXAMPLES OF NOISE TREATED RESIDENCES UNDER A SEPP OR PLANNING CONTROLS

The use of planning controls for new residential developments to protect against existing noise from infrastructure, industry and transport noise is common. Some examples include:

- All residential development in NSW near busy roads and rail corridors which is completed in accordance with SEPP (Infrastructure) 2007.
- Waterside, Penrith by Stockton.
- Residents near all major airports in Australia. This includes those with 24/7 operation and with curfews.

NSW ENVIRONMENTAL LEGISLATION FOR NOISE EMISSION

The *Protection of the Environment Operations Act 1997* (POEO Act) and the *Protection of the Environment Operations (Noise Control) Regulation 2017* (Noise Control Regulation) provide the main legal framework and basis for managing noise in NSW. It also makes certain agencies the appropriate regulatory authority (ARA) responsible for various premises/activities. This includes local councils, the Environment Protection Authority (EPA), Marine Parks Authority, Roads and Maritime Services (now Transport for NSW).

The main acoustic requirement of the POEO Act is to ensure that "a noise is not offensive" within the context of approved operations and planning controls. Offensive noise differs from annoyance based trigger levels in that it is a subjective term and not a quantified metric. Meeting trigger noise levels does however reduce the likelihood that noise is offensive, as does ensuring that noise levels are no greater than could reasonably be expected to occur from the approved activity. Offensive noise therefore is broader reaching and covers all noise including types of noise that are not subject to trigger noise level criteria under EPA policy, guidelines and EPLs or planning approvals.

Outcomes of the POEO Act is that actions and mitigation is undertaken where noise is offensive. Port Authority is aware of one instance where EPA has taken action against a noisy vessel at White Bay. It is understood this vessel was emitting noise levels of around 64dBA near residents without noise treatment. Actions can also be undertaken by the EPA where noise is not necessarily offensive through activities licensed under EPLs by setting noise limits or restricting the hours of operation of noisy activities. These noise limits are informed by trigger levels in EPA policy and guidelines plus predicted noise emission of the activity.

The EPA Noise Policy for Industry (NPfI) was designed to ensure that potential noise impacts associated with industrial projects are managed effectively by identifying approaches for setting trigger levels. This policy sets out the requirements for the assessment and management of noise from industry in NSW. It aims to ensure that noise is kept to acceptable levels in balance with the social and economic value of industry in NSW.

When new industry is being proposed or existing industry is being upgraded, redeveloped or needs review, attention needs to be paid to controlling noise. The NPfI is designed to assist industry and approval/regulatory authorities ensure that potential noise impacts associated with industrial projects are managed effectively.

The POEO Act also identifies which activities are to be licenced within the port. This relates to cargo types and how cargo is handled. This means that within the port, noise limits are usually set by the regulatory authority that granted the planning approval, and depending on the requirements in the POEO Act, the EPA additionally issues an Environment Protection Licence with noise limits.

There has been some inconsistency in licencing with respect to noise over the last 25 years. Vessel noise has not always been included in licence conditions and a licence may not necessarily include any noise limits.

PORT NOISE POLICY

The Policy is designed to facilitate port operations and improved noise outcomes within the context and constraints of SREP-26, other planning controls and environmental legislation.

The Policy aims to that noise from all vessels is managed in a consistent, transparent and fair manner, regardless of vessel and cargo type. The Policy sets noise limits for all vessels.

The Policy is an application of the NPfI. As such all new and upgraded operations need to be assessed to identify potential noise impacts and feasible and reasonable mitigation applied.

In accordance with the NPfI the Policy identifies a practical mechanism to reduce port noise within the context of planning controls for Bays West.

The noise maps produced under the Policy and associated tables also provide historical, current and future information to inform community and the consideration and application of further planning controls.

4 REVIEWING VESSEL TRIGGER NOISE LEVEL AND STATISTICAL SAMPLING

FEEDBACK

Suggestions were made that more advanced statistical methods could be used rather than just ranking. And that errors in median or 90th percentile vessel noise estimates could lead to poor outcomes.

RESPONSE

Vessel Trigger Noise Levels (VTNL) were set based on data for existing vessels using the port for current operators and median noise levels of similar vessels that will use future facilities.

Some comments were received around sample size of vessel noise data used in reviewing the VTNL for new operations and the suggested need for confidence limits. This statistical discussion relates to large population sizes with normal distributions where estimates need to be taken from a smaller sample. This is not the case here. Theoretical confidence limits can give some unrealistic outcomes which would be impossible in many situations.

None of the methods used in the Policy require normal statistical distributions, other distribution types or large samples of larger populations (which in this application may not exist). The use of the chosen percentile function is a ranking system only.

The approach is only required to split the noisiest vessels from the quietest and identify a median and upper 10th percentile. Ranking can be achieved for any size data set. We understand the percentiles may have error if only a small sample size was available, however this is not necessarily an issue and error is capped as explained below.

Based on existing maximum vessel engine noise limits for ensuring on-deck speech intelligibility under International Standards Organisation requirements, the upper possible noise level is capped. So is the lower possible noise level for the same reason, once on deck speech intelligibility is achieved, no further onboard mitigation is applied to reduce engine noise. For vessels of similar size and function this limits the possible noise levels at 160m as vessel noise levels are constrained by the noise levels on deck. This limits the possible spread and possible error in using a small sample.

