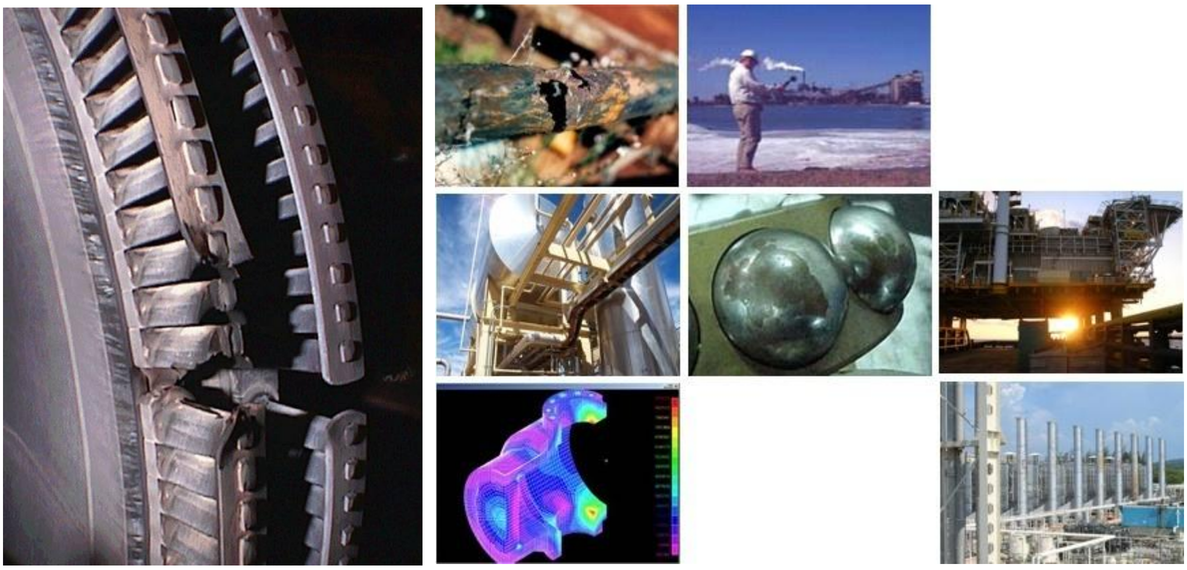
PORT HEDLAND OUTER HARBOUR DEVELOPMENT NOISE ASSESSMENT REPORT



BHP BILLITON IRON ORE

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EXECUTIVE SUMMARY

Overview

SVT were commissioned by BHP Billiton Iron Ore to undertake an environmental noise impact assessment of the present and proposed expansion of BHP Billiton Iron Ore's Port Hedland facilities in Western Australia. The objectives of the study are to determine current noise emission levels and to assess:

- the noise impacts of Outer Harbour Development Stages 1 to 4; and;
- where appropriate, to suggest methods to mitigate excessive noise emissions to achieve compliance with noise limits imposed under the regulations and in accordance with BHP Billiton Iron Ore's noise objectives

Background

Noise surveys of BHP Billiton Iron Ore's Port Hedland operations have been undertaken progressively over the years – commencing prior to the PACE Project (2004). Environmental noise emissions from BHP Billiton Iron Ore's Port Hedland facilities do not currently comply with the assigned noise emission levels of the Environmental Protection (Noise) Regulations 1997. As a result BHP Billiton Iron Ore has developed the following noise objectives:

- Reduce noise to as low as reasonably practicable, acknowledging growth, and where reasonably possible, comply with the requirements of the Environmental Protection (Noise) regulations 1997 (including seeking an exemption if necessary);
- Where it is impracticable to comply with the Environmental Protection Noise Regulations, ensure continuous improvement is facilitated through a Noise Reduction Management Plan; and
- Ensure the new plant and infrastructure being planned for the Port facilities particularly Prescribed Plant as defined by the Environmental Protection Act, (1984) complies with the Environmental Protection (Noise) regulations 1997.

Applicable Regulations

Port Facilities

For Port Facility operations the Environmental Protection (Noise) Regulations 1997 which operate under the *Environmental Protection Act 1986* are applicable. The Regulations specify maximum noise levels (assigned levels), which are the highest noise levels that can be received at noise-sensitive premises, commercial and industrial premises. Assigned noise levels have been set differently for noise sensitive premises, commercial premises, and industrial premises. For noise sensitive premises, i.e. residences, an "influencing factor" is added to the assigned noise levels. Penalties are also applied for noise that has tonal characteristics. Therefore, the maximum permissible noise levels allowed at the noise sensitive premise is the assigned noise level + influencing factor – tonal penalty. The maximum allowable noise levels for the various point receivers at Port Hedland is given in Table 1-1. For the in isolation assessment the received levels will be evaluated against the assigned levels, while for the cumulative assessment (i.e. Outer Harbour and Port Hedland Inner Harbour Project (PHIHP_) the assigned levels including a 5 dB penalty to ensure that the OHD is a non significant contributor will be used. The rationale behind this is provided in the body of the report.

Table 1-1: Assigned noise levels noise levels (including 5dB penalty for non significant contributor) for noise sensitive premises.

Position	Influencing Factor in dB	L_{A10} Assigned noise levels in dB(A)[1]			Non Significant Contributor	L_{A10} Assigned noise levels in dB(A)		
		Day	Evening	Night		Day	Evening	Night
Brearley St	2	47	42	37	5	42	37	32
Hospital	2	47	42	37	5	42	37	32
Police Station	17	62	57	52	5	57	52	47
Pretty Pool	0	45	40	35	5	45	40	30
South Hedland	0	45	40	35	5	45	40	30
Wedgefield camp	0	54	49	44	5	54	49	39
Rural Village	0	45	40	35	0	45	40	35

Modelling

The following noise source configurations were modelled:

1) **Inner Harbour.** Nelson Point and Finucane Island up to and including PHIHP. This configuration was taken as the base case.

2) **Outer Harbour Port Facility**. The port facilities were modelled for the following situation:

   Outer Harbour Development consists of:

   - 4 Car Dumpers and associated stockpiles (Staged development) at Boodarie
   - Overland conveyors
   - Jetty and Wharf offshore of Finucane Island.

Port Facility Compliance and Noise Control

Compliance

BHP Billiton Iron Ore's operations are located adjacent to the Town of Port Hedland and due to historical land use planning there is a minimal buffer between industry and sensitive receptors. None the less BHP Billiton Iron Ore is committed to reducing noise levels, but also understandings that existing land use conflicts make compliance with the Noise Regulations difficult. All noise control recommendations have been based on meeting BHP Billiton Iron Ore's noise objectives.

[1] L_{A10} assigned noise level which is not to be exceeded for more than 10% of the time. The L_{A10} noise limit is the most significant for this study since this is representative of continuous noise emissions from the Port facility.

It has been shown in the body of the report that without any noise control the proposed Outer Harbour Development is not compliant with the assigned levels and the cumulative impacts on the receivers will increase.

Noise Control and ALARP

A detailed examination of engineering noise controls for the proposed Outer Harbour Development will be undertaken during preparation of the Works Approval application. An integrated approach will be taken that will focus on a range of factors such as:

- BHP Billiton Iron Ore's noise objectives;
- Magnitude of predicted noise impacts at the sensitive receptors;
- Ranking of noise source contributions at the sensitive receptors; and
- The principle of As Low as Reasonably Practicable (ALARP) which balances noise attenuation by considering positive and negative impacts of the noise attenuation on :
    - Safety;
    - Life cycle Costs
    - Reliability of system with noise attenuation in place
    - On-going maintenance requirements; and
    - Operations.

The prime aim of the integrated approach will be to meet BHP Billiton Iron Ore's noise objectives where reasonably practicable, based on optimization of noise controls across BHP Billiton Iron Ore's Port Hedland operations.

In order to ensure that noise control benefits are properly understood various studies have been commissioned in order to determine which noise control options will provide solutions that meet BHP Billiton Iron Ore's noise objectives. These studies include:

- the long term measurement of a range of ultra low and low noise idlers (taking into consideration wear and tear , and maintenance requirements to ensure optimal noise reduction benefit),
- the measurement of noise emissions from wider conveyors at varying speeds and
- preliminary As Low As Reasonable Practicable (ALARP) work sessions in order to understand the practicability of various noise control solutions.

The model has also been peer reviewed and based on the recommendations of the peer review various aspects of the model have been updated improving the accuracy of the model.

The assessment of potential engineering noise control measures may include the installation of:

- Landside noise barriers;
- Wider and slower belts
- Enclosures for conveyor drives and transfer stations;
- Ultra low and low noise conveyor idlers
- Low noise specification equipment.

The final package of engineering noise controls for the construction and operation of Stage 1, will be confirmed as part of the Works Approval application proposed to be submitted in 1st quarter 2012. This will also include modeling for the operation of all four stages of the proposed development.

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1. INTRODUCTION

SVT were commissioned by BHP Billiton Iron Ore to undertake an environmental noise impact assessment of the present and proposed expansion of BHP Billiton Iron Ore's Port Hedland facilities in Western Australia. The objectives of the study are to determine noise emission levels in order to:

- Assess the noise impacts of the proposed Outer Harbour Development; and
- Where appropriate, to suggest methods to mitigate excessive noise emissions to achieve compliance with noise limits imposed under the Environmental Protection (Noise) Regulations 1997 and in accordance with BHP Billiton Iron Ores noise objectives.

1.1 Applicable Documents

The following lists the applicable documents:

- Noise Reduction Management Plan – Port Hedland Rev 3 Sept 2010; and
- SVT Doc: 075063-12-100-Rev4-30 March 2010 Port Hedland Noise Assessment Report – RGP 6 Car Dumper 5 And Associated Infrastructure
- SVT Doc: 075063-66-100 Rev 6 Sept 2011 Port Hedland Inner Harbour Project (PHIHP) Environmental Noise Assessment
- SVT Doc: 075063-41-100-Rev2-9 Dec 2010 Port Hedland Biannual Attended Noise Measurement
- BHP Billiton Iron Ore has developed the following noise objectives:
- Reduce noise to as low as reasonably practicable, acknowledging growth, and where reasonably possible, comply with the requirements of the Environmental Protection (Noise) regulations 1997 (including seeking an exemption if necessary);
- Where it is impracticable to comply with the Environmental Protection Noise Regulations, ensure continuous improvement is facilitated through a Noise Reduction Management Plan; and
- Ensure the new plant and infrastructure being planned for the Port facilities particularly Prescribed Plant as defined by the Environmental Protection Act, (1984) complies with the Environmental Protection (Noise) regulations 1997.

1.2 Major Activities

The major activities undertaken during the course of this study are given below.

- Measurement of equipment noise levels and calculation of associated Sound Power Levels (SWL);
- Modelling of Outer Harbour Development,assuming similar equipment to that already in operation at Port Hedland;
- Evaluation of the proposed Outer Harbour Development with BHP Billiton Iron Ore's noise objectives; and

- Preliminary ALARP work session to assess the practicability of various noise control solutions in order to meet BHP Billiton Iron Ore's noise objectives.

2. BHP BILLITON IRON ORE PORT HEDLAND OPERATIONS

2.1 Introduction

BHP Billiton Iron Ore is one of Australia's largest iron ore producers, operating open pit mining operations in the Pilbara region of Western Australia at Mt Whaleback, Yandi, Jimblebar, Orebody 18, Orebody 23/25, Area C and Yarrie/Nimingarra. Two dedicated heavy haulage rail systems, running from Newman, Area C and Yandi mines and Yarrie/Nimingarra operations, deliver the ore to BHP Billiton Iron Ore's Port Hedland port facilities.

The BHP Billiton Iron Ore Port Hedland port facilities consist of processing, stockpiling and shiploading operations at Finucane Island and Nelson Point, located on the opposite sides of the Port Hedland Inner Harbour.

At the conclusion of the 2009/2010 financial year the Rapid Growth Project 5 (RGP5) expansion has been completed and commissioned and RGP6 is currently under construction. BHP Billiton Iron Ore is now seeking approval for the proposed Outer Harbour Development.

2.2 Previous Noise Modelling Overview

Noise surveys of BHP Billiton Iron Ore's Port Hedland operations have been undertaken progressively over the years commencing prior to the PACE Project (2004). Environmental noise emissions from BHP Billiton Iron Ore's Port Hedland facilities do not currently comply with the assigned noise emission levels of the Environmental Protection (Noise) Regulations 1997. As a result noise modelling has been undertaken prior to each expansion phase and has provided noise contours and predicted noise levels at a number of sites within Port Hedland, these include:

- Brearley Avenue;
- Old Hospital;
- Police Station;
- Pretty Pool;
- South Hedland; and
- Wedgefield

The location of these receivers used in the model can be seen in Figure 2-1.

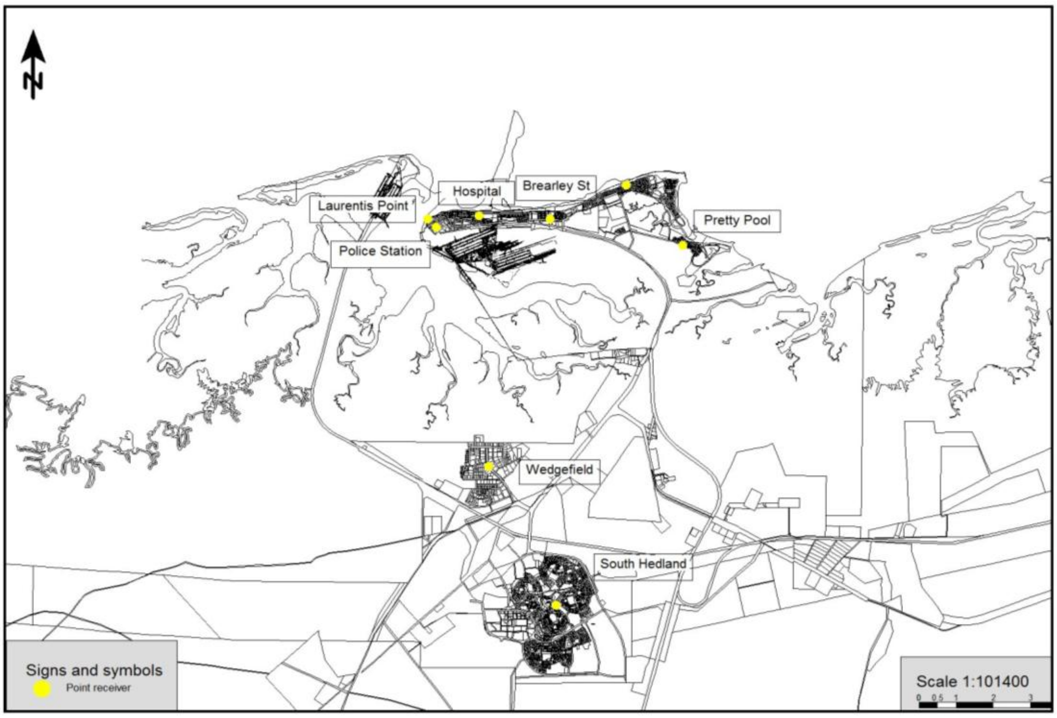

Figure 2-1 Port Hedland Layout and Noise Level Receivers

BHP Billiton Iron Ore has undertaken to continue monitoring the above sites and will continue to use the old Hospital site as the point of reference to measure noise performance. These sites are monitored biannually[2] in accordance with BHP Billiton's Noise Reduction Management Plan (NRMP) for Port Hedland. BHP Billiton Iron Ore considers the Hospital[3] to be the most appropriate reference site location with respect to noise for the following reasons:

- it is located within an area reflective of where the community lives;
- the monitoring location is adjacent to the old Hospital building – a noise sensitive premises;
- it is more directly influenced by BHP Billiton Iron Ore's operations (i.e. away from the Port operations and ocean influences);and
- it is slightly elevated compared to the surrounding topography and hence is likely to provide a more conservative assessment point.

