

Appendix F

Vessel Noise Guideline

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F. 1 Overview

This Vessel Noise Guideline identifies how to set achievable noise targets for vessels in accordance with reasonable and feasible approaches in the EPA's Noise Policy for Industry. Noise targets should not be unachievable as unachievable noise targets remove the incentive for an individual vessel to comply with them.

The vessel noise targets developed under this guideline are called Vessel Trigger Noise Levels. Exceedence of these trigger levels results in escalating actions being taken to reduce noise. These actions are taken by the Port Authority with the vessel operator and port user.

The Vessel Trigger Noise Levels and statistics used in their derivation are used to inform noise levels for used in environmental assessments. Ongoing monitoring will be used to inform periodic review of the trigger levels.

This Vessel Noise Guideline will assist the port in delivering the following benefits under the Port Noise Policy:

- improved and consistent management of noise from the port
- certainty for residents, industry, regulators, and approval authorities about anticipated and acceptable levels of noise collectively from vessel and landside port activities
- establishment of a long-term commitment to reduce vessel noise and community exposure
- enhanced communication about typical port noise emissions to the community and stakeholder through the production of noise maps.

The key outputs from this Guideline are day and night time noise triggers for vessels at a berth and noise maps that identify the maximum likely vessel noise levels and night time exposure from the port to surrounding areas.

This document is intended to be used and referenced when:

- undertaking a vessel noise assessment for a new activity or redevelopment at a berth; or
- during periodic reviews of Vessel Trigger Noise Levels
- production of port noise maps

This document is intended to be used and referenced by:

- Port Authority
- port tenants and developers
- regulators and approval authorities

This guideline aims to achieve the following:

- provide the mechanism to establish appropriate day and night levels for each berth under the Port Noise Policy.
- publication of clear and accessible information relating to noise exposure and noise levels from vessels visiting the port
- long term noise reduction of vessel noise at berth while at port.

F. 2 Vessel noise

This section introduces the concept of noise exposure which is a measure of both noise level and the number of days the vessel is present. This approach is used to assist the evaluation of vessel noise which is intermittent and occurring at different berths at different times throughout the year.

For example, if a vessel operates at a constant noise level, the exposure level will continue to increase for every day the vessel is in the port. Or if two vessels are considered, one having slightly lower noise levels than the other, both may have the same exposure level if the vessel with slightly lower levels is there for twice as long. This accounts for the slightly noisier vessel leaving port earlier and providing the community with an equal period of time without vessel noise.

The Port Noise Policy and this guideline consider both noise exposure and noise levels from vessels.

The benefits that may be realised by considering both noise level and noise exposure are:

- more ship free nights to reduce community impact
- reduction in night time noise level by accommodating higher cargo handling rates in the day in the short term for vessels that are unable to initially meet night time noise trigger levels. Increased unloading during the day will also reduce night time noise exposure for these vessels by reducing the vessel's length of stay.
- an upper limit on vessel noise so over time the noisiest 50% of vessels no longer visit the port
- progressive reduction of the upper limit to further reduce noise

2.1 Noise sources included as vessel noise

Vessel noise is defined as all noise produced by mechanical plant that is part of the vessel. This includes as a minimum:

- Engines or generators
- Fans and HVAC
- On-board self unloading/loading systems

Vessel Trigger Noise Levels are defined at the level that is representative of the highest noise level experienced at any sensitive receiver from the berth (referred to for simplicity throughout this document as "nearest sensitive receiver").

2.2 Noise exposure and noise levels

Noise levels may be related directly to the perceived loudness of vessels in a port, however a noise level does not provide information about how long the noise is present for. The noise level and duration of exposure is important when understanding the potential noise impact from a port as noise from vessels at berth is periodic and does not occur on a continual basis. Noise only occurs when vessels are berthed and at other times noise is at the otherwise ambient level from other sources of noise which may include distant traffic and natural sounds.

2.2.1 Noise exposure

Noise exposure takes into account both the noise level and the duration of the exposure over the night time period. For example, if a receiver location was exposed to a constant noise level, the noise exposure would increase relative to the length of time the noise was present. The exposure level and noise level are the same when the noise level is present all of the time.