If a small sample is taken, and due to significant bad luck, the median is largely different and does not reflect the actual population, there are two possible outcomes under the Policy. Both of these work in favour of the community:

- The first is that set VTNL is more stringent than expected.
- The second is that the VTNL is higher than it should be. If this created a significant noise impact, then this would have resulted in increased noise mitigation being applied to residences as part of the environmental approval and actual noise levels would be less than predicted. This is not a bad outcome.
 - As additional data is obtained, this would identify a new lower median noise level that can be complied with. Following review, the VTNL would be lowered to the more stringent value.
 - Note, the environmental process in the Policy requires consideration of the upper 10th percentile noise level in any case. So even with a high median and small sample size, it is unlikely to have resulted in much higher noise mitigation than the population upper 10th percentile given that the maximum possible upper noise level is capped.
 - If the initial analysis shows a high noise level that requires significant mitigation, it is likely that data would be reviewed to confirm that the median is correct. This review

may identify the median is lower which could reduce the cost of noise mitigation. The cost factors would also drive review of mitigating vessels.

In Appendix F – Vessel Noise Guideline, the VTNL considers noise levels while unloading. For new operations it considers the types of vessels that will be unloading.

This process sets a target that eliminates the noisier vessels. Any noise impacts associated with the VTNL and cumulative impacts from other port noise sources are evaluated in the environmental assessment and impacts managed by applying feasible and reasonable noise mitigation.

5 REASONABLE AND FEASIBLE, MITIGATION

FEEDBACK

There were various interpretations of the words limit and criteria in relation to noise and how this compares to trigger levels in the Port Noise Policy. Some of these related to the specific approaches in NSW and the term feasible and reasonable.

WHAT DOES THE WORD LIMIT MEAN IN NSW AND HOW DO THEY RELATE TO TRIGGER LEVELS?

A common misperception of noise criteria/trigger levels and noise limits are that these are always mandatory limits that must not be exceeded, where all actions must be undertaken, at any cost, so that there are no exceedances. This is not the case in many jurisdictions including NSW which has feasible and reasonable considerations.

NSW does not set mandatory noise limits, as defined in EPA policy, in legislation. This differs from some countries where noise criteria/limits are passed into law.

Instead all NSW noise policy documents are effectively guidelines with recommended noise trigger levels. Under these guidelines the noise trigger levels are to be met where it is both feasible and reasonable which can lead to instances where noise levels are higher than the trigger levels once all feasible and reasonable mitigation has been applied. The outcome of this process is used to identify specific limits and licence/approval conditions that can be met or are appropriate for the specific project or activity.

Noise trigger levels only become mandatory limits under NSW law if:

- A. they are specified in approval conditions and licences as limits, rather than limits to be met where feasible and reasonable. AND,
- B. where exceeding the limit results in actions to meet the limit, rather than just minimising noise.

The following shows a couple of examples.

1. The EPL noise limit for bulk goods that is applied to salt unloading at Glebe Island is not a true noise limit that is mandatory for vessels to meet. Under the licence the only actions that are undertaken for exceeding the limit are for the vessel to cease unloading. If the vessel ceases unloading this meets the broader requirements of the EPL and the vessel can continue to emit noise that exceeds the EPL noise limit while not unloading. This does not meet B above.
2. The 'noise limit' in the planning consent for White Bay Cruise Terminal has feasible and reasonable provisions and so it is not a limit. The consent also states that where the criteria cannot be met, appropriate mitigation should be provided to limit impacts and reported to the Director General. This on it's own does not meet A and B above. The outcome was the Port

Authority's Noise Mitigation Strategy (NIMS) and the noise treatment of previously untreated residences where external noise levels were greater than 55dBA at night. The vessel reference level under the Noise Mitigation Strategy is 58dBA and is applied as a noise limit, through implementation of the Noise Restriction Policy. Residences with noise levels above 55dBA, with the reference vessel noise level, have been offered noise treatment. This Strategy was approved by the Department of Planning and Environment. The NIMS meets the requirements of both A and B above.

FURTHER INFORMATION ON FEASIBLE AND REASONABLE

The EPA's policies, including the NPfl and the superseded Industrial Noise Guideline, outline the broad definitions of feasible and reasonable. These definitions are expanded upon in more detail within the Port Noise Policy for the context of the port.

The feasible and reasonable terms in EPA policies and guidelines also consider whether it is possible for existing industry to meet the latest trigger levels in current policy and guidelines. Where existing industry can not meet the latest trigger levels, alternative trigger levels may be set. These alternative trigger levels are complemented with a noise reduction program for the existing site. The consideration of alternative noise targets for existing sites has been an approach used by the NSW EPA since the 1980s.

VESSEL MITIGATION

There were a number of points raised around including more specific examples of vessel noise. All of these examples and more may be implemented by vessel operators to meet the proposed trigger noise level and more stringent future noise levels. Vessels that are noisy and unable to implement them will be restricted from berthing within port. The vessel mitigation examples in the Port Noise Policy does not limit vessels to only those mitigation options. The only requirement is that vessel trigger noise levels are met.

MITIGATION TRIGGERS

There were suggestions that the Port Noise Policy should identify noise level thresholds after which noise mitigation should be offered to affected residents for their homes.