[2] Biannual monitoring consists of attended measurements within Port Hedland (i.e. no unattended measurements are taken at this stage). The main focus of the attended measurements is to validate the accuracy of the noise model.

[3] Ambient L_{A10} noise levels (i.e. plant plus background noise) at the Hospital have been measured to be between 54 and 58 dB(A) at nighttime.

3. OUTLINE OF PROPOSED PORT UPGRADE

The proposed Outer Harbour Development will be developed in stages with each stage proposing to increase the output of the facility by up to 60 MTpa. The port development can be spatially categorised into the following three components (see Figure 3-1):

1) Overland, jetty and wharf conveyors;
2) Boodarie stockyards;
3) Rail spur corridor and rail loop.

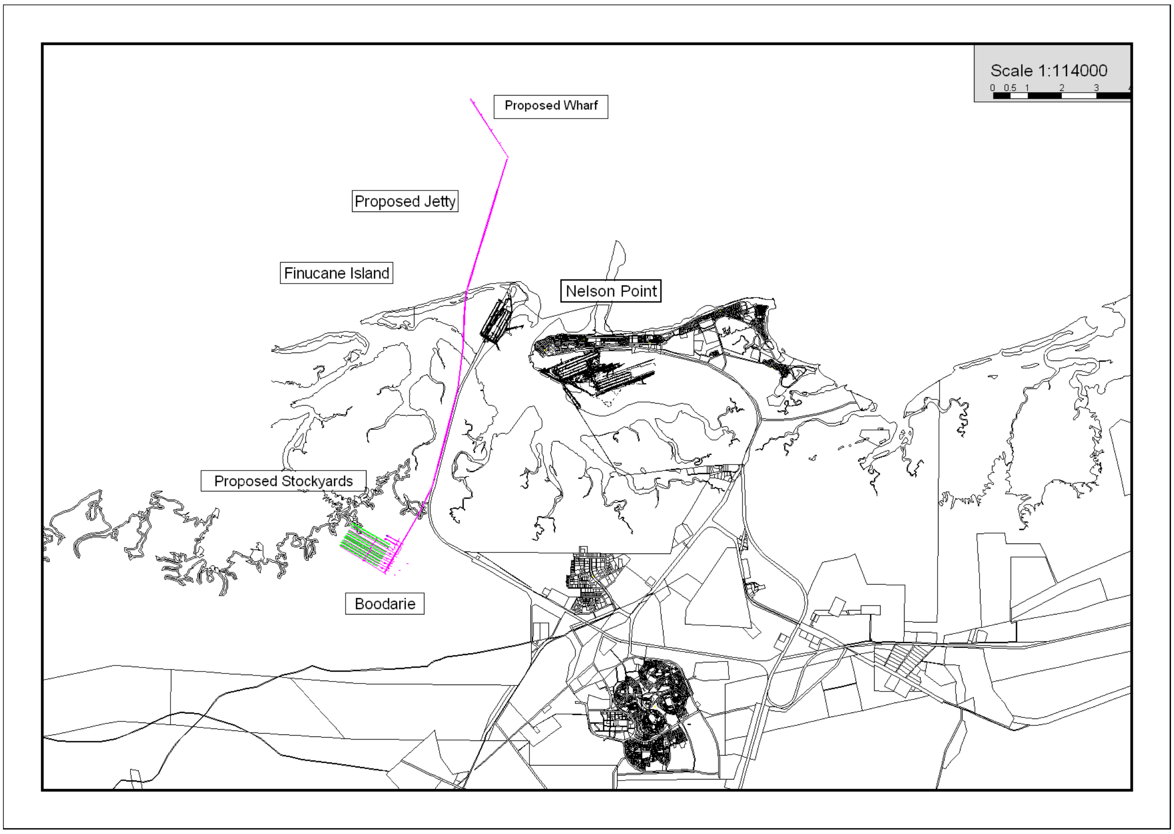

Figure 3-1 Proposed Outer Harbour Development layout

3.1 Overland, Jetty and Wharf Conveyor

The proposed Outer Harbour Development has been divided into stages. Each Stage has a conveyor system with the capacity of up to approximately 60 MTpa that will transport ore from the Boodarie site to Finucane Island. The jetty/wharf structure and associated shiploading are located offshore from Finucane Island. The current engineering layout indicates that the overland conveyor route (infrastructure corridor) will follow the existing/ decommissioned HBI conveyor, and diverge across West creek onto Finucane Island. Once all stages are completed there will be a total of four car dumpers with associated conveyors systems transporting up to approximately 60MTpa each via overland conveyor to Finucane Island and via four conveyors to associated shiploaders to the offshore wharf (up to approximately 240 MTpa). The major noise sources for the Finucane Island (Outer Harbour) and conveyors are considered to be:

- Overland conveyors;
- Overland conveyor drives;
- Transfer conveyors and drives for the conveyors;
- Wharf conveyors; and
- Ship loaders.

3.2 Mainland: Boodarie Stockyards

The Boodarie site will accommodate rail loops and stockyards and associated materials handling facilities with a capacity of up to 240MTpa. The stockyards will be established in stages of up to approximately 60MTpa capacity each. Each stockyard consists of the following major noise sources:

- Car dumper;
- In-loading conveyor;
- Screen house;
- Stock yard conveyors and conveyor drives;
- Stackers;
- Reclaimers; and,
- Out-loading conveyor.

3.3 Inner Harbour Growth Program

The noise assessment will use the PHIHP configuration as the base case for the cumulative assessment of noise impacts on sensitive receivers as per BHP Billiton Iron Ore's noise objective for continuous improvement. The applicable PHIHP configuration is given in Appendix A and B.

4. PORT HEDLAND AND SURROUNDING AREA

4.1 Port Hedland

Within Port Hedland there are industrial, commercial and residential areas. The industrial areas are concentrated at Nelson Point and Finucane Island, the commercial area is located at the town centre of Port Hedland and the residential area is located along the west end of Port Hedland.

The industrial activities in Port Hedland are primarily due to port operations associated with the shipping of iron ore and salt. Other operations include handling and shipping of manganese, copper concentrate, chromate and the port also operates as a live export port for livestock. Of these activities due to scale the BHP Billiton Iron Ore facilities at Nelson Point and Finucane Island are currently the greatest contributors to noise impacts within the west end of town.

4.2 Wedgefield Industrial area

The industrial area of Wedgefield is located approximately 5.5km from the BHP Billiton Iron Ore operations at Port Hedland as shown in Figure 4-1. Wedgefield field is zoned as an industrial area.

4.3 South Hedland

South Hedland is a town, consisting of a residential area with a shopping and office area which is zoned as a commercial area. South Hedland is located approximately 9km south of Port Hedland as shown in Figure 4-1.

Figure 4-1 Port Hedland and surrounding area, image © 2009 Google – Map Data © 2009 DigitalGlobe

5. APPLICABLE REGULATIONS AND ASSIGNED LEVELS

Two separate modelling activities have been undertaken. These activities are port operations and rail operations. Each activity has different applicable regulations. State that rail guidelines and outputs is discussed in SVT document 075063-72-100 Outer Harbour Development Rail Noise Assessment: Western Spur.

5.1 Regulation Applicable to Port Facility Operations

5.1.1 Summary of Legislation

Noise management in Western Australia is implemented through the Environmental Protection (Noise) Regulations 1997 which operate under the *Environmental Protection Act 1986*. The Regulations specify maximum noise levels (assigned levels), which are the highest noise levels that can be received at noise-sensitive premises, commercial and industrial premises.

Assigned noise levels have been set differently for noise sensitive premises, commercial premises, and industrial premises. For noise sensitive premises, i.e. residences, an "influencing factor" is incorporated into the assigned noise levels.

The regulations define three types of assigned noise level:

- L_{Amax} assigned noise level means a noise level which is not to be exceeded at any time;
- L_{A1} assigned noise level which is not to be exceeded for more than 1% of the time;
- L_{A10} assigned noise level which is not to be exceeded for more than 10% of the time.

The L_{A10} noise limit is the most significant for this study since this is representative of continuous noise emissions from the port facility. Table 5-1 shows the assigned noise levels for noise sensitive premises. As can be seen from the table the time of day also affects the assigned levels for noise sensitive residences.

Table 5-1: Assigned noise levels for noise sensitive premises.[4]

Type of premises receiving noise	Time of day	Assigned Level dB(A)		
		L_{A10}	L_{A1}	L_{Amax}
Locations within 15m of a building directly associated with a noise sensitive use.	0700 to 1900 hours Monday to Saturday	45+ influencing factor	55+ influencing factor	65+ influencing factor
	0900 to 1900 hours Sundays and public holidays	40+ influencing factor	50+ influencing factor	65+ influencing factor
	1900 to 2200 hours all days	40+ influencing factor	50+ influencing factor	55+ influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35+ influencing factor	45+ influencing factor	55+ influencing factor
Locations further than 15m from a building directly associated with a noise sensitive use.	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises	All hours	65	80	90

Since the port facilities operates 24 hours a day the most stringent noise limit that would apply to noise emissions will occur during the night time hours.

Table 5-2: Assigned penalties for intrusive or dominant noise characteristics.[5]

Adjustment where noise emission is not music these adjustments are cumulative to a maximum of 15 dB		
Where tonality is present	Where modulation is present	Where impulsiveness is present
+5 dB	+5 dB	+10 dB

Noise levels at the receiver are subject to penalty corrections if the noise exhibits intrusive or dominant characteristics, i.e. if the noise is impulsive, tonal, or modulated. That is, the measured or predicted noise levels are increased by the applicable penalties, and the adjusted noise levels must comply with the assigned noise levels. Regulation 9 sets out objective tests to assess whether the noise is taken to be free of these characteristics.

[4] Environmental Protection (Noise) Regulations 1997

[5] Environmental Protection (Noise) Regulations 1997

5.1.2 Assigned Level Evaluation for Port Hedland

As the assessment is for a multitude of different premises, different assigned noise levels will be applicable to different areas of the town. As can be seen from Table 5-1 different premises zoning classifications have different assigned levels. So industrial premises have an assigned LA_{10} value of 65dB(A), commercial premises have an assigned LA_{10} value of 60dB(A) while residential premises have different assigned levels depending on the day of the week and the time of the day and surrounding land use. The relevant zone to each noise monitoring positions is shown in Table 5-3.

Table 5-3 Zones relevant to each logging position

Residential	Commercial (60dB(A))	Industrial (65dB(A))
Darlot Street Hospital Rural Village Pretty Pool South Hedland Golf Course Cook Point Brearley Avenue Wedgefield Residential	Police Station (Influencing Factor = 17dB for residents at police station) Port Hedland Shopping Centre South Hedland Telstra Building	Wedgefield Industrial Estate HBI/ Boodarie

The most stringent assigned levels are applicable to residential areas at night time (22:00 to 07:00), on weekends from 09:00 and public holidays. Residential areas will therefore be the focus of the assessment undertaken here.

5.1.3 Influencing Factors

The influencing factor is calculated at the noise sensitive premises and the calculated value is added to the assigned noise levels as shown in Table 5-1. The influencing factor depends on land use zonings within circles of 100 metres and 450 metres radius from the noise receiver. The value is dependent on:

- the proportion of industrial land use zonings;
- the proportion of commercial zonings; and
- the presence of major roads within the circles.

Due to the large number of noise sensitive premises an influencing factor has not been calculated for each premises, but rather an influencing factor has been calculated for specific areas as shown in Figure 5-1 and

Table 5-4, which is considered representative of the area. As can be seen from the figure, and as expected the influencing factor and therefore the assigned noise level varies within the town area.

Table 5-4 Influencing Factor for various locations in Port Hedland

Residential Area	Influencing Factor
Police Station	17dB
Hospital	2dB
Darlot St	2 to 3dB
Brearley Avenue	1 to 2 dB
Pretty Pool	0
Cook Point	0
Rural Village	0
South Hedland Golf Course	0

Figure 5-1 Influencing factors that can be applied to different areas of Port Hedland, image © 2009 Google – Map Data © 2009 DigitalGlobe

5.1.4 Corrections for Characteristic of Noise

Noise levels at the receiver are subject to penalty corrections if the noise exhibits intrusive or dominant characteristics, i.e. if the noise is impulsive, tonal, or modulating. Table 5-2 presents the penalties incurred for noise that exhibits intrusive or dominant characteristics (i.e. if it has tonal, modulating or impulsive characteristics).

The Outer Harbour Development will be considered in isolation and cumulatively with all of BHP Billiton Iron Ore's port operations, inclusive of the recently submitted works approval for PHIHP (i.e. the cumulative assessment will include all noise sources from PHIHP and the Outer Harbour Development). For the in isolation case it is not expected that there will be any tonal signal present in the receiver noise due to the distance of the Outer Harbour Development from Port Hedland. As a result a penalty for tonality will not be applied.

However for the cumulative case tonality was assessed for the Port Hedland area using 1/3rd octave measurements taken over 30 minute periods at various locations within the town of Port Hedland. It was found that tonal signals were present in areas extending from McKay street to the corner of McGregor and Lukis streets. A 5dB penalty therefore applies to this area and will be applied to the cumulative case. Beyond the McGregor and Lukis streets intersection no tonal characteristics could be attributed to the BHP Billiton Iron Ore facility was found within the noise measurements. The 5dB penalty should therefore not be applied to these areas.

As the existing ambient noise levels are high the tonal penalty has **not** been applied to the in-isolation case as noise from the existing plant will mask any tonality from the new plant.

5.2 Assigned Level Evaluation for Wedgefield

Wedgefield Residential Camp is classified as a residential area and therefore will be subject to assigned levels as per the regulation for noise sensitive[6] premises.

5.2.1 Influencing Factors

As advised by DEC, Wedgefield residential camp has a 9dB influencing factor.

5.2.2 Corrections for Characteristic of Noise

As Wedgefield is approximately 5.5km from Port Hedland it is expected that there will be no tonality in the received noise from the Port facility due to absorption in the atmosphere. No penalty will therefore be applicable to Wedgefield.

5.3 Assigned Level Evaluation for South Hedland

South Hedland can be classified as predominately residential. For the purposes of this report and for evaluation purposes the commercial area of South Hedland will not be considered since the most restrictive assigned noise levels for the town is due to noise sensitive premises. Therefore, South Hedland will be subject to assigned levels as per the regulation for noise sensitive premises.

5.3.1 Influencing Factors

Since there are large areas of South Hedland which are zoned residential, the influencing factor has been assumed to be 0. The limits as per the regulation for noise sensitive areas will be used as a worst case scenario for all areas in South Hedland.

5.3.2 Corrections for Characteristic of Noise

As South Hedland is approximately 9km from Port Hedland it is expected that there will be no tonality in the received noise from the Port facility due to absorption in the atmosphere. No penalty will therefore be applicable to South Hedland.

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[6] Sensitive premises are defined as premises occupied solely or mainly for residential or accommodation purposes; rural premises; caravan parks and camping grounds; Hospitals with less than 150 beds; rehabilitation centres, care institutions; educational institutions; premises used for public worship; hotels; premises for aged and child care; prisons and detention centres.

5.4 Assigned Noise Levels for Port Hedland, South Hedland and Wedgefield

In order to ensure that the new plant does not significantly contribute to the received noise levels at the receivers from Port Hedland to South Hedland the assigned levels have been reduced by 5dB in accordance with the regulation for a non significant conrtibutor. Taking into account penalties and influencing factors, the assigned noise level at the various receivers used in the Port Hedland model are presented in Table 5-5.