The duration of exposure depends on the length of stay by a vessel and the occupancy rate of the berth. Exposure may be reduced by reducing the night time noise level and/or the duration of vessel visits.

Factors that influence the duration of exposure to noise from the port include the typical length of stay for bulk carrier vessels. This typically ranges from 2 days to 6 days while loading or discharging cargo. The

length of stay for bulk carrier vessels relates to the average unloading/load rate over a 24 hour period and the amount of cargo to be transferred. Factors that influence unloading/load rates over a 24 hour period are:

- vessel and shore capacity rates to handle cargo
- time taken to set up and shut down unloading/loading activities
- time based limits placed on the vessel which may include operational restrictions

This policy evaluates exposure in the night time as the purpose of this policy is to reduce night time noise exposure which is when there is greatest potential for community impact and when there are more stringent noise restrictions in place. It is expected that in most instances noise levels will be similar in the day for vessels that meet the Vessel Target Noise Level, but on occasions vessel noise levels may be higher in the day. This may occur in the short term to facilitate increased unloading speeds in the day if a vessel has to reduce unloading speeds at night while it develops a mitigation solution to meet the night time trigger level. Increased unloading speeds in the day act to minimise the length of stay of the noisier vessel which reduces the communities exposure to night time noise.

Because of the mechanism that allows short term increased noise levels in the day, exposure levels in the day cannot be accurately predicted since the number of vessels that may require higher unloading rates in the day is unknown. Since they can not be accurately predicted, day exposure noise mapping is not currently undertaken under this guideline.

The use of noise exposure allows noise maps to be produced that show the overall relative noise level and duration of multiple vessel visits at different locations near the port over an extended time period. It is important to note that these maps show relative noise exposure over the year or season rather than noise levels. They may be used to compare different locations around the port and also the relative activity of the port over different years in the same location. As an example of how noise exposure levels differ from noise levels, the noise levels may be similar in two different locations but have different exposure levels if the berths are occupied for a significantly different number of days. The noise exposure maps, while not showing noise levels, each have accompanying tables which show the expected noise levels near each berth when a vessel is present and the number of days when vessels are present.

2.3 Noise from vessels at berth

There are two main sources of mechanical plant noise emanating from a vessel at berth. These are:

- noise from on-board generators providing power for critical on-board systems and also to self-unloading equipment (referred to as baseload noise); and
- noise from self-unloading systems while in operation (referred to as self-unloading noise).

Baseload noise will always be present as on-board generators are required to provide electricity to critical on-board systems.

Where baseload and self-unloading systems are operating together, this increases noise exposure by increasing noise levels.

Noise levels associated with vessel arrival at and departure from berth (including preparation for) or vessel transit are excluded from noise assessments. This is because noise levels at this time may not be representative of noise emission from the vessel throughout the stay and may include noise from on-board engines, tug boats and essential processes relating to the safe departure and arrival of a vessel.

2.4 Time periods

Noise levels are assessed over the duration of a vessel visit and focus on the more sensitive night time period. It is recognised that unloading/loading restrictions in the night time period can increase the duration of the vessel visit which may also increase the overall exposure in the night time period.

The time period for the daytime is 7am to 10pm and the night time period is defined as 10pm to 7am. These time periods are broadly consistent with:

- NSW Government policies relating to transportation and industrial noise sources
- NSW legislation for state infrastructure (State Environmental Planning Policy (Infrastructure) 2007)
- Australian Standards used to set design levels or mitigate noise levels within commercial and residential buildings.

For noise mapping annual periods are over a calendar year and with data averaged over a two year period. The seasons are defined over three months as:

- Summer, December to February
- Winter, June to August

Equivalent continuous noise level (L_{eq}) noise levels are evaluated against noise targets over 15 hours during the daytime period and for the worst case 1 hour level during the night time period. The noise target L_{Aeq} noise levels are used for future predictions of noise exposure.