Triggers for reviewing and identifying reasonable and feasible noise mitigation are already identified in the EPA's Noise Policy for Industry. Examples where this has been applied for Glebe Island and White Bay may be found in:

- Multi-User Facility environmental assessment and Response to Submissions
- Hanson Concrete Batching Plant environmental assessment and Response to Submissions
- White Bay Cruise Terminal Noise Mitigation Strategy

NOISE ABATEMENT PROGRAM

There were suggestions that the Port Authority should establish a noise abatement program.

Port Authority does not currently have a port-wide noise abatement program to manage existing noise levels from the port. This is because:

- Noise mitigation has been installed to eligible residences on a project basis for new operations in the port (specifically the White Bay Cruise Terminal Noise Mitigation Strategy). These residences are mostly older homes without existing noise treatment and predate planning controls.
- Other areas surrounding the port have noise levels that are similar to or less than the noise levels identified in the various plans and controls developed in response to SREP-26 such as Glebe Island and White Bay Masterplan, Urban Development Plan (UDP) for Ultimo-Pyrmont Precinct (1995 update), Lend Lease Master Plan 1997 (Jackson's Landing), council approvals and others.

6 POLICY VESSEL TRIGGER AND EXISTING GLEBE ISLAND 1 AND 2 BULK SHIPPING EPL (SALT SHIP)

FEEDBACK

There were a number of comments relating the apparent 10dBA difference between the 45dBA EPL and the 55dBA vessel trigger noise level.

55dBA VESSEL TRIGGER NOISE LEVEL AND THE EXISTING SALT SHIP 45dBA NIGHT TIME EPL

Direct comparison can not be made between the 45dBA night time EPL 'limit' and the proposed 55dBA trigger level for vessels. The 55dBA relates to actual noise levels from vessels, whereas the 45dBA 'limit' does not. Outlined below are the requirements for a limit to prevent noise above its stated value.

- A. The limit must be met. AND,
- B. Exceeding the limit results in actions to meet the limit, rather than just minimising noise.

These requirements can be related to the 45dBA EPL 'limit' and the 55dBA vessel trigger noise level.

The 45dBA bulk shipping EPL noise 'limit' applied to the salt ship does not meet these requirements and noise levels generally remain in the medium 50dBA to 55dBA range and up to 58dBA at night. This is because the vessel, when it exceeds the 'limit', ceases unloading to minimise noise in accordance with the licence but continues to emit noise that exceeds the noise 'limit'. This meets the requirements of the licence but does not result in compliance with the 'limit'.

In contrast the 55dBA trigger level for vessels in the PNP meets these requirements above for a noise limit. Vessels that exceed 55dBA will be removed from the berth if they are unable to reduce noise to ensure that noise levels from the berth are no higher than 55dBA.

With the 55dBA trigger level, vessels will be unloading with noise levels in the same medium range as the vessels not unloading under the 45dBA EPL 'limit'. So, while there is 10dBA difference in the numerical values, the outcome is similar noise levels in each instance.

FUTURE NOISE REDUCTION

The Glebe Island 1 and 2 bulk shipping EPL has also not resulted in quieter vessels that would also reduce noise impact at other times of the day. This is because the night time criterion of 45dBA has not been achievable for an unloading vessel. Noise from vessels unloading in the daytime have been up to 64dBA followed by night time noise levels of 58dBA while not unloading. In comparison the 55dBA night time trigger level in the Policy is also the upper noise goal for daytime under 24/7 operation. Noise levels in the day and evening are only acceptable as an interim solution while a vessel is working to reduce noise levels and has reduced unloading rates at night time. The 24/7 noise goal and night time vessel trigger level is to be reduced to 50dBA in the longer term following review.

Achievable noise goals under the Policy can result in 24/7 noise reduction and also provide improved respite by having more days without a vessel at the berth due to shorter unload times.

BASIS FOR THE 45dBA BULK SHIPPING NIGHT TIME EPL LIMIT

The basis behind the EPL 45dBA night time limit is not apparent. The following is noted with respect to this limit:

- It does not appear to consider the legislated SREP-26 (SEPP) and the subsequently developed and implemented planning controls to manage noise impacts at nearby residences.
- The context and purpose of SREP-26 is to recognise the port in planning controls as an industrial interface with 24/7 operation near urban areas.
- The port is existing infrastructure.
- The existing night time background noise level at Jackson's Landing is 47dBA (in the absence of the port operation, refer to the REF for the Multi-User Facility).
- The limit for this activity is inconsistent with some other approved port operations, such as at Glebe Island berths 7 and 8 and cruise operations in White Bay. Noting that a 45dBA limit is also applied to one operator at berths 7 and 8 but not others which operate at higher noise levels.
- Under the EPA's former Industrial Noise Policy which was in effect when the EPL was set, the noise criteria for an urban industrial interface is between 50dBA and 55dBA and a limit of 55dBA may be set without negotiation with the community.
- Under the EPA Industrial Noise Policy alternative noise targets may be set if existing sites can not meet new noise criteria. This is coupled with a noise reduction program. This approach is consistent with the current EPA NPfl and older approaches in the 1980s.
- Under the SREP-26, subsequent Urban Development Plan and Lend Lease Master Plan 1997, residences at Jackson's Landing, where the 45dBA night time limit applies, were required to be mitigated for external noise levels of up to 64dBA. Other residential locations surrounding the port were also required to be designed to mitigate noise.
- Port Authority has published predicted noise levels in the *Glebe Island and White Bay Masterplan* and ongoing monitoring reports its the website.