Table 5-5: Assigned noise levels for noise sensitive premises including 5dB penalty for tonality.

Position	Influencing Factor in dB	L_{A10} Assigned noise levels in dB(A)[7]			Non Significant Contributor	L_{A10} Assigned noise levels in dB(A)		
		Day	Evening	Night		Day	Evening	Night
Brearley St	2	47	42	37	5	42	37	32
Hospital	2	47	42	37	5	42	37	32
Police Station	17	62	57	52	5	57	52	47
Pretty Pool	0	45	40	35	5	45	40	30
South Hedland	0	45	40	35	5	45	40	30
Wedgefield camp	0	54	49	44	5	54	49	39
Rural Village	0	45	40	35	0	45	40	35

[7] L_{A10} assigned noise level which is not to be exceeded for more than 10% of the time. The L_{A10} noise limit is the most significant for this study since this is representative of continuous noise emissions from the Port facility.

6. NOISE MODELLING – OVERVIEW

Noise emission from the BHP Billiton Port Hedland facilities can be considered as consisting of two components, which will be assessed separately, they are as follows:

1) Port Facility; and

2) Rail Transport. (SVT document 075063-72-100 Outer Harbour Development Rail Noise Assessment: Western Spur)

6.1 Methodology for Port Facility

A noise model was developed for RGP 5 which was the configuration at the time site verification was undertaken. The RGP 5 model was verified using site measurements taken in February 2010 and July 2010 (see SVT Doc 075063-41-100 Port Hedland Biannual Attended Noise Measurements July 2010 Rev 0 December 2010). Once the RGP 5 model had been verified, RGP 6 and PHIHP configurations were added to the model using similar noise sources from RGP 5 for all the new equipment that is to be installed. Similarly the Outer Harbour Development configurations (i.e. Stages 1 – 4) were added to the model.

Noise contours have been produced for the area surrounding the port facility, and noise levels have been predicted at various locations in Port Hedland, Wedgefield, Pretty Pool and South Hedland. The noise contours and noise level predictions have been developed for the case where all plant equipment is operating to provide a conservative assessment.

The output of the model will be used to determine the noise control measures for various equipment items at the Port Hedland port facility.

6.2 Noise Model Software

An acoustic model has been developed using SoundPlan noise modelling program developed by SoundPlan LLC. SoundPlan software calculates sound pressure levels at nominated receiver locations or produces noise contours over a defined area of interest around the noise sources. The inputs required are noise source data, ground topographical data, meteorological data and receiver locations.

The model has been used to generate noise contours and predict noise levels at noise sensitive locations for the area around Port Hedland, South Hedland and Wedgefield.

6.3 Input Data

6.3.1 Source Sound Power Levels

Depending on the configuration the Port Hedland noise model consists of approximately 626 noise sources, which makes it a very detailed model[8]. The sound power levels used in the model are derived from sound power levels calculated from on-site noise measurements. The on-site measurements consisted of nearfield noise measurements and in some cases far field noise measurements. In most cases the sound power levels were verified using two separate

[8] Each major equipment item has been modeled so that significant noise sources can be identified and appropriate noise controls can be determined.

measurements. Additional far field measurements of isolated noise sources are planned in the near future to validate various sound power levels.

6.3.2 Topography and Ground Types

Topographical information for the noise model was provided in .dxf format files, which were imported into the noise model directly. For the Boodarie yard, it is assumed that the yard is at a constant 5m AHD? (absolute) elevation, since this information was not contained in the .dxf file. Ground absorption for hard and soft surfaces is as specified by the CONCAWE[9] propagation algorithm. The ground absorption for the sea surface has been set to zero (perfectly reflecting), representing a realistic worst-case condition at the frequencies of interest. Soft ground has been used for land. Stockpiles in the form of berms have been included in the model. CONCAWE is a conservative algorithm, which has been shown to over predict, it is also accepted by the DEC.

6.3.3 Receiving Locations

The noise model has been used to predict noise levels at the six locations at which baseline noise levels have been previously established. Those locations are as indicated in Table 6-1.

[9] CONCAWE (Conservation of Clean Air and Water in Europe) was established in 1963 by a group of oil companies to carry out research on environmental issues relevant to the oil industry. The outcome was an empirical algorithm which predicts noise levels at receiving locations.

Table 6-1 Co-ordinates of receiving locations

Receiver	Location	GPS co-ordinates (GDA-95)
R1	Brearley St , Port Hedland	7753338 N, 667699 E
R2	Hospital 7753, Port Hedland	7753424 N, 665799 E
R3	Police Station, Port Hedland	7753117 N, 664652 E
R4	Pretty Pool, Port Hedland	7752609 N, 671261 E
R5	South Hedland	7742771 N, 667852 E
R6	Wedgefield	7746567 N, 666048 E

6.3.4 Meteorology

Certain meteorological conditions can increase noise levels at a receiving location by a process known as refraction. When refraction occurs, sound waves that would normally propagate directly outwards from a source can be bent downwards causing an increase in noise levels. Such refraction occurs during temperature inversions and where there is a wind gradient.

The SoundPlan noise model has a range of different algorithms which it can use to calculate noise levels for user defined meteorological conditions. The CONCAWE algorithm for industrial noise simulation has been used in the SoundPlan model to predict the sound levels at each of the point receiver locations and the surroundings. Meteorological conditions assigned to the model are in accordance with EPA's recommendations for worst-case weather conditions outlined in *Guidance for the Assessment of Environmental Factors, Draft No.8, May 2007*:

- Day (07:00 - 19:00) wind speed – 4m/s; Pasquill Stability Class "E"; temperature - 20°C; and relative humidity – 50%.
- Night (19:00 – 07:00) wind speed – 3m/s; Pasquill Stability Class "F"; temperature – 15°C; and relative humidity – 50%.

The meteorological condition for night-time includes the refraction effects of sound waves during propagation in the parts of the atmosphere close to the ground. Worst-case conditions usually occur during night-time, when downward refraction bends the waves towards the ground increasing the noise levels at the receiver. The night time meteorological conditions were used in the model as this represents the worst case conditions.

6.4 Noise Model Validation and Background Noise

Biannual validation measurements are undertaken at Port Hedland. These measurements are used to validate the model and to determine the models accuracy. The latest validation measurement was undertaken between the 15th and 17th July 2010 (Has there been some since then check still valid). Using these results, the current model was found to be, on average, accurate to within 3.15dB[10] from the measured value.

[10] Refer to SVT document 075063-41-100 for the details of the latest bi-annual measurements

Longer term logging was also undertaken in March 2008 at various locations around Port Hedland for at least 14 days in order to get an indication of representative noise levels for the area under the RGP3 configuration (see Appendix D for details).

6.5 Noise model configurations

The following was modelled:

1) **Port Facility**. The port facilities were modelled for the following situations:

- Inner Harbour 240 MTpa
- Outer Harbour (Stage 1 to 4) Development (see Appendix A and B for a detailed overview of the proposed layouts) divided into the following:
    1. Stage 1 : 60 MTpa
    2. Stage 2 : 120 MTpa
    3. Stage 3 : 180 MTpa
    4. Stage 4 : 240 MTpa

7. NOISE MODELLING – PORT FACILITY

7.1 Noise Modelling Results for PHIHP

The PHIHP configuration used in the model is shown in Appendix A and B. This configuration was taken to be the base case modelling configuration for the outer harbour development. The worst case[11] predicted noise levels at the point receivers are given in Table 7-1. Figure 7-1 shows the noise contours for PHIHP.

Table 7-1 Point Receiver predictions for PHIHP with Noise control

Receiver Locations	PHIHP with noise control L_{A10} noise levels dB(A)
Brearley St	49.7
Hospital	57.2
Police Station	60.6
Pretty Pool	32.5
South Hedland	26.1
Wedgefield	34.5

[11] Worst Case conditions are defined as worst case operational conditions (i.e. all plant equipment operating) and worst case environmental conditions (i.e. as defined by Draft note 8).

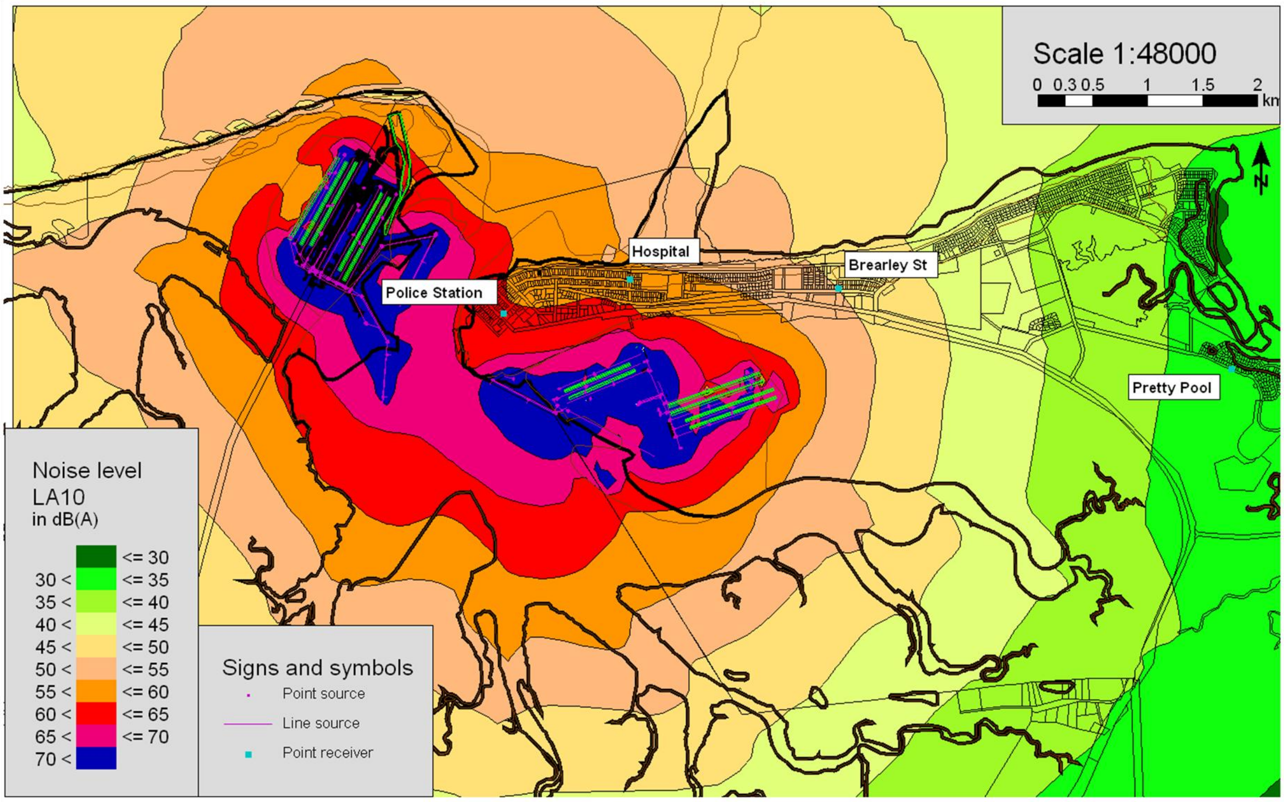


Figure 7-1 Noise contours of the Port Hedland area for PHIHP

7.2 Noise Modelling Results for Outer Harbour Development

The Outer Harbour Development configuration used in the model is shown in Figure 3-1. For this configuration it has been assumed that there is no noise control in place and that standard mining equipment was used in the model.

7.2.1 Outer Harbour Development Stage 1 in Isolation

The worst case predicted received noise levels, using standard mining equipment, at the point receivers are given in Table 7-2. When the predicted Outer Harbour Development levels are considered in isolation, it can be seen that for the Outer Harbour Development Stage 1 received noise levels exceed the regulation at the Hospital and Brearley. Figure 7-2 shows the noise contours for Outer Harbour Development Stage 1 with Standard Noise Control.

Table 7-2 Point Receiver predictions for Outer Harbour Development Stage 1 in Isolation

Receiver Locations	Outer Harbour Development L_{A10} noise levels in Isolation dB(A)	L_{A10} assigned noise levels dB(A)
	Stage 1	
Brearley St	38.0	**32**
Hospital	43.7	**32**
Police Station	46.3	**47**
Pretty Pool	30.0	**30**
South Hedland	25.7	**30**
Wedgefield	31.3	**39**

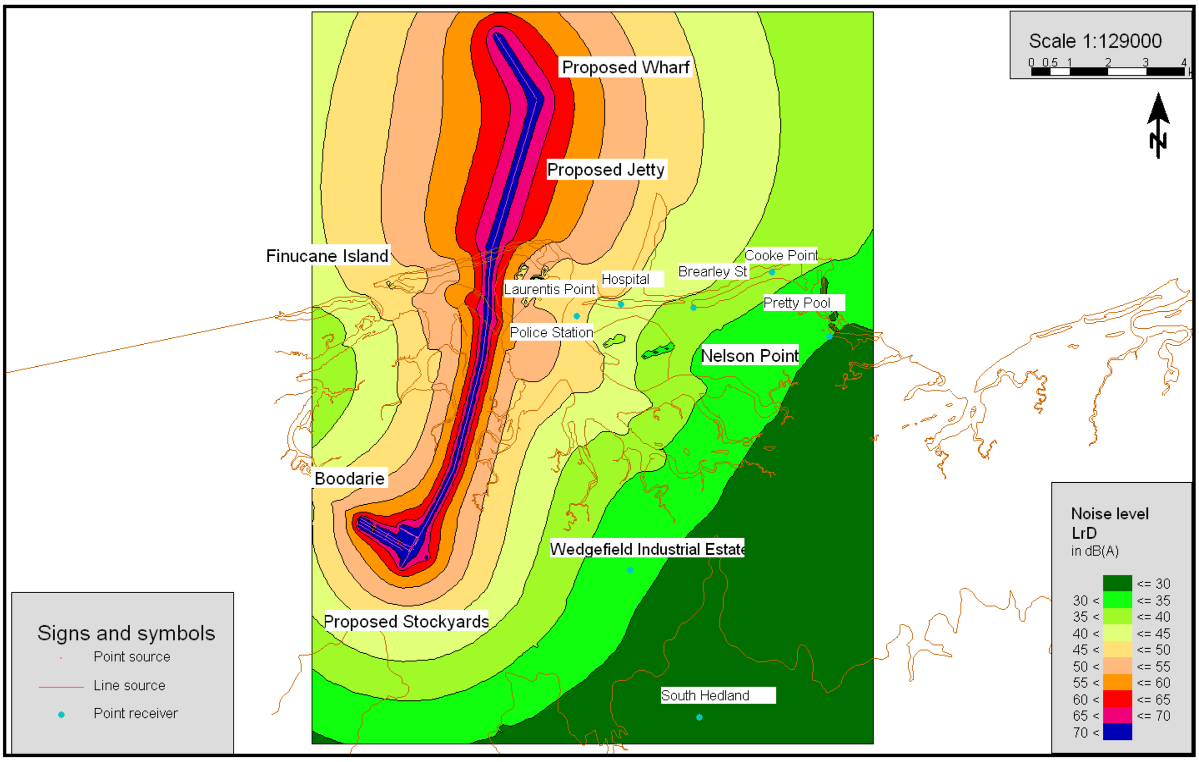


Figure 7-2 Noise contours of the Port Hedland area for Outer Harbour Development Stage 1

7.2.2 Cumulative Outer Harbour Development Stage 1 operating in conjunction with PHIHP

The cumulative noise levels for the Outer Harbour Development operating in conjunction with PHIHP (current approved facility configuration) are shown in Table 7-3.