2.5 Noise descriptors

Noise levels are assessed using the equivalent continuous noise level (L_{eq}). The main descriptor to be used is the A-weighted level (L_{Aeq}) which is most suitable for typical steady noise emission from a vessel's baseload and self-unloading systems.

Correction factors for annoying characteristics, excluding low frequency noise, may be applied in accordance with the EPA's Noise Policy for Industry. Note that annoying factors must be present at the receiver location before they can be applied and included in the overall A-weighted noise level.

Standard approaches for low frequency noise in the Noise Policy for Industry evaluate differences between A and C weighted levels. However, this is not suitable when considering mitigation of vessel engines and fans that inherently have low frequency noise. For example, many engines may trigger a correction factor for annoying characteristics even when the low frequency component is too quiet to cause annoyance. Furthermore, the difference between A and C weighted noise levels from vessels may vary significantly in different directions. Using the Noise Policy for Industry this would result in penalties being triggered in some directions and not others when the low frequency noise impact on community is relatively constant in all directions.

An approach to manage low frequency noise will be developed following the implementation of this policy. The implementation of this policy will result in a database of vessel noise levels which will provide a statistical understanding of low frequency noise.

These new approaches for low frequency noise may parallel those used in NSW for diesel locomotives where both A-weighted and low frequency noise levels are separately evaluated.

The Vessel Target Noise Levels will be updated once approaches for low frequency noise have been established.

Sleep disturbance events are assessed using the L_{Amax} noise descriptor in accordance with the Noise Policy for Industry against the one-hour L_{A90} noise level at the time of the disturbance. In most instances the vessel baseload or self-unloading noise from the vessel will form the steady background noise level at the time of the event.

F. 3 Management of vessel noise

Noise levels from vessels will be managed in accordance with the Port Authority's Vessel Noise Operating Protocols for each berth. These outline responsibilities and actions to be undertaken and enforced where a vessel exceeds the Vessel Trigger Noise Level.

3.1 Noise mitigation

The underlying focus is to minimise night time noise exposure and to manage noise from vessels. In the first instance this will be achieved by reducing noise levels from vessels. Where the Vessel Trigger Noise Levels are exceeded then the Vessel Noise Operating Protocols will be enforced.

Should new developments require considerations of other forms of noise mitigation, Port Authority in conjunction with EPA and DPI&E will review the anticipated noise exposure at residences and other sensitive receivers and consider other forms of noise mitigation as outlined in the EPA's Noise Policy for Industry.

3.2 Noise maps

Noise maps shall be produced to communicate the overall noise emission from vessels visiting the port. The port noise maps shall utilise the Vessel Trigger Noise Level for each berth, which is the maximum permissible noise level, for future noise maps which is considered to be conservative. Where actual noise levels are known for current and historical levels these may be used instead of Vessel Trigger Noise Levels to indicate actual or historical noise levels.

Noise maps may be used to inform:

- community
- residential and commercial developers in the vicinity of the port
- planning processes
- regulators and approval authorities
- triggers for noise mitigation.

F. 4 Setting vessel trigger noise levels

Noise trigger levels are to be set in consultation with the EPA and DPI&E and based on the levels that can feasibly and reasonably be achieved by vessels visiting the port. The vessel noise levels may be reviewed and set for berths under the following situations:

- new use of a berth
- as at the commencement of this noise policy to set a level for the ongoing existing use of a berth
- periodic review of vessel trigger noise levels.