7 CUMULATIVE PORT NOISE LEVELS, AMENITY AND THE VESSEL TRIGGER NOISE LEVEL

FEEDBACK

Concerns were raised about the apparent high noise trigger level of 55dBA from vessels compared with noise trigger levels in the EPA's Noise Policy for Industry.

RESPONSE

The night VTNL of 55dBA does not relate directly to amenity and intrusiveness noise trigger levels under the NPfI. Its function is to instead set reasonable and feasible noise limits for a vessel that firstly eliminates the noisier vessels from the port and then becomes more stringent over time to provide further ongoing noise reduction. This is consistent with the EPA's long standing approach to reducing noise from existing infrastructure. And also similar to other Australian and international approaches to reduce noise from vehicles (Eg Australian Design Rules, see Policy Appendix D for other examples) where the target does not relate to amenity, but ensures that limits are set that can be reduced by achievable amounts over time.

Under the Policy the impact of vessels under the VTNL, cumulative noise across the port and how this relates to broader amenity and mitigation requirements is assessed when operations change during an environmental assessment. An example of this may be seen in the environmental assessment and response to submissions report prepared for the approved Multi-User Facility and Hanson Concrete Batching Plant. The Multi-User Facility approval considered the likely range of vessels to be visiting the facility, evaluated a conservative vessel that was higher than the median level of 55dBA for the vessel types that may use the berth, then considered the cumulative impact of vessels and other port operations at sensitive receivers. The Concrete Batching Plant response to submissions also considered individual and cumulative impact of both facilities.

The whole of port noise mapping developed under the Policy also provides information on broader noise levels and noise level exposure across the port, with historical context, that may be used to identify need for noise mitigation. The maps facilitate noise mitigation, at existing receivers and future receivers, to be reviewed in the context further planning controls.

8 NEW ZEALAND STANDARD 6809:1999 FOR PORT NOISE MANAGEMENT AND LAND USE PLANNING

FEEDBACK

While this is a current standard used in New Zealand for setting noise limits for port development and residential land use planning, there were comments that it was not a relevant consideration in the development of the Port Noise Policy since the Standard is 20 years old.

OVERVIEW

While not directly transferable to NSW noise policy, planning controls and environmental assessments, and not discounting these NSW approaches, the processes used in New Zealand (NZ) Standard NZS 6809 were considered and applied to Glebe Island and White Bay during the Policy review phase. NZS 6809 is used to manage noise from port development and to identify where noise sensitive receivers require noise mitigation as part of their design under their approval or under a noise abatement program for existing receivers near a port.

This is a current Standard specifically for assessing noise from NZ ports where noise is controlled by the port. This Standard (Section 6.4.2) was specifically developed for port noise with consideration to:

- a) Port location and proximity to current or potential residential areas
- b) Port activity types (current and future)
- c) Frequency of ship movement by type, time of day, duration of stay and expected berth location
- d) Variations in port activities within a year (e.g. due to seasonal factors)
- e) Appropriate meteorological effects
- f) Current and future port capacity and any proposed port operations
- g) Noise monitoring data
- h) The best practicable option for reduction of noise emissions.

To account for the changing nature of port noise, due to short term berth occupancy compared to the fixed nature of an industrial site, the Standard uses the L_{dn} descriptor. This is the 5 day consecutive energy average of the day and night time L_{Aeq} where a 10dBA penalty is applied to the night time L_{Aeq} level. The advantage of L_{dn} is that it provides a measure that responds to both the length of vessel visit and the changing noise levels.

The Standard sets an upper limit on internal noise levels within residences of 45dBA L_{dn} which is marginally less stringent than the 40dBA day and 35dBA L_{Aeq} night criteria that has typically been applied to internal areas within residences under the various plans related to Glebe Island and White Bay, DCPs and approvals developed following SREP-26.

For external noise levels NZS 6809 applies an inner and outer control boundary formed by 65dBA and 55dBA L_{dn} noise contours. The 65 L_{dn} level corresponds to 24/7 noise levels of 59 L_{Aeq} for 5 days of continuous noise and the 55 L_{dn} level to 49 L_{Aeq} over 5 days. For shorter term noise exposure less than 5 days, where the community has been given respite, the equivalent L_{Aeq} noise levels from vessels and port noise can be higher to produce the same L_{dn} .

Development of property for residential purposes is considered appropriate under the NZS 6809 between the 55 L_{dn} and 65 L_{dn} control lines, so long as they are adequately attenuated for port noise. Locations with noise levels above 65 L_{dn} should only be considered for new residences under exceptional circumstances and again where adequate noise insulation is given to buildings. The control lines are also used to assess the impact of port development or for noise abatement of current noise levels at existing receivers.

Applying the Standard to case studies at Glebe Island and White Bay appeared to correlate well with ongoing subjective community feedback on noise from the port.

COMPARISON TO GLEBE ISLAND AND WHITE BAY

At Glebe Island and White Bay, the 55 L_{dn} control boundary appeared to correlate well with community reaction for unmitigated residences around the port, as has the band formed between the 55 L_{dn} and 65 L_{dn} control lines for community with mitigated residences. Noise levels that push mitigated residences beyond 65 L_{dn} have resulted in complaints.

All historical measured noise levels for the port in the *Glebe Island and White Bay Masterplan* near residences fall within the upper and lower equivalent control bands when adjusted to L_{Aeq} and would be deemed acceptable with mitigation, other than at one location. All of these locations would require internal noise levels to be less than 45 L_{dn} under the Standard.