As can be seen from the table the received levels for all the receivers are higher than the predicted PHIHP levels.

Table 7-3: Point Receiver predictions for Outer Harbour Development Stage 1 with PHIHP

Receiver Locations	Combined level, Outer Harbour Development with PHIHP approved NC in dB(A)	PHIHP with Noise control In dB(A)
	Stage 1	
Brearley St	50.0	49.7
Hospital	57.3	57.2
Police Station	60.4	60.6
Pretty Pool	34.6	32.5
South Hedland	29.0	26.1
Wedgefield	36.6	34.5

7.2.3 Point Calculations Outer Harbour Development Stage 1 to Stage 4 in Isolation

The worst case received noise levels, using standard mining equipment, at the point receivers. As there will be separate work approvals each stage is considered in isolation. The cumulative case will consider all stages cumulatively and include the contributions from PHIHP. Stages 1 to 4 received levels are given in Table 7-4. As can be seen from the table, all the received levels for each stage are above the assigned levels at Brearley Street and the Hospital.

Table 7-4 Point Receiver predictions for Outer Harbour Development Stage 1 to Stage 4 in Isolation

Receiver Locations	Outer Harbour Development L_{A10} noise levels in Isolation dB(A)				L_{A10} assigned noise levels dB(A)
	Stage 1	Stage 2	Stage 3	Stage 4	
Brearley St	38	37.9	37.9	37.8	**32**
Hospital	43.7	43.7	43.7	43.5	**32**
Police Station	46.4	46.2	46.2	46.0	**47**
Pretty Pool	30.1	29.9	29.9	29.8	**30**

Receiver Locations	Outer Harbour Development L_{A10} noise levels in Isolation dB(A)				L_{A10} assigned noise levels dB(A)
	Stage 1	Stage 2	Stage 3	Stage 4	
South Hedland	25.7	25.5	25.5	25.3	**30**
Wedgefield	31.4	31.3	31.2	31.2	**39**

7.2.4 Cumulative Outer Harbour Development Stage 4 operating in conjunction with PHIHP

Table 7-5 shows the increase in noise levels for the cumulative impacts (i.e. operation of the Outer Harbour Development operating in conjunction with PHIHP) for each successive Stage.

Table 7-5 Point Receiver predictions for Outer Harbour Development Stage 1 to 4 with PHIHP

Receiver Locations	PHIHP with NC dB(A)	Combined level, Outer Harbour Development with PHIHP dB(A)			
		Stage 1	Stage 2	Stage 3	Stage 4
Brearley St	49.7	50.0	50.3	50.5	50.8
Hospital	57.2	57.3	57.5	57.7	57.9
Police Station	60.6	60.4	60.6	60.8	60.9
Pretty Pool	32.5	34.6	35.8	36.8	37.6
South Hedland	26.1	29.0	30.5	31.8	32.6
Wedgefield	34.5	36.6	37.6	38.5	39.1

7.3 Summary of Results (Outer Harbour Development Stages 1 to 4)

Table 7-6 shows the difference between the assigned level and the Outer Harbour Development in isolation. As can be seen from the table, the in isolation case at Brearley St and the Hospital are above the assigned levels.

Table 7-6 Summary of the difference between the assigned levels and Outer Harbour received levels for Stages 1 to 4 in Isolation in dB(A)

Receiver Positions	L_{A10} noise levels in dB(A)				
	Assigned level	Difference between Outer Harbour Development in Isolation with and Assigned level			
		Stage 1	Stage 2	Stage 3	Stage 4
Brearley St	**32**	6	5.9	5.9	5.8
Hospital	**32**	11.7	11.7	11.7	11.5
Police Station	**47**	-0.6	-0.8	-0.8	-1
Pretty Pool	**30**	0.1	-0.1	-0.1	-0.2
South Hedland	**30**	-4.3	-4.5	-4.5	-4.7
Wedgefield	**39**	-7.6	-7.7	-7.8	-7.8

Table 7-7 shows the difference between PHIHP and the Outer Harbour Development Stages 1 to 4 with PHIHP operating. As we can see from the table, all receivers are above the PHIHP with Noise Control noise levels.

Table 7-7: Summary of the difference between PHIHP and Outer Harbour Stages 1 to 4 with PHIHP operating

Receiver Positions	L_{A10} noise levels in dB(A)				
	PHIHP with NC	Difference between Combined level, Outer Harbour Development and PHIHP with NC			
		Stage 1	Stage 2	Stage 3	Stage 4
Brearley St	49.7	0.3	0.6	0.8	1.1
Hospital	57.2	0.1	0.3	0.5	0.7
Police Station	60.6	-0.2	0	0.2	0.3
Pretty Pool	32.5	2.1	3.3	4.3	5.1
South Hedland	26.1	2.9	4.4	5.7	6.5
Wedgefield	34.5	2.1	3.1	4	4.6

7.4 Comparison of results at the Hospital

Figure 7-3 shows how the overall noise level at the Hospital changes with time. The changes are associated with the different Outer Harbour Development configurations and expected tonnage per year. The levels indicate worst case scenario (with no noise reduction measures in place for the outer harbour development).

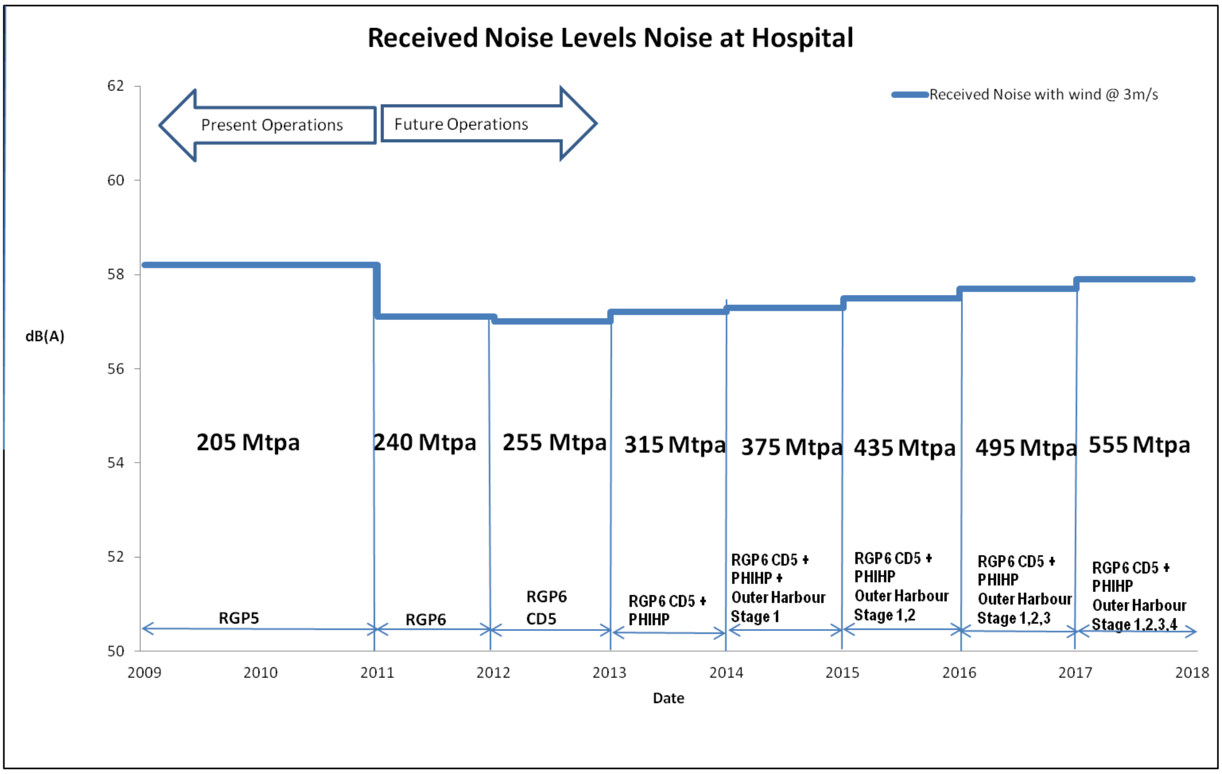


Figure 7-3 Hospital overall predicted noise levels for the different configurations.

8. ANALYSIS OF RESULTS, NOISE CONTROL AND ALARP

8.1 Methodology

The primary purpose of environmental noise control is to propose noise control measures that will reduce noise levels at the sensitive receivers so that they will be compliant with the assigned noise levels. Unfortunately this is not always feasible, as it may not always be possible to practicably implement noise control measures to the extent required to reduce noise at the receivers to a level which they are compliant with the assigned noise levels.

With the above in mind the methodology followed in this report is based on BHP Billiton Iron Ore's noise objectives which are as follows:

- Reduce noise to as low as reasonably practicable, acknowledging growth, and where reasonably possible, comply with the requirements of the Environmental Protection (Noise) regulations 1997 (including seeking an exemption if necessary);
- Where it is impracticable to comply with the Environmental Protection Noise Regulations, ensure continuous improvement is facilitated through a Noise Reduction Management Plan; and
- Ensure the new plant and infrastructure being planned for the Port facilities particularly Prescribed Plant as defined by the Environmental Protection Act, (1984) complies with the Environmental Protection (Noise) regulations 1997.

8.2 Cumulative Impact Compliance

To estimate the feasibility of achieving compliance the cumulative noise impact at the Hospital will be taken as a representative case. The rationale behind using the Hospital is that it has traditionally been used as the benchmark for noise sensitive receivers identified in BHP Billiton Iron Ore's Noise Reduction Management Plan (2009).

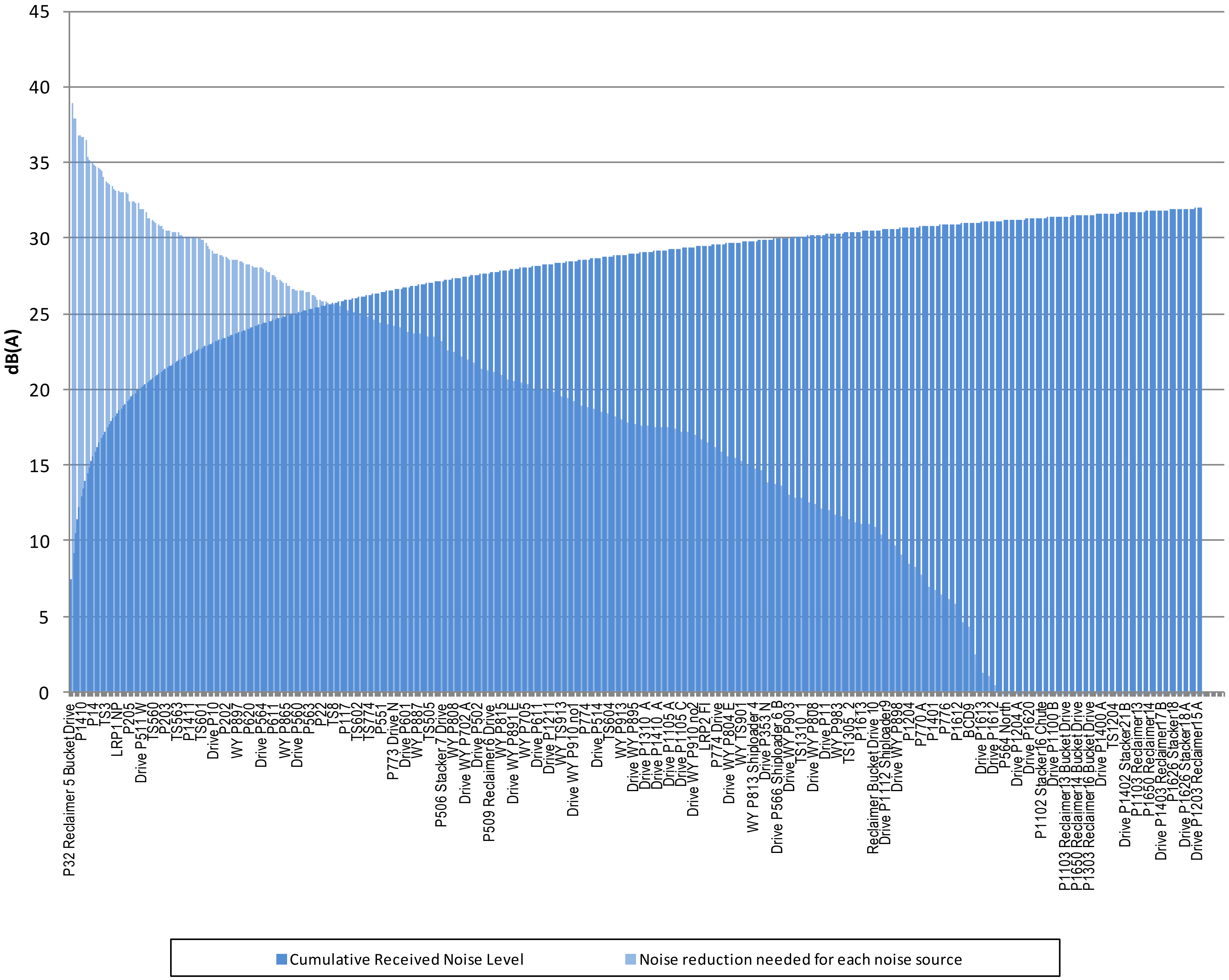


Figure 8-1 Pareto chart showing the noise contributions at the Hospital and the cumulative increase in the noise level at the Hospital with each noise source

The Outer Harbour Stage 4 and PHIHP has approximately 579 noise sources that contribute to the overall noise at the Hospital.[12] Figure 8-1 shows the required noise reduction for each noise sources in order to achieve compliance with the most stringent assigned level (i.e. 32dB (A) at night time). The figure also shows the growth in accumulated noise as each noise source is added to the overall noise level at the Hospital.

As can be seen from the figure each noise source from the facility needs to be reduced, with the highest noise sources requiring up to a 40dB reduction, and with the less significant noise contributors requiring a noise reduction between 30 and 1dB. This level of noise reduction will achieve a noise level of 32 dB (A) at the Hospital but it will also be a huge undertaking, and is not considered reasonably practicable.

8.3 Noise Control Philosophy

The next sections consider the recommended noise control for the in-isolation case and the cumulative case for the Outer harbour development. In recommending the noise control the following has been taken into consideration:

1) **Noise Source Contribution Ranking**. Usually noise control starts with determining which noise sources are contributing significantly to the noise level at the different receivers. In order to effectively reduce the noise at this receiver it is necessary to first address the primary noise sources at the receiver before addressing the less significant noise source contributors. Without addressing the primary noise source the overall noise level will not be significantly reduced.

2) **Baseline Noise Level.** The top noise source at a receiver that has the least practical attenuation will set the baseline for the minimum achievable noise level at that receiver. From this noise level a sliding scale of diminishing returns results. An example of this effect is conveyor P14 which has a stacker running along its length (see Figure 8-2). As the conveyor has a stacker running along its length the noise control options are limited to low noise idlers which can offer a noise reduction of approximately 5 dB. This will reduce the received noise level at the Hospital to approximately 44.2 dB (A) (?? Aren't we aiming for and or we are at around 57 dB (A)?. Which implies that if all the other noise sources are removed the lowest possible noise level at the Hospital will be 44.2 dB (A).

[12] As can be seen from the figure in order to meet the assigned level at the Hospital 80% of the reduction in noise is achieved by reducing the noise emissions from the first noise source.