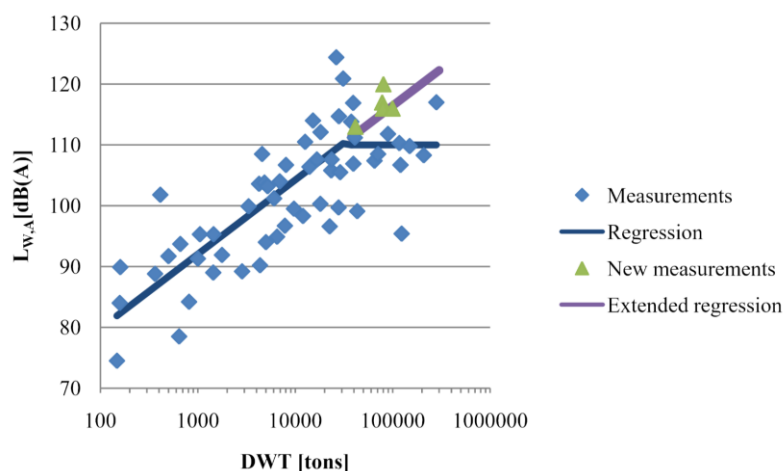
The vessel trigger noise levels and mitigation measures developed under this guideline are consistent with the process for setting alternative noise targets as defined in the EPA's Noise Policy for Industry. The Noise Policy for Industry identifies how to set alternative reasonable and feasible noise targets where standard noise target levels within the Noise Policy for Industry cannot feasibly and reasonably be met.¹ It is also consistent with approaches taken to set individual noise targets for other vehicle types.

The specific noise levels set for an individual vessel at a berth are known as the Vessel Trigger Noise Level. The Vessel Trigger Noise Level includes all relevant noise descriptors required to measure noise at an individual berth. The Vessel Trigger Noise Level must always reflect reasonably achievable levels for vessels available to service Australia and specifically the tenants/operators of Glebe Island and White Bay. However, it is envisaged that some vessels will require feasible and reasonable noise amelioration to achieve the Vessel Trigger Noise Level without operational restrictions being applied. This approach seeks to strike a balance between legitimate port activities and the reasonable expectations of the surrounding community. Noise targets should generally not be unachievable as unachievable standards removes the incentive for an individual vessel to comply. When setting the Vessel Trigger Noise Level it is permissible to take into account actions by frequently visiting ships to implement noise mitigation measures on board. Over time the L_{Aeq} components of the Vessel Trigger Noise Level may be reduced if technically feasible and reasonable to do so. The L_{Amax} noise descriptors will remain constant unless changes are made to the assessment of sleep disturbance events by the EPA.

4.1 Methodology

The methodology applied to setting Vessel Trigger Noise Level recognises the variability in noise levels between vessels of different types and also between vessels of the same weight (**Error! Reference source not found.**). The methodology seeks to minimise noise from vessels by setting the Vessel Trigger Noise at a level that would limit the ability of the noisiest vessels within the range from utilising each berth.

Figure 1: Example relationship between vessel Dead Weight Tonnage and sound power level



¹ Sections 2 and 6 of the Noise Policy for Industry

Source: Witte, R, "Container Terminals and Noise", Internoise 2008

F. 5 Measurement of vessel noise levels

5.1 General

Individual noise measurements should be undertaken for each berth and vessel to establish a baseline and enable statistical analysis of noise emission for vessels while at berth. Noise measurements shall be undertaken at locations with clear line of sight to the vessel as follows:

- at an orientation towards the worst affected noise sensitive receiver at a nominal distance of 160m from the vessel;
- at the worst affected noise sensitive receiver; and
- perpendicular to the vessel at a nominal distance of 160m.

The measurement distance from the vessel may be varied from the distances nominated above (and corrected to 160m) where the proposed measurement point would be significantly affected by extraneous noise, not be representative of the vessel or otherwise impractical.

When selecting a measurement location consideration must be given to the directivity of the vessel noise sources in the vertical plane. When close to a vessel it is common for the large elevated major noise sources, such as the stack and fans, to have high directivity at an angle that would pass over a closer ground level measurement location. Furthermore, in addition to directivity in the horizontal plane, a measurement distance of around 160m is preferable due to the large size of vessels. Any measurements too close to a vessel may be dominated by the nearest noise source and not sufficiently measure other on-board sources.

A number of noise measurements may need to be taken from the same location under different operating scenarios. For example the first set of measurements may include the vessel running its on-board generators (baseload noise) and a second set of measurements may include the vessel running its on-board self-unloading systems (self-unloading noise).

All noise measurements shall be adjusted to estimate the vessel sound power level noise emission assuming spherical geometric noise propagation with any relevant corrections for directivity at the measurement locations. Any correction made for atmospheric conditions and air absorption included in the sound power level must be justified and the value of the correction given in parenthesis next to the sound power level.