The one location with noise levels higher than the 65 L_{dn} upper control band measured 64dBA L_{Aeq} in Balmain. This noise level was also later measured at Jackson's Landing when frequented by the car

ships, upon which the mitigation for all buildings at Jackson's Landing was designed to mitigate. A noise level of 64dBA L_{Aeq} equates to 70L_{dn} which, according to the Standard, should only be considered under exceptional circumstances and with appropriate noise mitigation to provide internal noise levels of less than 45 L_{dn}.

Overall the development controls in NSW for WhiteBay and Glebe Island and the noise levels from the port following SREP-26 are consistent with the NZS 6809, noting that the approval of Jackson's Landing would have been regarded as exceptional circumstances considering the previous high noise levels from the car ships.

Current noise levels pre Covid-19 from 2017 to the start of 2020 are consistent with the *Glebe Island and White Bay Masterplan* including near the White Bay Cruise Terminal. Noise levels measured from the port in Balmain are now typically in the mid 50s and not above 58dBA L_{Aeq} unless there is a breach of limits at the cruise terminal or a vessel is undertaking unusual operations such as emergency repair.

CASE STUDY OF EXISTING SHIPS NEAR JACKSON'S LANDING

Noise levels at Jackson's Landing, such as measured from a cruise ship and a salt vessel in the last 12 months, both of which generated noise complaints, would have put noise levels above the upper control band of 65 L_{dn}. This occurred for the salt ship, which effectively complied with the EPL by not unloading at night. Both of these vessels featured noise levels of up to 64dBA on a continuous basis. The salt ship also produced significant sleep disturbance noise events from 5am upon re-commencing unloading and was berthed for 5 days.

In comparison, the worst case night time cumulative noise impact of 58dBA identified in the Multi-User Facility RtS, with two vessels unloading and 100% operation of the MUF and batching plant would occur for one night followed by respite with vacant berths and levels of 50dBA at night. This would place Jackson's Landing between the upper and lower control bands with dBA levels 7 L_{dn} less than the cruise ship and 5 L_{dn} less than the salt ship.

Furthermore, typical predicted noise levels with only one vessel unloading and sites operating at lower capacity would be quieter again.

9 COMMENTS RELATING TO DUAL NOISE LIMITS FOR LANDSIDE AND VESSELS

FEEDBACK

Concern that the use of both landside and vessel noise limits to improve the ability to manage noise, rather than a single number for the combined noise, would lead to increased noise impact.

RESPONSE

The port already has ongoing 24/7 landside operations currently and planned into the future. Both 24/7 landside and vessel operations are recognised in the legislation and planning controls.

Combining noise goals for landside operations and vessels has not been practical as:

- port noise issues relate primarily to vessel noise which needs to be isolated for measurement and management.
- most landside operations in the port are independent of vessels being present.

- restricting landside operations when a vessel is present would not result in a significant or at times measurable noise reduction even if the entire landside part of the port was to be shut down (as vessel noise levels dominate the environment).
- current landside noise goals when applied to vessels over the last 20 years have not reduced noise. They have been unachievable and high noise levels have remained as there has not been an incentive to reduce noise when goals are unachievable.

Dual noise limits, while having the appearance of increasing noise levels by increasing criteria values, instead consider actual port noise levels and provide an enforceable mechanism to reduce both components of port noise and provide community respite. Criteria values should not be confused with actual port noise levels.

10 FUTURE LOWER LIMITS

FEEDBACK

Comments that the proposed vessel trigger noise level would not reduce noise impact from vessels and that the 50dBA longer term goal should not be numerically defined.

RESPONSE

The vessel target noise level already restricts the noisiest vessels from the ability to visit the port to provide an immediate improved noise outcome.

Reducing noise levels further from a vessel is a significant commitment by the vessel operator and the staged approach provides certainty that the port and operator can meet the future noise reductions.

By comparison over the last 20 years, vessel noise levels have not reduced directly by virtue of their design and one of the newest bulk carriers to visit in the last 12 months (4 years old) was the noisiest measured of its type.

For the vessel operator and the port tenant defined future limits ensure that any vessel operator's commitment won't be quickly superseded by more stringent noise requirements. This for example lets the tenant secure more cost effective longer term contracts for a quieter vessel and provide the benefits of a quieter vessel in port during the first year of operation under the Policy.

11 COMMENTS ABOUT HOW NOISY 65 $L_{A_{MAX}}$ APPEARS TO BE

FEEDBACK

Clarification sought whether 65dBA $L_{A_{max}}$ was excessively noisy compared to averaged $L_{A_{eq}}$ trigger levels.

RESPONSE

A brief discussion on the relationship between $L_{A_{max}}$ and $L_{A_{eq}}$ levels and criteria is provided as a response.

The $L_{A_{max}}$ noise descriptor is sensitive to very short loud noise events. For example the noise event could be over in less than 0.5 seconds and could be caused by an object being struck.

For sleep disturbance it works in tandem with the $L_{A_{eq}}$ noise descriptor, which is an energy average. The $L_{A_{eq}}$ noise criteria is set at a lower value than $L_{A_{max}}$.

If there were ongoing L_{Amax} events, but at a level less than the criteria for L_{Amax} , the impact this has on the community is captured by the L_{Aeq} criteria. Ongoing L_{Amax} type noise levels increase the measured L_{Aeq} and if significant, would result in exceedance of the L_{Aeq} criteria, if not the L_{Amax} criteria too.