Figure 8-2 Picture of a stacker and reclaimer with their associated conveyor belt system

3) **Prioritisation of Noise Control for Multiple Receivers and Sources.** The Port Hedland model consists of over 579 noise sources and 7 noise sensitive receivers. The sensitive receivers are distributed both near and far from the facility. Each receiver has a different set of top noise contributors. In some cases the top noise source contributions are similar for some receivers, but not for all. In order to evaluate this complex situation the analysis of multiple noise sources and receivers will require a holistic approach. This is achieved by determining the correlation between noise sources and the ranking of the noise source contribution at the different receivers. This has resulted in a weighting factor being applied to each noise source that will help prioritise noise control measures.

4) **Achieving ALARP**. In order to determine what is practical, factors such as cost, noise reduction at receiver, maintenance and safety will have to be taken into consideration. Ultimately these factors require interdisciplinary input.

8.4 Noise Control and ALARP

A detailed examination of engineering noise controls for the proposed Outer Harbour Development will be undertaken during preparation of the Works Approval application. An integrated approach will be taken that will focus on a range of factors such as:

- BHP Billiton Iron Ore's noise objectives;
- Magnitude of predicted noise impacts at the sensitive receptors;
- Ranking of noise source contributions at the sensitive receptors; and
- The principle of As Low as Reasonably Practicable (ALARP) which balances noise attenuation by considering positive and negative impacts of the noise attenuation on :
    - Safety;
    - Life cycle Costs
    - Reliability of system with noise attenuation in place
    - on-going maintenance requirements; and
    - Operations.

The prime aim of the integrated approach will be to meet BHP Billiton Iron Ore's noise objectives where reasonably practicable, based on optimization of noise controls across BHP Billiton Iron Ore's Port Hedland operations.

In order to ensure that noise control benefits are properly understood various studies have been commissioned in order to determine which noise control options will provide solutions that meet BHP Billiton Iron Ore's noise objectives. Some of these studies include the following:

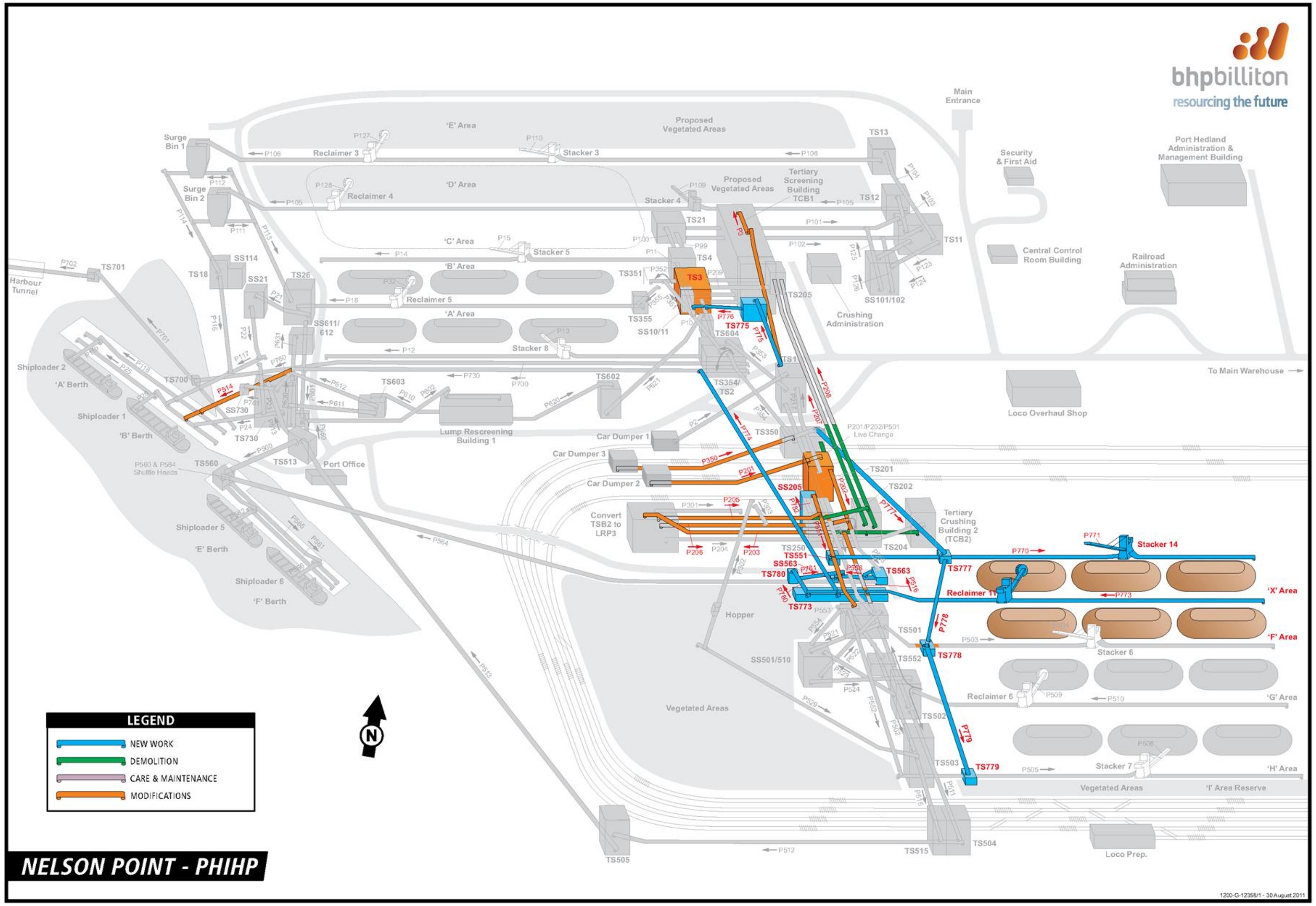
- Long term measurement of a range of low noise idlers (6 different types in total). The aim of this trial is to determine which low noise idler type provides the best reduction in noise over an extended period of time. The trial will be run over 18 months (17 months have already been completed) in order to monitor each idler type and to determine if the benefit they offer deteriorates over time. From this trial the preferred idler type will be chosen.
- Measurement of conveyors with varying belt widths and speeds. A design option that is under consideration is the increase in conveyor belt widths which will reduce conveyor speeds. The reduction in speed will result in a reduction in noise. In order to accurately determine the benefit offered field measurements of a range of conveyors is planned.
- ALARP Work Sessions. Various ALARP work sessions are planned. The primary purpose of the initial work sessions will be to understand the practicability of various noise control solutions. A preliminary ALARP work session has already been held which looked at various noise control solutions such as different conveyor enclosures and noise shields. The output of this work session was fed back into the design team for further analysis.
- Model Improvement. The model has been peer reviewed. The outcomes of the review were very positive and no major issues were identified. Based on the review recommendations various aspects of the model will be updated improving the accuracy of the model.

The assessment of potential engineering noise control measures may include the installation of:

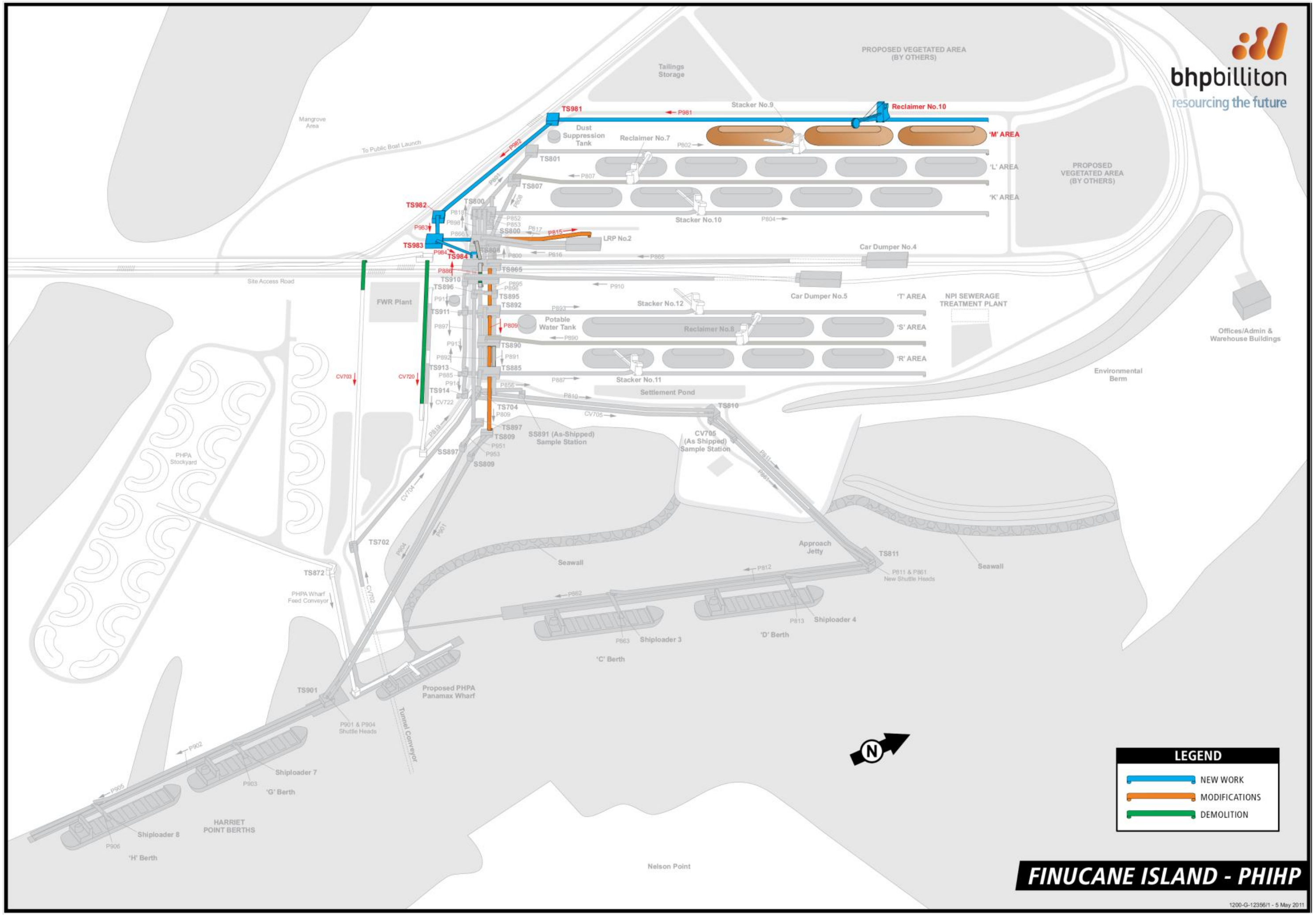
- Landside noise barriers;
- Wider and slower belts
- Enclosures for conveyor drives and transfer stations;
- Ultra low and low noise conveyor idlers
- Low noise specification equipment.

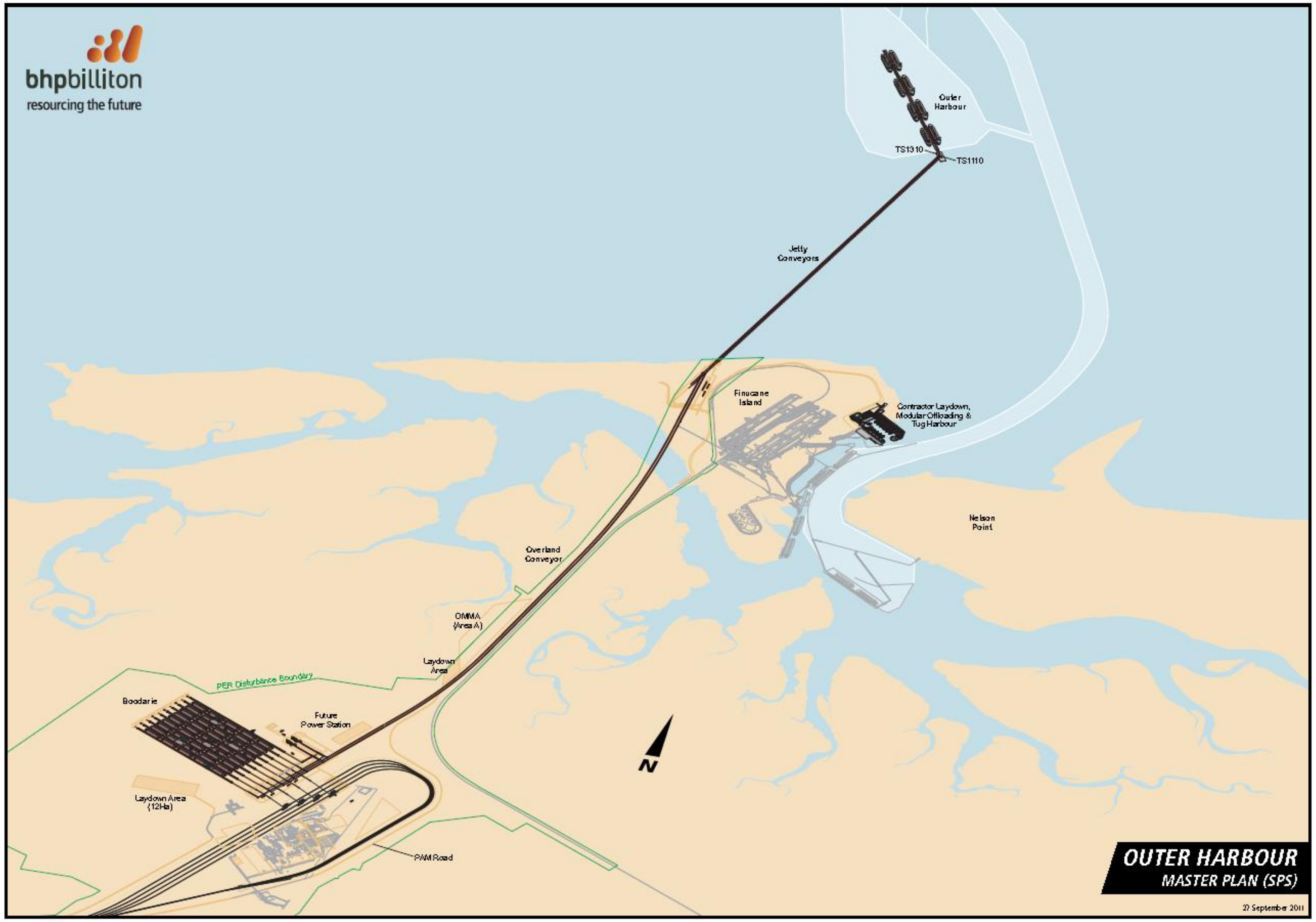
The final package of engineering noise controls for the construction and operation of Stage 1, will be confirmed as part of the Works Approval application proposed to be submitted in 1st quarter 2012. This will also include modeling for the operation of all four stages of the proposed development.