Noise measurements should be guided by the requirements of *Australian Standard 1055 Acoustics - Description and measurement of environmental noise (2018)*. The noise measurement procedure may be updated from time to time to also include updated measurement practices such as NEPTUNE's *Noise Measurement Protocol Moored Ships (2017)*.

Noise measurements should be completed in broadband and one-third octave band noise levels to obtain overall noise levels and reference spectra.

The noise level data set used to identify statistical parameters is maintained and updated with new vessels and the existing vessels reviewed to ensure that the dataset is representative of current port operations. These will be used to evaluate updates to Vessel Trigger Noise Levels.

5.2 Steady state noise levels, L_{Aeq} and L_{Ceq}

The analysis should identify the median, upper 10th percentile and the median spread of noise emission from different vessels visiting each berth. The median spread of noise emission is defined as the difference between the median and upper 10th percentile values.

Percentile values shall be calculated using an interpolation methodology that is inclusive of the range between 0 and 100 and where the percentile value is not necessarily a member of the sample set. For example the MS Excel 2016 function, PERCENTILE.INC, is suitable to use in the analysis.

The steady state noise levels should only include noise baseload and self-unloading systems as defined in this document unless there are any other significant items that reflect typical operation while unloading.

5.2.1 Low frequency noise

Noise measurements completed at the reference location near the port should also capture low frequency noise below 160Hz as follows:

- C-weighted noise levels
- linear Z-weighted one-third octave band noise levels between 10Hz and 160Hz.

5.2.2 Use of descriptors to estimate L_{Aeq} contribution from a vessel

The ambient noise level around the port makes direct measurement and assessment of average noise metrics such as L_{eq} levels problematic. As noise levels from vessels are relatively constant, statistical metrics such as L_{90} or L_{min} should be used as a measure of steady noise emission in accordance with the Noise Policy for Industry. Any adjustments identified by measurement to correct source noise emission from the selected parameter to L_{eq} must be reported and measured in an appropriate location that is also unaffected by extraneous ambient noise.

5.3 Sleep disturbance

Event types that have the potential to cause sleep disturbance (short loud events) should be measured. The range in measured L_{Amax} levels and median L_{Amax} level should be documented for each event type.

Examples of night time operations for vessels resulting in L_{Amax} measurements include the opening and closing of cargo hatches.

F. 6 Determining the vessel trigger noise level

6.1 New use of a berth

A new use, intensified use of a berth or a new berth may present a change to the current noise environment near the berth. When this occurs the new use will likely trigger a planning approval that requires consideration for noise impacts as part of an environmental assessment. Upon consideration of a new or intensified use, the potential noise impact should be evaluated which may lead to a Vessel Trigger Noise Level to be identified.

6.1.1 Steps to identify the new Vessel Trigger Noise Level

1. Identify the vessel type that will be servicing the new use of the berth. Consideration should be given to the type of unloading activity and discharge rates. Where available noise data is limited a similar vessel type may be used if it may be considered to be appropriately representative adopting a conservative approach.
2. Review and document all available measured noise levels for vessels of the type identified in 1 above.
3. Identify noise levels for current and historical vessel noise levels at the berth.
4. Identify the median and upper 10th percentile noise levels for the vessels above using the statistical methodology in Section F. 5 while unloading at a rate which matches onshore processing capacity. This should include all relevant steady state noise parameters and sleep disturbance events.
5. Set the median levels in 4 above as the night time initial Vessel Trigger Noise Level. Where available measured noise levels are not plentiful, a conservative approach should be adopted to identify the median and 90th percentile noise levels.
6. Add 5dBA to the steady state noise parameters and set this as the initial daytime Vessel Target Noise Level. This should not be a goal, but to facilitate a vessel in the short term that can not meet the night time VTNL. The 24/7 goal for a vessel unloading should be the median noise level from 4 above.
7. Document the reference spectra for the Vessel Trigger Noise Level.

The daytime Vessel Noise Trigger Level should be set at a level that facilitates maximum unloading rates for vessels that in the short term cannot meet the night time VTNL and may be subject to reduced or cessation of unloading restrictions. Permitting a vessel to discharge cargo at the maximum operational capacity will assist in reducing night time noise exposure by reducing the vessel's overall length of stay.