12 BERTH PROTOCOLS

FEEDBACK

Criticism that the protocols appear to relax the trigger levels set under the Port Noise Policy.

RESPONSE

Specific berth protocols and actions, while associated, are not part of the Policy. The Policy refers to and requires the development and application of berth specific actions and protocols. Please refer to Section F7, Appendix F.

The Vessel Noise Operating Protocol issued by Port Authority for review is considered to provide an approach which is measurable, enforceable and reasonable under the Policy.

The effectiveness of the Protocol will be reviewed against the Policy following implementation. The intention is this is reviewed, amended and improved as further data becomes available.

In response to some community comments regarding concerns for noise during the evening, amendment to the Protocol will include, changed the daytime exceedance threshold from 3dBA to 0dBA after 6pm. Previously actions such as attended measurements and management plans to reduce noise were not triggered until noise levels were more than 3dBA above the VTNL. This has the effect of accelerating the consequences for exceedances that occur during the evening period.

WBCT AND PORT NOISE POLICY VESSEL COMPLIANCE REGIMES

There were some comments that the initial 55dBA vessel trigger levels and protocol are less stringent than approaches used at the White Bay Cruise Terminal.

The Policy vessel trigger level of 55dBA is more stringent than the 58dBA White Bay Cruise Terminal Noise Mitigation Strategy's reference level for cruise ships. However, a difference is that the approach to achieve compliance under the Policy is more proactive to assist the bulk vessels to reduce noise, by requiring management plans to be prepared and actioned.

The Policy is also more stringent in that it also applies to the operator and tenant instead of just the vessel. This is to prevent a situation where a different noisy vessel is brought to port each time to avoid getting three corrective action notices. In this situation the three corrective action would be applied to the operator and tenant rather than the vessel.

The Policy requires the development of protocols for each berth with defined actions to be taken if a vessel exceeds the Vessel Target Noise Level.

The draft Vessel Noise Operating Protocol is an application of the Policy. The draft Protocol does differ from the WBCT actions in that vessels are not banned under this protocol. Instead they are required to be towed off berth at the vessel operator's cost each night and returned the following day if they wish to commence unloading. This has a significant cost impact and it is anticipated this cost impact will drive mitigation of the vessel or replacement of the vessel.

13 ARRIVAL AND DEPARTURE TIMES

FEEDBACK

Concern over 24/7 arrival and departures of vessels.

RESPONSE

Arrival and departure at night time is consistent with a port operating 24/7.

If appropriate, Port Authority may consider specific actions to manage noise for night time arrivals and departures, based on review of monitoring data from these arrival and departure periods.

14 CONSTRUCTION NOISE FROM NON-PORT RELATED PROJECTS

FEEDBACK

Suggestions the Policy should also include noise from construction projects.

RESPONSE

This is beyond the scope of the Policy as there already exists established EPA noise guidelines for the management of construction noise. These projects have been approved by DPIE Planning and have EPLs for construction that are regulated by the EPA

We note that under these guidelines, night construction works may only be undertaken where there is strong justification for these works. Strong justification does not typically include reducing project delivery time, unless this is desired by the affected community. The conditions of approval for these projects issued by DPIE planning for state significant infrastructure projects often allow 24/7 construction. These projects are licensed by the EPA and unless approved by the consent or the EPL, the contractor needs to apply for licence variations to undertake out of hours works

Night time noise criteria for construction projects are generally set at the background noise level plus 5dBA. Port Authority, when invited, has reviewed construction assessments and compared their measured background noise levels with Port Authority levels. This is to ensure that projects are considered against to the same datum and that the construction project's measured levels have not been affected by vessels in port which could result in less stringent criteria.

15 COMMENTS MAKING COMPARISON BETWEEN VESSELS AND AIRCRAFT

FEEDBACK

Suggestions, that like some airports with curfews, the port should also have a curfew. And that noise from aircraft was managed by curfews.

RESPONSE

A point to consider when making comparisons between, airports, ports, vessels and aircraft is that aircraft already have individual noise limits applied to obtain certification. This assists each airport in every jurisdiction to manage noise during 24/7 operation or under curfew. Vessels however do not have individual noise targets, which is why there is such a range in noise levels across different vessels. The Policy proposes to assign noise limits to vessels that eliminate the noisiest vessels and quieten them down over time. This cap placed on noisy vessel levels then reduces overall noise from

the port, in the same way as aircraft noise reduction has reduced airport noise. These examples are also outlined in the Policy.

Within Australia, residences affected by aircraft noise are noise treated as a requirement under planning controls. Airports in Australia operate 24/7 and some have curfews.

Sydney's Western Sydney Airport once developed will not have a curfew. Planning controls have required that all noise sensitive buildings near the airport and flight paths are noise treated to prepare for future operations.

Sydney's Mascot Airport has a flight curfew limiting some night flights but undertakes ground operations 24/7. Residences near the airport and flight paths have noise treatment.

16 EVENING NOISE LEVELS

FEEDBACK

Concern that evening noise trigger levels have been combined with daytime.