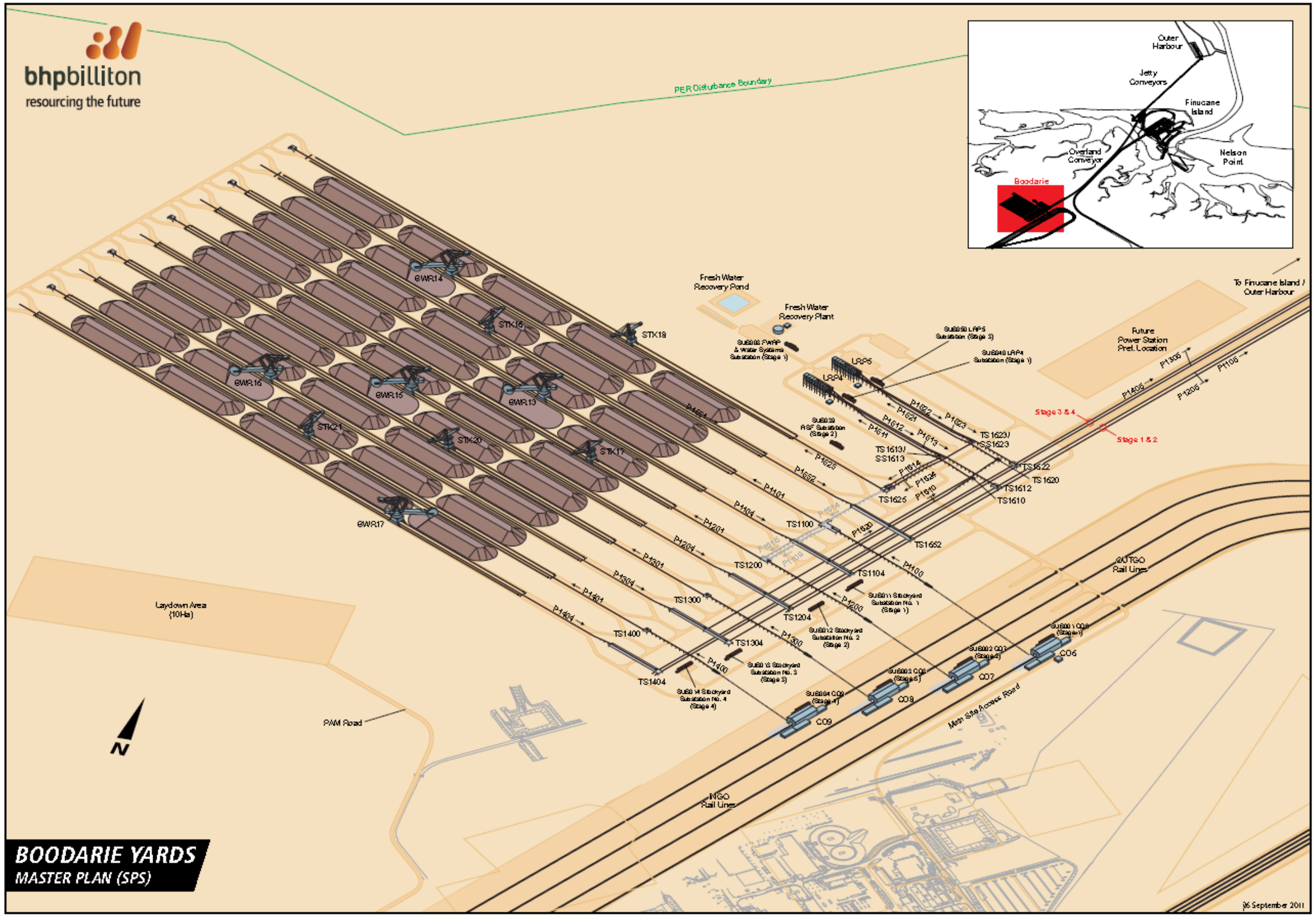
APPENDIX A : PHIHP CONFIGURATION NELSON POINT

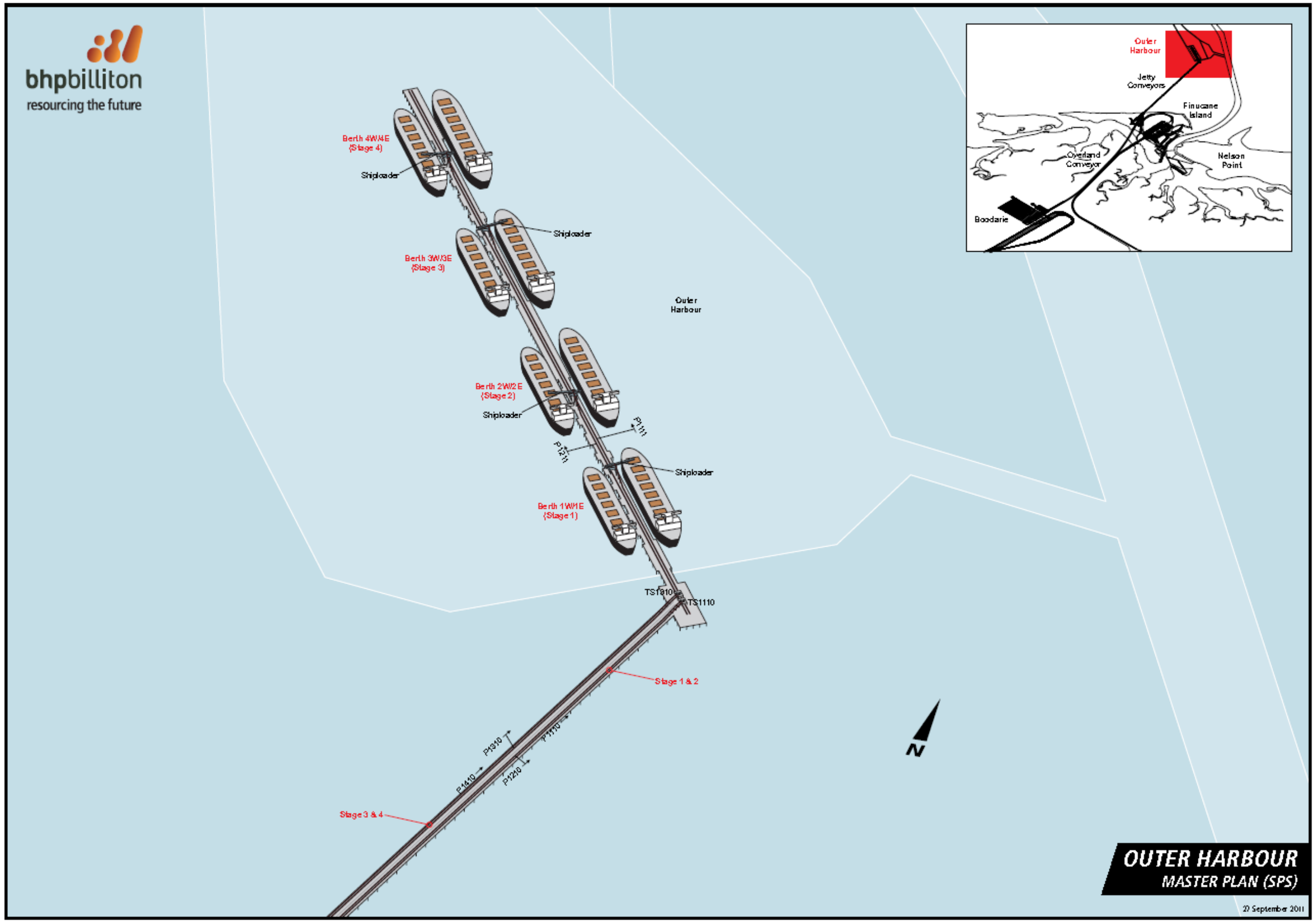


APPENDIX B : PHIHP AND OUTER HARBOUR CONFIGURATION: FINUCANE ISLAND AND BOODARIE




bhpbilliton
resourcing the future
Outer Harbour
TS1310
TS1110
Jetty Conveyors
Finucane Island
Contractor Laydown, Modular Offloading & Tug Harbour
Nelson Point
Overland Conveyor
OMMA (Area A)
Laydown Area
PER Disturbance Boundary
Boodarie
Future Power Station
Laydown Area (12Ha)
PAM Road
N
OUTER HARBOUR
MASTER PLAN (SPS)
27 September 2011


bhpbilliton
resourcing the future
BOODARIE YARDS
MASTER PLAN (SPS)
PER Disturbance Boundary
Outer Harbour
Jetty Conveyors
Finucane Island
Overland Conveyor
Nelson Point
Boodarie
Fresh Water Recovery Pond
Fresh Water Recovery Plant
To Finucane Island / Outer Harbour
Future Power Station Pref. Location
Stage 3 & 4
Stage 1 & 2
Laydown Area (10Ha)
PAM Road
OUTGO Rail Lines
INGO Rail Lines
Main Site Access Road
N
26 September 2011


bhpbilliton
resourcing the future
Berth 4W/4E (Stage 4)
Shiploader
Shiploader
Berth 3W/3E (Stage 3)
Outer Harbour
Berth 2W/2E (Stage 2)
Shiploader
Shiploader
Berth 1W/1E (Stage 1)
TS1010
TS1110
Stage 1 & 2
Stage 3 & 4
N
Outer Harbour
Jetty Conveyors
Finucane Island
Overland Conveyor
Nelson Point
Boodarie
OUTER HARBOUR
MASTER PLAN (SPS)

APPENDIX C : EXISTING SOURCES SOUND POWER LEVEL

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
Conveyors										
P10	86	91.6	91.5	90.8	88	83.2	78.7	70.1	65.8	89.2
P11	86.8	93.6	93.9	91.5	87.3	86.4	83.5	76.1	71.4	91.2
P117	97.5	97	94.6	92.5	87.3	82.2	80.6	73.1	67.5	89.7
P118	88	91.1	91	91.1	88.6	86.2	81.9	74.4	68.2	90.9
P119 Shiploader 2	94.9	95.7	93.1	90.6	89.8	84.5	81.7	74.8	69.1	90.8
P12	91.6	95.9	87.3	85.3	81.4	75.5	75.3	66.3	57.1	83.5
P13 Stacker 8	89.5	92.9	92.3	91.9	84.9	78.8	77.4	68.7	63.2	87.5
P14	84.6	85.8	81.3	80.7	80.4	79.1	77.8	70.9	64.1	84
P15 Stacker 5	85.4	92.3	92.2	91.2	88.1	85.2	83.8	74	67.8	90.9
P16	94.2	91	89	88.7	90.7	86	79.2	71.6	65.1	90.8
P2	93.6	97.4	95.3	93.5	89.3	84	83.5	78.1	71.3	91.6
P201	89.3	96.2	90.4	87.8	83.6	78.1	73.7	65.1	56.9	85.2
P202	87.7	93.4	90.2	88.5	87.3	82.2	81.7	77.4	70	89.2
P203	91.4	96.7	92.1	88.9	86.7	83	78.9	73.8	70.3	88.6
P205	94.6	97.9	92.8	91.3	89.9	85.9	82.5	75.3	71.1	91.4
P206	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
P21	94.9	95.7	93.1	90.6	89.8	84.5	81.7	74.8	69.1	90.8
P22	93.5	97.4	94.4	91.5	88.2	83.5	83.1	72.4	67	90.5
P23	91.7	96.3	95.2	92.7	90.8	86	84.3	76.9	70.3	92.4
P24	89	93.6	94	89.9	86.9	81.8	80.6	71.7	65	88.8
P25	86	88.6	90.8	89.2	84.2	79.7	76.8	68.4	66.4	86.4
P26 Shiploader 1	94.9	95.7	93.1	90.6	89.8	84.5	81.7	74.8	69.1	90.8
P29	86	91.6	91.5	90.8	88	83.2	78.7	70.1	65.8	89.2
P32 Reclaimer 5	91.1	95.5	95	93.8	90.7	86.2	81.2	73.6	68.2	92.1
P350	92.8	96.6	91.8	89.5	88.5	84.3	79.3	73.4	68.9	89.7
P351	89.7	94.4	91.3	90.5	88	82.2	78.4	70.5	64.4	88.9
P353	96.6	99.6	97.4	93.6	91.9	88.1	85.7	77.9	71.8	93.9
P354	89.7	94.4	91.3	90.5	88	82.2	78.4	70.5	64.4	88.9
P355	89.3	96.2	90.4	87.8	83.6	78.1	73.7	65.1	56.9	85.2
P501	88.7	87.5	89.5	90.9	91	87	82	74.3	66.7	91.9
P502	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
P503	88.7	92.6	89.8	89.1	89.5	83	78.7	70.3	64.2	89.4
P504 Stacker 6	89	93.3	94.1	92.2	93.3	93.1	89.3	81.4	75.9	96.7
P505	92.7	89.4	92.4	91.8	90.1	82.4	77.7	68.5	63.8	90
P506 Stacker 7	89	93.3	94.1	92.2	93.3	93.1	89.3	81.4	75.9	96.7
P509 Reclaimer 6	88.9	94.5	95.1	95.5	94.5	88	83	76	69.7	94.6
P510	91.5	87.9	89.5	88.9	86	80.5	76.3	67.6	62.3	87
P511	85	90.4	91.9	92.7	90.7	86.9	82.4	76.2	71.7	92.2

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
P512	97.8	96	93	92.7	90.7	86.3	82.4	73.8	69.8	92
P513	94	91.3	92.6	94.1	90.6	85.4	81.4	75.5	68.9	91.9
P514	94.3	97.9	94.1	94.2	90.7	86.6	79.1	69.7	66.1	92
P551	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
P551A	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
P552	79.6	82.1	82	80.4	78.8	76.6	73	66.8	63.2	81.3
P560	93.7	96.1	92.5	90.7	88.7	83.1	80.7	74.5	68.8	89.9
P561	87.7	93.4	90.2	88.5	87.3	82.2	81.7	77.4	70	89.2
P562 Shiploader 5	89.3	96.2	90.4	87.8	83.6	78.1	73.7	65.1	56.9	85.2
P563	87.7	93.4	90.2	88.5	87.3	82.2	81.7	77.4	70	89.2
P564 sec3 ground elev	85.7	91.4	88.2	86.5	85.3	80.2	79.7	75.4	68	87.2
P565	87.7	93.4	90.2	88.5	87.3	82.2	81.7	77.4	70	89.2
P566 Shiploader 6	89.3	96.2	90.4	87.8	83.6	78.1	73.7	65.1	56.9	85.2
P601	85.6	89.3	91.4	92	90.5	85.5	79.7	70.7	65.8	91.1
P602	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
P610	86.4	90.1	90.9	91.9	91.5	85.4	79.6	71.4	67	91.5
P611	86.4	90.1	90.9	91.9	91.5	85.4	79.6	71.4	67	91.5
P612	86.4	90.1	90.9	91.9	91.5	85.4	79.6	71.4	67	91.5
P620	84.6	87.1	87	85.4	83.8	81.6	78	71.8	68.2	86.3
P621	87.9	94.6	89.2	87.8	85.1	81.3	77.5	71.6	67.2	87
P700	90.1	93.3	93.6	90.7	90.6	84.5	81.5	74.8	67.8	91.1
P701	91	90.1	90.1	91.4	88.6	83	79.3	74	67	89.6
P702	88.6	91.3	89.3	87.7	84.9	81.8	79.3	75.3	68.4	87.5
P730	87.7	93.4	90.2	88.5	87.3	82.2	81.7	77.4	70	89.2
WY P705	86.7	97.1	94	89	86.6	80.6	77.1	68.5	63.3	87.7
WY P800	92.8	101	96.1	94.2	92.2	87	85.4	78.7	71.6	93.7
WY P801	92.8	91.4	92.8	95.4	90.4	84.7	81.3	74.3	68.2	91.9
WY P802	92.8	95.6	94.3	91.6	90.7	85	83.1	76.6	68.1	91.7
WY P803 Stacker 9	92.9	97.9	97.4	96.5	92	84	81.9	73.3	48.7	93
WY P804	95.1	96.2	93.9	92.2	90.1	86.9	84.4	75	65.5	92.3
WY P805 Stacker 10	89	93.3	94.1	92.2	93.3	93.1	89.3	81.4	75.9	96.7
WY P806 Reclaimer 7	88.9	94.5	95.1	95.5	94.5	88	83	76	69.7	94.6
WY P807	87.3	93.2	90.9	89.1	89.9	82.7	81.1	73.8	65.9	90
WY P808	95.1	96.2	93.9	92.2	90.1	86.9	84.4	75	65.5	92.3
WY P809 B	87.3	90.9	91	91.7	88.7	81.8	79.5	71.7	64.6	89.5
WY P810	83.6	90.7	89.4	90.5	85.4	79.3	76.3	66	70.1	87
WY P811	89.6	93	89.4	87.2	87.2	80.4	77	69.9	63.1	87.3
WY P812	87.1	91.7	90.8	87.7	82.1	76.6	75.1	66.8	60.9	84.6
WY P813 Shiploader 4	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
WY P815	90.6	94.5	93.3	91.6	86.3	81.3	78.4	72.5	69.7	88.6