6.1.2 Including vessel noise in environmental assessments for new or intensified berth use

1. Review current noise maps and future noise map projections (10 years into future) to provide context.
2. Include environmental assessment that considers noise levels from the initial Vessel Trigger Noise Level and also consider potential impacts from a 90th percentile vessel.
3. Consider the cumulative impact for vessel(s) at adjacent berth(s). Include analysis of the likelihood of cumulative occurrence and the potential duration.
4. Prepare updated noise maps.
5. Evaluate noise impacts and potential noise mitigation measures.
6. Revise noise maps to reflect assessed mitigation measures.

6.1.3 Post completion of the environmental assessment

1. Implement a Vessel Noise Operating Protocol for the berth which sets the Vessel Trigger Noise Level and actions to be taken where exceedances are detected.

2. Ensure that the Vessel Noise Operating Protocol for the berth is capable of being enforced.
3. Review data on vessel noise and Vessel Noise Operating Protocol periodically.
4. Review the Vessel Noise Operating Protocol and Vessel Trigger Noise Level once every three years and update where appropriate in accordance with this Vessel Noise Guideline and in consultation with the tenants.

6.2 Ongoing existing use of a berth

A Vessel Trigger Noise Level may be applied to berths that have an ongoing existing use. Benefits in applying a Vessel Trigger Noise Level may include:

- simplifying existing noise limits for different vessels using the same berth
- consistency in noise management from vessels at all berths across the port
- improved clarity to community and other external stakeholders in how noise from vessels is managed.

6.2.1 Steps to identify an ongoing use Vessel Trigger Noise Level

The steps to identify a Vessel Trigger Noise Level for an ongoing existing use are:

1. Review all current vessels utilising the berth and all applicable noise limits at the berth.
2. Measure and/or review all current noise levels from vessels in accordance with Section 5.2.
3. Review current operational aspects for different vessels such as:
 - a. Unloading/loading systems
 - b. Vessel base generators
 - c. Time periods of operation
4. Identify the noise exposure by each vessel while berthed.
5. Set Vessel Trigger Noise Level in accordance with the methodology described in Section 6.1.1.

When applying the methodology the following additional considerations should be taken into account:

- a. Existing users may already be subject to noise level limits in approvals and some users may not be subject to any noise limits.
 - b. There may be limited data for some users, particularly where noise limits have not been previously set. This may bias the dataset used to identify the Vessel Trigger Noise Level.
 - c. A vessel noise operating protocol was not an original requirement when commercial agreements were set between the port and cargo owners or the cargo owners and vessels.
6. Implement a vessel noise operating protocol.
 7. Document the reference spectra and update the noise maps.
 8. Reviews of the vessel noise operating protocol and Vessel Trigger Noise Level and update where appropriate.

6.3 Periodic review of vessel noise level triggers

Under NSW Noise Policy for Industry, alternative reasonable and feasible noise triggers for vessels may be set where:

- standard noise trigger levels cannot reasonably be met, and
- alternative noise triggers are combined with a noise reduction program.

Noise reduction is initially achieved by restricting visitation by vessels that are above the Vessel Trigger Noise Level.

The goal for the port is best practice management of shore based noise and the progressive reduction of noise emission from vessels at berth. The vessel noise operating protocols and the Vessel Trigger Noise Level for each berth will be reviewed on a periodic basis (at least once every three years).

This review will include consideration of vessel noise reduction options, as outlined in Section 8.1.1 and 8.3.1 of the Port Noise Policy, and whether these are considered reasonable and feasible as defined in the EPA's Noise Policy for Industry. Input into this review will be sought from vessel operators and tenants.

After consultation with community, tenants and vessel operators, Port Authority will review the vessel noise operating protocols and consider reducing each Vessel Trigger Noise Level utilising the principles outlined in this document, however in any case not reducing the Vessel Trigger Noise Level by more than 2dBA during each review period. This process will be undertaken in consultation with EPA.