RESPONSE

The vessel noise goals of 55dBA are for 24/7 operation. This level is applied as a limit for night time. Noise levels would not be expected to change throughout the time period (as a vessel's operations are generally constant) and so the additional resolution of an evening period VTNL was not considered to provide any benefit. In response to community comments on the evening period we have changed the daytime exceedance threshold after 6pm from 3dBA to 0dBA

The 60dBA VTNL for daytime is included to facilitate temporary allowance for vessels that cannot meet the night time VTNL of 55dBA until management plans have been implemented. The unloading rates from a vessel, that can be accepted by onshore processing and storage, should not produce noise levels that exceed 55dBA.

In response to community comments the Protocol will be amended to change the daytime exceedance threshold from 3dBA to 0dBA after 6pm. Previously actions such as attended measurements and management plans to reduce noise were not triggered until noise levels were more than 3dBA above the VTNL.

For landside activities the proposed evening period criteria have been retained. Landside operations also typically continue without a vessel in port.

17 NOISE MODELLING AND MEASUREMENT

FEEDBACK

Robust technical discussion was received around measurement techniques and whether penalties are to be applied if vessels have noise characteristics that create higher annoyance.

COMMENTS AROUND TONALITY, LOW FREQUENCY AND OTHER FACTORS INCLUDING TIME WEIGHTINGS

The Policy is an application of the EPA's NPfl. As such modifying factors apply and are included in the Policy.

For further information on application of these factors in assessment of developments at the port refer to the environmental assessments for the Multi-User Facility and Hanson's Batching Plant.

Concerns were raised that alternative approaches are suggested for low frequency noise instead of those used by the EPA's Noise Policy for Industry (NPfI). The NPfI approach for vessels, as with diesel rail locomotive noise, is problematic. This is because low frequency consideration is triggered by the differences between low frequency noise and mid to high frequency noise rather than how much low frequency noise is present.

This can lead to penalties on quiet vessels with reasonable levels of low frequency noise. And no penalties on other vessels with enough low frequency noise to cause reasonable complaint. For example, a vessel with significant levels of both low frequency noise and mid to high frequency noise would not be recognised as causing a low frequency issue.

To resolve low frequency noise issues the Policy recommends further work to consider using both A-weighted and Z-weighted (greater emphasis on low frequency content) noise trigger levels for vessel noise, which would be similar to approaches used in EPLs for diesel rail locomotives. However, since the majority of noise measurements have been made using the NPfI or a similar approach in the superseded Industrial Noise Policy, there is little data about low frequency noise levels from vessels using the port. Preliminary work, based on limited data, suggests there is a low frequency noise level threshold that could be used as a trigger. For now, it is intended that penalties for low frequency are applied in accordance with the Noise Policy for Industry.

Comments were also received about perceived issues regarding standing waves influencing noise measurements. Under the EPA's NPfI, of which the Policy is an application, all environmental noise measurements are free field. Standing waves do not occur in free fields as they are caused by reflection. We expect that all measurements are taken with sufficient skill during any monitoring activities so that they are measured in the free field.

As an application of the NPfI, the Port Noise Policy uses the same time weightings for statistical and maximum level descriptors.

COMMENTS THAT A THEORETICAL 8 VESSELS WITHIN THE PORT WOULD INCREASE NOISE LEVELS BY NEARLY 10 DECIBELS

This is not physically possible as vessels are up to 200m long and cannot be co-located within the existing berths and current operations. Co-location would be required for noise levels near the port to add to the maximum mathematical level for 8 sources.

This number of vessels at berth at once has also never happened in the ports known history and is not representative.

Noise levels based on the occupation of existing berths at capacity are provided in the Policy noise maps (Appendix I).

SUGGESTIONS TO USE SOUND POWER LEVEL AND ALTERNATIVES TO POINT SOURCES

While technically beneficial to use this approach from some perspectives, it does not work well in practice:

- Measuring the source levels and directivities of multiple individual sources, within the one vessel, and each with frequency dependent directivity distributed around the vessel which is in the order of 200m long and 80m high, is not practical and this includes the use of current monitoring array technology.

- The most relevant parameter is much simpler, worst case sound pressure noise levels at receivers. Sound pressure at this location also directly relates to noise impact and potential mitigation following environmental analysis.
- Cumulative noise contours based on simplified sound power sources based on worst case pressure measurements at a receiver are more representative of noise impacts where vessel position and orientation to the berth are variable.
- Worst case sound pressure as a point source is also more useful for noise mitigation design and may be moved along the berth length to account for the different receivers picked up by different vessel positions.

We agree with the comments that decisions must be made between point and line sources in modelling. We also note many ships have sources which act as area sources. However, a key consideration is scale relative to the distances of interest in these decisions.

All line and area sources on vessels are of finite area and size. As such they have the same geometric dispersion losses as point sources at the typical distances between the sources and noise sensitive receiver distances. This can perhaps be understood by considering that all line and area sources can be constructed from an infinite representation of point sources, each having inherent geometric dispersion losses of 6dB per doubling of distance, and noting that the path length differences between each source are no longer significant at the distances of interest. Doubling of 3dBA can only occur when a line source is suitably infinite in apparent length that there are significant differences in path lengths between noise radiated opposite the receiver and noise from the line at greater visible distances.

CRITICISM THAT THE MEASUREMENT PROCEDURE IS ADHOC AND NOT REFERENCED TO A STANDARD

The measurement procedure needs to work within the specific environment of the port for the noise sources being measured in the application of the Policy.