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
WY P816	101.2	102.8	98.4	96.9	95.9	94.4	93.3	87.6	83.4	99.6
WY P817	101.2	102.8	98.4	96.9	95.9	94.4	93.3	87.6	83.4	99.6
WY P818	88.8	92.3	92.4	88.3	81.8	79.6	76.2	68.1	61.1	85.7
WY P861	88.6	89.3	89.7	85.2	81.2	74.8	71.8	65.7	61.8	82.8
WY P862	92.3	92.4	91.8	88.5	85.8	82.2	77.8	70.2	65.3	87.7
WY P863 Shiploader 3	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
WY P865	87.2	91.8	89.3	88.2	88.2	81.5	79.4	73.1	66	88.6
WY P866	92.8	95.6	94.3	91.6	90.7	85	83.1	76.6	68.1	91.7
WY P885	92.8	95.6	94.3	91.6	90.7	85	83.1	76.6	68.1	91.7
WY P886	95.1	96.2	93.9	92.2	90.1	86.9	84.4	75	65.5	92.3
WY P887	84.3	85.4	84.5	82.7	81.2	76.4	74.6	66.3	61	82.7
WY P888 Stacker 11	89	93.3	94.1	92.2	93.3	93.1	89.3	81.4	75.9	96.7
WY P889 Reclaimer 8	95	102.4	101.6	99	95	87.8	84.5	77.7	75.1	96.1
WY P890	85.1	85.2	83.8	82.4	82.4	76.8	74.3	67.6	62	83.1
WY P891	87.6	93.2	93.4	93.7	90	81.9	80	71.9	64.6	90.7
WY P892	87.3	93.2	90.9	89.1	89.9	82.7	81.1	73.8	65.9	90
WY P893	93	90	88.9	90.3	90.9	84.2	79.5	70.6	64.8	90.6
WY P894 Stacker 12	84.8	86.9	82.9	81.6	79.2	71	68.9	57.6	76.1	80.8
WY P895	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
WY P896	89.3	96.2	90.4	87.8	83.6	78.1	73.7	65.1	56.9	85.2
WY P897	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
WY P898	87.2	91.8	89.3	88.2	88.2	81.5	79.4	73.1	66	88.6
WY P901	77.6	83.5	79.8	75.4	73.9	69.6	64.9	58.9	54.1	75.3
WY P902	87.6	93.5	89.8	85.4	83.9	79.6	74.9	68.9	64.1	85.3
WY P903 Shiploader 7	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
WY P904	77.6	83.5	79.8	75.4	73.9	69.6	64.9	58.9	54.1	75.3
WY P905	87.6	93.5	89.8	85.4	83.9	79.6	74.9	68.9	64.1	85.3
WY P906 Shiploader 8	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
WY P910	87.2	91.8	89.3	88.2	88.2	81.5	79.4	73.1	66	88.6
WY P911	93.7	96.1	92.5	90.7	88.7	83.1	80.7	74.5	68.8	89.9
WY P913	87.2	91.8	89.3	88.2	88.2	81.5	79.4	73.1	66	88.6
WY P914	89.3	96.2	90.4	87.8	83.6	78.1	73.7	65.1	56.9	85.2
Conveyor Drives										
Drive P10	103.2	110.6	106.5	105.8	112.3	111.7	103.3	92.2	82.5	114.3
Drive P11	99.7	100.5	104.9	102.8	98	96.3	94.5	88.1	76.4	101.8
Drive P113 W	103.9	105	109.8	108.7	110.5	110.4	107.9	96.9	94.6	114.2
Drive P117	100.2	104.7	105.2	103.1	103.6	101.3	96.7	93.2	90.1	105.7
Drive P118	101.1	103.4	103.7	104.3	110.9	111.4	101	92.2	83.6	113.4
Drive P119 Shiploader 2	99.7	100.5	104.9	102.8	98	96.3	94.5	88.1	76.4	101.8

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
Drive P12 N	107.7	109.9	108.5	104.6	105.6	108.4	94.4	93.6	88.5	110
Drive P12 S	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P14 N	106.9	112.3	108.3	105.7	103.4	103.9	96.8	93.2	85.9	107.1
Drive P14 S	105.4	110.9	107.7	106.1	103.1	103.7	96.1	92.2	86	106.8
Drive P16 N	104.9	109.8	111	108.9	114.7	110	115.3	102.2	95.4	118.6
Drive P16 S	103.8	107.8	106.5	105.4	106.1	106.6	101.1	92.4	86.2	109.6
Drive P2 N	100.9	104.2	104.1	103	104.3	98.9	99.6	87.7	79.3	105.7
Drive P2 S	101.2	104.7	102.8	104.3	107.6	100.9	96.5	87.3	79	107
Drive P201N	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P201S	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P202	103.3	106.7	106.1	104.8	105.3	109.7	108.3	97.5	93.5	113.3
Drive P203 A	105.8	108.6	106.3	107.5	110.6	103.9	99.4	90.2	82	110.1
Drive P203 B	105.8	108.6	106.3	107.5	110.6	103.9	99.4	90.2	82	110.1
Drive P205 E	105.8	108.6	106.3	107.5	110.6	103.9	99.4	90.2	82	110.1
Drive P206	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P21	100.2	104.7	105.2	103.1	103.6	101.3	96.7	93.2	90.1	105.7
Drive P22 S	97	102.2	104.4	103.8	102.2	108.6	107.6	93.6	92.5	112.1
Drive P23 N	95.9	102.6	102.5	104.3	109.7	107	104.3	98.1	89.1	111.6
Drive P24 E	95.1	98.6	106	99.7	99.2	97.4	95.4	89.3	87.8	102.5
Drive P25	99.7	100.5	104.9	102.8	98	96.3	94.5	88.1	76.4	101.8
Drive P26 Shiploader 1	99.7	100.5	104.9	102.8	98	96.3	94.5	88.1	76.4	101.8
Drive P29	103.2	110.6	106.5	105.8	112.3	111.7	103.3	92.2	82.5	114.3
Drive P350	93.1	101.2	101.2	93.3	96	95.9	85.1	77.1	70.4	98.4
Drive P351	103.2	107.6	105.4	105.4	110.4	110.9	102.8	95.7	88.9	113.3
Drive P353 N	93.7	90.7	89.6	91	91.5	84.9	80.2	71.3	65.5	91.3
Drive P354	99.6	103.4	103.8	103.5	104.7	107.2	96.3	88.4	84.3	108.9
Drive P355	102.1	104.2	102.4	106.1	111.2	111.5	103.1	95.3	83.6	113.8
Drive P501	103.9	105.7	104.3	106.3	112	112	103	94.4	84.9	114.3
Drive P502	100.2	104.7	105.2	103.1	103.6	101.3	96.7	93.2	90.1	105.7
Drive P503 N	102.2	107.3	109	106.5	107	112.3	106.2	95.6	88.7	114.2
Drive P503 S	102	107.5	109.7	107.3	107.9	113.6	109	97.7	89.8	115.8
Drive P505 A	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P505 B	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P510 N	101.4	105.5	107.4	103.8	107.9	108.6	103.6	94.7	86.4	111.5
Drive P510 S	101.6	105.8	104.8	102.1	105.9	103.7	96.8	89.4	82.8	107.2
Drive P511 W	104.3	105.4	108.4	106.6	110.9	115	110.2	99.4	91	117.3
Drive P512 N	105.5	106.5	107.5	106.2	107.7	111.7	106.9	98.3	89.9	114.1
Drive P513 W	102.1	103.6	104.7	104.5	105.4	112	101.2	94.6	88.3	113
Drive P514	95.1	98.6	106	99.7	99.2	97.4	95.4	89.3	87.8	102.5
Drive P551	100.2	104.7	105.2	103.1	103.6	101.3	96.7	93.2	90.1	105.7
Drive P551A	100.2	104.7	105.2	103.1	103.6	101.3	96.7	93.2	90.1	105.7

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
Drive P552	102.1	104.2	102.4	106.1	111.2	111.5	103.1	95.3	83.6	113.8
Drive P560	105.8	108.6	106.3	107.5	110.6	103.9	99.4	90.2	82	110.1
Drive P561	103	107.9	108.8	109.7	110.3	106.9	107.1	90.1	82.1	112.7
Drive P562 Shiploader 5 A	99.7	100.5	104.9	102.8	98	96.3	94.5	88.1	76.4	101.8
Drive P562 Shiploader 5 B	99.7	100.5	104.9	102.8	98	96.3	94.5	88.1	76.4	101.8
Drive P563	100.2	104.7	105.2	103.1	103.6	101.3	96.7	93.2	90.1	105.7
Drive P564	103	107.9	108.8	109.7	110.3	106.9	107.1	90.1	82.1	112.7
Drive P565	103	107.9	108.8	109.7	110.3	106.9	107.1	90.1	82.1	112.7
Drive P566 Shiploader 6 A	99.7	100.5	104.9	102.8	98	96.3	94.5	88.1	76.4	101.8
Drive P566 Shiploader 6 B	99.7	100.5	104.9	102.8	98	96.3	94.5	88.1	76.4	101.8
Drive P601	100.2	104.7	105.2	103.1	103.6	101.3	96.7	93.2	90.1	105.7
Drive P602	95.1	98.6	106	99.7	99.2	97.4	95.4	89.3	87.8	102.5
Drive P610	100.2	104.7	105.2	103.1	103.6	101.3	96.7	93.2	90.1	105.7
Drive P611	95.1	98.6	106	99.7	99.2	97.4	95.4	89.3	87.8	102.5
Drive P612	95.1	98.6	106	99.7	99.2	97.4	95.4	89.3	87.8	102.5
Drive P620	105.8	108.6	106.3	107.5	110.6	103.9	99.4	90.2	82	110.1
Drive P621 W	100.2	104.7	105.2	103.1	103.6	101.3	96.7	93.2	90.1	105.7
Drive P700 E	110	106.9	106.8	108.2	109.9	112.8	104.2	94.2	87.7	114.6
Drive P700 W	111.2	112.9	108.8	108.5	106.1	101.9	102.7	95.5	92.4	108.9
Drive P701 E	103.1	106.2	106.6	106.2	105.2	113.5	107.9	96.4	92.5	115.2
Drive P701 W	99.9	104.7	106.5	107	108.5	111.1	104.8	96.5	92.7	113.4
Drive P702 A	105.8	108.6	106.3	107.5	110.6	103.9	99.4	90.2	82	110.1
Drive P702 B	105.8	108.6	106.3	107.5	110.6	103.9	99.4	90.2	82	110.1
Drive P730	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive WY P702 A	105.8	108.6	106.3	107.5	110.6	103.9	99.4	90.2	82	110.1
Drive WY P702 B	105.8	108.6	106.3	107.5	110.6	103.9	99.4	90.2	82	110.1
Drive WY P704	100.2	105.6	102.9	101.6	100.9	101.8	94.8	88.6	81	104.5
Drive WY P705 E	105.8	107.9	109	107.5	109	112.3	102	93.2	85.9	113.8
Drive WY P800	108	111.5	102.9	104.1	106.5	111.7	99.9	92.3	84.2	112.8
Drive WY P801 W	98.8	106.6	102.9	101.4	101.9	102.6	96.4	89.7	81	105.5
Drive WY P802 N	100.7	99.1	101	102.6	104.7	108.7	100.9	92.6	79.7	110.4
Drive WY P802 S	101.6	98.8	101.6	102.6	108.7	107.5	100.5	93.1	79.6	110.5
Drive WY P804 E	96.8	103.3	102	100.3	106.1	102.9	94.9	86.3	76.7	106.6
Drive WY P804 W	97.8	102.3	101.8	98.8	101.2	102.6	98.9	85.9	76	105.6
Drive WY P807 E	99	102.2	101.8	101.9	105.1	104.5	97.5	87.1	79.1	107.4
Drive WY P807 W	102.9	105.1	101.6	102.1	108.1	99.8	92.1	86.6	79.3	106.6
Drive WY P808	100.2	105.6	102.9	101.6	100.9	101.8	94.8	88.6	81	104.5
Drive WY P809 S	109	106.6	102.5	102.9	108.4	105.2	104.1	90.8	84.7	110.2
Drive WY P810 E	99.4	104.8	101.3	101.9	102.9	101.4	94.9	82.7	67.7	104.8
Drive WY P811 N	104.2	103.4	102.6	105.2	104.5	102.1	95.7	84.2	67.3	106

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
Drive WY P812 N	101.1	103.3	98.9	96.3	92.8	92.4	88	77.9	81.8	96.5
Drive WY P813	99.7	100.5	104.9	102.8	98	96.3	94.5	88.1	76.4	101.8
Drive WY P815 W	100.2	105.6	102.9	101.6	100.9	101.8	94.8	88.6	81	104.5
Drive WY P816 E	103.9	106.6	105.5	104	104.4	106	101.3	90.2	81.7	108.8
Drive WY P817	103.9	106.6	105.5	104	104.4	106	101.3	90.2	81.7	108.8
Drive WY P818	102.3	108.3	109.4	105.1	105.3	104.4	98.1	93.6	96.5	108.2
Drive WY P861 SE	110.2	111.9	107.9	110.3	113.4	105.3	102.6	96.9	90.2	112.7
Drive WY P862 W	101.1	103.4	103.7	104.3	110.9	111.4	101	92.2	83.6	113.4
Drive WY P863	99.7	100.5	104.9	102.8	98	96.3	94.5	88.1	76.4	101.8
Drive WY P865 E	107.7	113.3	108.2	108.7	109.2	108.6	97.9	92.6	82.9	111.3
Drive WY P865 W	107.8	116	110.3	107.6	105.8	108.1	96.4	90.3	80.8	110.1
Drive WY P866	100.7	99.1	101	102.6	104.7	108.7	100.9	92.6	79.7	110.4
Drive WY P885	101.9	102	102.8	108.1	106.1	106.2	98.4	89.6	84	109.1
Drive WY P886	108	111.5	102.9	104.1	106.5	111.7	99.9	92.3	84.2	112.8
Drive WY P887 N	100.7	99.1	101	102.6	104.7	108.7	100.9	92.6	79.7	110.4
Drive WY P887 S	101.6	98.8	101.6	102.6	108.7	107.5	100.5	93.1	79.6	110.5
Drive WY P890 N	100.7	99.1	101	102.6	104.7	108.7	100.9	92.6	79.7	110.4
Drive WY P890 S	102	105.3	105.5	107.2	111.6	111.7	103.8	98.7	86.6	114.3
Drive WY P891	101.6	101.4	100.4	100.3	106.9	106.9	102	89	82.3	109.8
Drive WY P891 E	101.6	101.4	100.4	100.3	106.9	106.9	102	89	82.3	109.8
Drive WY P892	110.2	111.9	107.9	110.3	113.4	105.3	102.6	96.9	90.2	112.7
Drive WY P893 N	100.7	99.1	101	102.6	104.7	108.7	100.9	92.6	79.7	110.4
Drive WY P893 S	101.6	98.8	101.6	102.6	108.7	107.5	100.5	93.1	79.6	110.5
Drive WY P895	97	102.2	104.4	103.8	102.2	108.6	107.6	93.6	92.5	112.1
Drive WY P896	95.1	98.6	106	99.7	99.2	97.4	95.4	89.3	87.8	102.5
Drive WY P897	100.2	104.7	105.2	103.1	103.6	101.3	96.7	93.2	90.1	105.7
Drive WY P898	93.9	99.8	97.8	97.7	97.8	100.6	95.8	86	80.3	103.2
Drive WY P901	101.1	103.4	103.7	104.3	110.9	111.4	101	92.2	83.6	113.4
Drive WY P902	101.1	103.4	103.7	104.3	110.9	111.4	101	92.2	83.6	113.4
Drive WY P903	99.7	100.5	104.9	102.8	98	96.3	94.5	88.1	76.4	101.8
Drive WY P904	101.1	103.4	103.7	104.3	110.9	111.4	101	92.2	83.6	113.4
Drive WY P905	101.1	103.4	103.7	104.3	110.9	111.4	101	92.2	83.6	113.4
Drive WY P906 Shiploader 8	99.7	100.5	104.9	102.8	98	96.3	94.5	88.1	76.4	101.8
Drive WY P910 no1	103	107.9	108.8	109.7	110.3	106.9	107.1	90.1	82.1	112.7
Drive WY P910 no2	103	107.9	108.8	109.7	110.3	106.9	107.1	90.1	82.1	112.7
Drive WY P911	105.2	108.8	110.3	108.6	114.2	110	113.2	102.3	94.9	117.3
Drive WY P913	101.6	106.8	105.7	103	105.8	108.8	106.3	98.7	90.5	112.1
Drive WY P914	101.6	106.8	105.7	103	105.8	108.8	106.3	98.7	90.5	112.1
P13 Stacker 8 Drive	106.7	106.2	108.4	104.9	104.9	101.3	99.5	91.2	86.9	106.8
P15 Stacker 5 N Drive	103.4	103.7	105.2	104	102.9	101.2	99.5	92.2	87.2	106.1