The ultimate noise trigger following multiple 2dBA (maximum incremental) reductions is 50dBA which is the anticipated minimum noise level that could reasonably be achieved by vessels at this point in time. Any vessel noise reduction beyond 50dBA is not considered feasible given existing technology and would be expected not have measurable benefit given the existing background noise levels in the community and other sources of ambient noise.

F. 7 Vessel noise operating protocols

A vessel noise operating protocol must be developed for each berth that contains a set of provisions that are reasonable and balance the interests of the vessel operator, the tenants and the surrounding community. The requirements must also be reasonably easy to administer and capable of enforcement by Port Authority.

Noise from a vessel at a berth is to be managed by the protocol so that noise can reasonably be expected to not exceed the Vessel Trigger Noise Level on a consistent basis, without imposing unreasonable penalties on vessel operators or tenants.

Where an individual vessel cannot meet the Vessel Trigger Noise Level, it will be required to carry out noise mitigation on the vessel or face operational restrictions such as restricted discharge rates, limits on night time operations, night time relocation and ultimately exclusion from the use of the berth.

The tenant will be required to also actively manage the vessels servicing its tenancy. Multiple and sequential breaches of the Vessel Trigger Noise Level will result in additional consequences under the vessel noise operating protocol.

Protocols shall up updated to reflect the revised Vessel Trigger Noise Level as outlined in Section 6.3.

7.1 Community

Port Authority will provide a responsive community information and complaint handling system to respond to queries and noise complaints received from local residents and other sensitive receivers. When reviewing a noise complaint about a vessel, Port Authority will:

- if sufficient information is provided, establish the location of the resident relative to port operations
- identify which vessel(s) was berthed and operations were occurring at the time of the complaint
- review the vessel noise levels
- ensure that any noise exceedances are dealt with in accordance with the appropriate Vessel Noise Operating Protocol
- inform the complainant of the result of the review.

The community should be consulted on an ongoing basis, and during future revisions of the vessel noise operating protocols.

F. 8 Producing noise maps

8.1 General

Noise maps shall be periodically produced and updated following changes to current or future operations within the port and revision of Vessel Trigger Noise Levels.

The maps shall include those identified in Section 3.2 and when produced they should be updated in Appendix I of this Noise Policy.

The maps should include all relevant L_{eq} and L_{Amax} noise descriptors.

Noise maps should be updated every 5 years or following the approval of new or upgraded operations that are subject to an environmental approval.

8.2 Noise map types

The maps shall be produced to show:

- annual exposure levels for current year
- annual projected exposure levels for 10 years into future
- seasonal exposure levels for current year
- seasonal exposure levels for 10 years into future
- representative day and night worst case noise levels for current year being simultaneous berth utilisation by all known regular port users
- representative day and night worst case noise levels for 10 years into future. Berth utilisation will have simultaneous activities being undertaken by all known future regular port users where berth allocation permits
- worst case day and night noise levels for a port with continuous 100% berth utilisation including currently unused berths.

8.2.1 Noise exposure maps

The current and predicted night time noise exposure maps are produced using the Vessel Trigger Noise Level. The Vessel Trigger Noise Level is conservative and the most appropriate when making predictions where exact future vessel noise levels are unknown. It is conservative as the trigger level is the upper noise limit.

The noise exposure level is the decibel noise level with a decibel time adjustment. The time adjustment reflects the number of nights when a vessel was present for at least one hour out of the number of nights within the map's annual or seasonal time period. The one hour presence reflects the use of the one hour night time L_{eq} noise descriptor.

Historical noise level and noise exposure maps may use actual vessel noise levels where they are known. The noise level used to produce the exposure map must be documented and normalised to the noise level at the nearest sensitive residential receiver.

8.2.2 Worst case and representative worst case noise maps

Current and future worst case and representative worst case noise level maps adopt the highest noise level of the Vessel Trigger Noise Level or an actual vessel noise level. Note that for daytime, some vessels may exceed the daytime Vessel Trigger Noise Level and continue to operate if the management plan can demonstrate that the daytime operations reduce the overall night time noise exposure.