Reference has also not been made to other Australian measurement standards as experience has shown that this does not lead to reliable results. Experience within TfNSW has often been that requiring measurements to meet Australian Standards has led to errors by following the standard without critical thinking. This for example leads to:

- Measure standing waves, strong reflections, influence by diffracted sound fields and other issues as the Standard does not have a suitable definition of distances from objects for the general case for free field measurement.
- Measurements with inadequate signal noise ratios.
- Not accounting for source directivity correctly in vertical and horizontal planes.

Because of these issues it is considered more effective to require experienced noise consultants to be engaged to act as competent professionals and simply measure the noise source in the free field (above a ground plane where relevant). That way any decisions about appropriately using standards need to be justified by the consultant.

Port Authority was involved with the development of the NEPTUNEs measurement procedure. It is noted this procedure is useful for providing a specific noise label' for an individual vessel as a one-off. It is not suited to ongoing measurement of every vessel within a port at any time.

The NEPTUNEs procedure has the same practical limitations with respect to sound power as already discussed and general noise measurement at this port. While assisting on the NEPTUNEs committee with its procedure development, we have used alternative measurement approaches more suited to the implementation of the Policy.

GLOSSARY

| T E R M | D E S C R I P T I O N |
|---|--|
| dBA | <p>The term dBA is an abbreviation which indicates the noise levels have been expressed in decibels (dB) using an A-weighting filter which approximates how the human ear perceives the relative loudness of noise sources at low frequency (chugging of engines) and medium (fans and engine exhaust flow) and at higher frequencies at moderate noise levels commonly encountered in environmental noise.</p> <p>While dBA is strictly only valid for moderate loudness levels, it is commonly used across the range of noise levels commonly encountered in the environment and in industry.</p> |
| dBC | <p>The term dBC is an abbreviation which indicates the noise levels have been expressed in decibels (dB) using a C-weighting filter which approximates how the human ear perceives the loudness of noise sources at low frequency (chugging of engines), medium (fans and engine exhaust flow) and at higher frequencies at louder noise levels than the A-weighting filter is strictly valid for.</p> <p>A key difference between dBC and dBA is that it is more sensitive to low frequency noise and reflects that humans are more sensitive to low frequency noise at higher loudness levels than would be indicated with a dBA noise reading.</p> <p>Since it is more sensitive to low frequency noise, it is used by the NSW EPA as a check for how much low frequency noise is present by comparing simultaneous dBC and dBA levels during measurement. A much higher dBC compared to a dBA reading of the same noise shows there is significant low frequency present.</p> |
| dBZ | <p>The term dBZ refers to noise measurements undertaken with a Z-weighted filter. A Z-weighted filter is essentially unweighted and does not reflect human perception. It has some weightings applied to reflect limitations in practical acoustic measurement equipment in the frequency range of human sensation and is an agreed practical alternative to unweighted linear noise measurement. Unweighted frequency ranges would otherwise require measurement from DC (which is costly to implement) to infinite frequency. Older equipment with linear weighting settings did not have a defined measurement range under a standard. This led to variability between manufacturers and equipment models.</p> |
| Environment Protection Licence (EPL) | <p>The NSW Environment Protection Authority may issue an EPL relating to activities that are outlined in the NSW Protection of the Environment Operations Act. The EPL may provide noise limits for assessment and detail operational actions that must undertaken when the licenced activity occurs.</p> |
| L _{Aeq} , L _{Amax} , L _{A90} , L _{A50} and L _{A10} | <p>In general, noise levels in any location vary continuously and any sound level meter will show this changing decibel level on the display. To make sense of the range in noise levels that may occur within a standard time period, various statistics are used in acoustics.</p> <p>The simplest are the L_{A90}, L_{A50} and L_{A10} descriptors for A-weighted levels. The number in each of these descriptors indicates the percentage of time that noise levels exceed the indicated value. For example an L_{A90} is the noise level that was exceeded 90% of the time, and L_{A50} is the noise level that was exceeded 50% of the time (also the median) and L_{A10} is the noise level that was exceeded 10% of the time.</p> <p>L_{Amax} is the maximum root mean square noise level over a 125ms time constant (fast) within the measurement period. It differs from the peak noise level in that it is more representative of how humans perceive a peak noise level than the</p> |

GLOSSARY

| T E R M | D E S C R I P T I O N |
|----------|---|
| | <p>peak decibel level that can be measured. Peak noise levels (L_{peak}) are instead used to measure noise that has the potential to cause physical damage to hearing or building structures from explosions or large impacts.</p> <p>The L_{Aeq} is more complex to derive from changing noise levels and is an averaging process. The averaging process results in a single equivalent number for the measurement period that has the same total sound energy as the changing noise levels over the time period.</p> <p>Similar descriptors are used for other weighting filters such as C-weighting. Descriptors instead use a C subscript, for example L_{Ceq}.</p> |
| L_{dn} | <p>The L_{dn} day night descriptor uses weighted L_{Aeq} to provide a single numerical number to describe noise levels over the day and night. This is achieved by converting the 15 hour day L_{Aeq} and 9 hour night L_{Aeq} into a 24 hour level with a 10dBA penalty added to the night time L_{Aeq} noise level.</p> <p>Under New Zealand Standard 6809 the L_{Aeq} average for L_{dn} is taken over 24 hours for 5 days. This results in a noise descriptor and criteria that is sensitive to the time that a vessel makes noise, the level of noise made by the vessel and the number of days the vessel unloads for.</p> |