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
P15 Stacker 5 S Drive	101.6	104.4	107.8	104.4	102.8	101.1	98.3	91.8	85.4	105.8
P32 Reclaimer 5 Bucket Drive	102.5	106.5	111.3	114.5	113.2	114.6	108.1	101.1	96.8	117.3
P32 Reclaimer 5 Drive	104.7	107.4	109.6	109.9	109	114.2	106.3	97	88.4	115.8
P504 Stacker 6 Drive	98.7	104.1	107.2	105.5	104.7	103.8	102.5	92.7	85.7	108.5
P506 Stacker 7 Drive	98.7	104.1	107.2	105.5	104.7	103.8	102.5	92.7	85.7	108.5
P509 Reclaimer 6 Bucket Drive	99.4	101.4	106.2	106.8	104.7	109.1	101.7	95.9	86	111
P509 Reclaimer 6 Drive	104.1	106.1	110.9	111.4	109.4	113.8	106.4	100.5	90.6	115.7
WY P803 Stacker 9 Drive	98.7	104.1	107.2	105.5	104.7	103.8	102.5	92.7	85.7	108.5
WY P805 Stacker 10 Drive	98.7	104.1	107.2	105.5	104.7	103.8	102.5	92.7	85.7	108.5
WY P806 Reclaimer 7 Bucket Drive	99.4	101.4	106.2	106.8	104.7	109.1	101.7	95.9	86	111
WY P806 Reclaimer 7 Drive	104.1	106.1	110.9	111.4	109.4	113.8	106.4	100.5	90.6	115.7
WY P888 Stacker 11 Drive	98.7	104.1	107.2	105.5	104.7	103.8	102.5	92.7	85.7	108.5
WY P889 Reclaimer 8 Bucket Drive	102.8	102.7	106.6	114.3	111.2	108.5	101.4	98.2	95.7	113
WY P889 Reclaimer 8 Drive	96.6	99.8	100.4	102.8	110	104.4	101.6	94.4	83	110
WY P894 Stacker 12 Drive	86.2	91	91.3	88.1	85.8	81.5	76.9	69.2	62	87.2
Others										
CD 1	122.9	123.1	118.2	113.9	107.5	104.3	100.8	97.6	88	111.2
CD 2	122.9	123.1	118.2	113.9	107.5	104.3	100.8	97.6	88	111.2
CD 3	122.9	123.1	118.2	113.9	107.5	104.3	100.8	97.6	88	111.2
LRP1 NP	121.6	125.5	119.9	116.3	110.6	107.5	104.9	101.7	93.4	114.2
LRP2 FI	120	123	116.3	111.9	107.1	103.3	100	94.7	85.8	110
LRP3 NP	121.6	125.5	119.9	116.3	110.6	107.5	104.9	101.7	93.4	114.2
TS1	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	108.7
TS2/354	105	109.9	108.9	106.7	112.7	109.6	103.2	96.5	89.6	108.7
TS20	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS201	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	111.7
TS202	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	111.7
TS207	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS22	80.2	85.1	84.1	81.9	87.9	84.8	78.4	71.7	64.8	108.7
TS250	83.2	88.1	87.1	85	90.9	87.8	81.4	74.7	67.8	108.7
TS26	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	108.7
TS3	106.2	111.1	110.1	108	113.9	110.9	104.4	97.7	90.8	108.7
TS350	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	91.7
TS351	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS355	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
TS4	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	111.7
TS501	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	111.7
TS502	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	108.7
TS503	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	108.7
TS504/515	80.2	85.1	84.1	81.9	87.9	84.8	78.4	71.7	64.8	108.7
TS505	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	111.7
TS506	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	111.7
TS513	83.2	88.1	87.1	85	90.9	87.8	81.4	74.7	67.8	111.7
TS551	80.2	85.1	84.1	81.9	87.9	84.8	78.4	71.7	64.8	111.7
TS551	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	108.7
TS560	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	108.7
TS563	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	108.7
TS601	105	109.9	108.9	106.7	112.7	109.6	103.2	96.5	89.6	108.7
TS602	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS603	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	108.7
TS604	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	111.7
TS700	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS701	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS730	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	108.7
TS8	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
WY TS702	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	111.7
WY TS704	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	111.7
WY TS800	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	108.7
WY TS801	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
WY TS807	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
WY TS808	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
WY TS809	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	108.7
WY TS810	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	91.7
WY TS811	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	108.7
WY TS865	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	108.7
WY TS885	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	111.7
WY TS890	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	111.7
WY TS892	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
WY TS895	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
WY TS896	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
WY TS897	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	111.7
WY TS901	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	111.7
WY TS910	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	111.7
WY TS911	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	111.7
WY TS913	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
WY TS914	80.2	85.1	84.1	81.9	87.9	84.8	78.4	71.7	64.8	108.7

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
P13 Stacker 8 Chute	97.3	105	108.6	105.1	105.4	101.1	96.5	89.2	81.6	106.3
P15 Stacker 5 Chute	97.3	105	108.6	105.1	105.4	101.1	96.5	89.2	81.6	106.3
P32 Reclaimer 5 Chute	101	98	100.5	101.2	101.4	102.8	98.1	95.1	87.3	106.1
P504 Stacker 6 Chute	97.3	105	108.6	105.1	105.4	101.1	96.5	89.2	81.6	106.3
P506 Stacker 7 Chute	97.3	105	108.6	105.1	105.4	101.1	96.5	89.2	81.6	106.3
P509 Reclaimer 6 Chute	101	98	100.5	101.2	101.4	102.8	98.1	95.1	87.3	106.1
WY P803 Stacker 9 Chute	97.3	105	108.6	105.1	105.4	101.1	96.5	89.2	81.6	106.3
WY P805 Stacker 10 Chute	97.3	105	108.6	105.1	105.4	101.1	96.5	89.2	81.6	106.3
WY P806 Reclaimer 7 Chute	101	98	100.5	101.2	101.4	102.8	98.1	95.1	87.3	106.1
WY P888 Stacker 11 Chute	97.3	105	108.6	105.1	105.4	101.1	96.5	89.2	81.6	106.3
WY P889 Reclaimer 8 Chute	101	98	100.5	101.2	101.4	102.8	98.1	95.1	87.3	106.1
WY P894 Stacker 12 Chute	97.3	105	108.6	105.1	105.4	101.1	96.5	89.2	81.6	106.3

APPENDIX D : PHIHP SOURCES SOUND POWER LEVEL

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
P770	88.7	92.6	89.8	89.1	89.5	83	78.7	70.3	64.2	89.4
P770 Drive	103	107.9	108.8	109.7	110.3	106.9	107.1	90.1	82.1	112.7
P771 (Stk14)	89	93.3	94.1	92.2	93.3	93.1	89.3	81.4	75.9	96.7
P771 (Stk14) Drive A	98.7	104.1	107.2	105.5	104.7	103.8	102.5	92.7	85.7	108.5
P771 (Stk14) Drive B	98.7	104.1	107.2	105.5	104.7	103.8	102.5	92.7	85.7	108.5
P771 Stacker 14 Chute	97.3	105	108.6	105.1	105.4	101.1	96.5	89.2	81.6	106.3
P772 (Rec11)	88.9	94.5	95.1	95.5	94.5	88	83	76	69.7	94.6
P772 (Rec11) Bucket Drive	99.4	101.4	106.2	106.8	104.7	109.1	101.7	95.9	86	111
P772 (Rec11) Chute	101	98	100.5	101.2	101.4	102.8	98.1	95.1	87.3	106.1
P772 (Rec11) Drive A	99.9	104.7	106.5	107	108.5	111.1	104.8	96.5	92.7	113.4
P772 (Rec11) Drive B	99.9	104.7	106.5	107	108.5	111.1	104.8	96.5	92.7	113.4
P773	91.5	87.9	89.5	88.9	86	80.5	76.3	67.6	62.3	87
P773 Drive N	103.9	105.7	104.3	106.3	112	112	103	94.4	84.9	114.3
P773 Drive S	103.9	105.7	104.3	106.3	112	112	103	94.4	84.9	114.3
P774	94	91.3	92.6	94.1	90.6	85.4	81.4	75.5	68.9	91.9
P774 Drive	102.1	103.6	104.7	104.5	105.4	112	101.2	94.6	88.3	113
P775	94	91.3	92.6	94.1	90.6	85.4	81.4	75.5	68.9	91.9
P775 Drive	99.6	103.4	103.8	103.5	104.7	107.2	96.3	88.4	84.3	108.9
P776	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
P776 Drive	98.7	104.1	107.2	105.5	104.7	103.8	102.5	92.7	85.7	108.5
P777	94	91.3	92.6	94.1	90.6	85.4	81.4	75.5	68.9	91.9
P777 Drive	99.6	103.4	103.8	103.5	104.7	107.2	96.3	88.4	84.3	108.9
P778	94	91.3	92.6	94.1	90.6	85.4	81.4	75.5	68.9	91.9
P778 Drive	99.6	103.4	103.8	103.5	104.7	107.2	96.3	88.4	84.3	108.9
P779	94	91.3	92.6	94.1	90.6	85.4	81.4	75.5	68.9	91.9
P779 Drive	99.6	103.4	103.8	103.5	104.7	107.2	96.3	88.4	84.3	108.9
P780	94	91.3	92.6	94.1	90.6	85.4	81.4	75.5	68.9	91.9
P780 Drive	99.9	104.7	106.5	107	108.5	111.1	104.8	96.5	92.7	113.4
TS773	103.2	108.1	107.1	105	110.9	107.8	101.4	94.7	87.8	111.7
TS774	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
TS775	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS777	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS778	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS779	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS780	83.2	88.1	87.1	85	90.9	87.8	81.4	74.7	67.8	91.7
WY P980 Rec10	88.9	94.5	95.1	95.5	94.5	88	83	76	69.7	94.6
WY P980 Rec10 Drive A	99.9	104.7	106.5	107	108.5	111.1	104.8	96.5	92.7	113.4
WY P980 Rec10 Drive B	99.9	104.7	106.5	107	108.5	111.1	104.8	96.5	92.7	113.4
WY P980 Reclaimer 10 Bucket	99.4	101.4	106.2	106.8	104.7	109.1	101.7	95.9	86	111
WY P980 Reclaimer 10 Chute	101	98	100.5	101.2	101.4	102.8	98.1	95.1	87.3	106.1
WY P981	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
WY P981 Drive	103	107.9	108.8	109.7	110.3	106.9	107.1	90.1	82.1	112.7
WY P982	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
WY P982 Drive	102.1	103.6	104.7	104.5	105.4	112	101.2	94.6	88.3	113
WY P983	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
WY P983 Drive	102.1	103.6	104.7	104.5	105.4	112	101.2	94.6	88.3	113
WY P984	92.6	98.5	94.8	90.4	88.9	84.6	79.9	73.9	69.1	90.3
WY P984 Drive	99.9	104.7	106.5	107	108.5	111.1	104.8	96.5	92.7	113.4
WY TS981	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
WY TS982	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
WY TS983	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
WY TS984	80.2	85.1	84.1	81.9	87.9	84.8	78.4	71.7	64.8	88.7

APPENDIX E : OUTER HARBOUR DEVELOPMENT SOURCES SOUND POWER LEVEL

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
BCD6	122.9	123.1	118.2	113.9	107.5	104.3	100.8	97.6	88	111.2
BCD7	122.9	123.1	118.2	113.9	107.5	104.3	100.8	97.6	88	111.2
BCD8	122.9	123.1	118.2	113.9	107.5	104.3	100.8	97.6	88	111.2
BCD9	122.9	123.1	118.2	113.9	107.5	104.3	100.8	97.6	88	111.2
Drive P1100 A	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1100 B	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1101 A	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1101 B	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1102 Stacker16 A	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1102 Stacker16 B	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1103 Reclaimer13 A	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1103 Reclaimer13 B	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1104 A	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1104 B	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1105 A	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1105 B	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1105 C	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1106 A	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1106 B	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1107 A	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1107 B	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1110 A	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1110 B	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1111	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1112 Shiploader9	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1200 A	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1200 B	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1201 A	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1201 B	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
Drive P1202 Stacker17 A	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1202 Stacker17 B	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1203 Reclaimer15 A	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1203 Reclaimer15 B	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1204 A	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1204 B	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1205 A	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1205 B	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1205 C	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1210 A	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1210 B	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1211	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1212 Shiploader10	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1300 A	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1300 B	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1301 A	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1301 B	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1302 Stacker20 A	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1302 Stacker20 B	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1303 Reclaimer16 A	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1303 Reclaimer16 B	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1304 A	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1304 B	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1305 A	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1305 B	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1305 C	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1310 A	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1310 B	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1311	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1312 Shiploader11	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
Drive P1400 A	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1400 B	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1401 A	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1401 B	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1402 Stacker21 A	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1402 Stacker21 B	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1403 Reclaimer17 A	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1403 Reclaimer17 B	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1404 A	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1404 B	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1405 A	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1405 B	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1405 C	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1410 A	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1410 B	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1411	108.3	115.8	114.7	111.2	112.5	113.7	100.7	96.7	90.5	115.6
Drive P1412 Shiploader12	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1610	104.3	105.4	108.4	106.6	110.9	115	110.2	99.4	91	117.3
Drive P1611 A	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1611 B	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1612	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1613	104.3	105.4	108.4	106.6	110.9	115	110.2	99.4	91	117.3
Drive P1614	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1620	104.3	105.4	108.4	106.6	110.9	115	110.2	99.4	91	117.3
Drive P1621 A	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1621 B	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1622	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1623	104.3	105.4	108.4	106.6	110.9	115	110.2	99.4	91	117.3
Drive P1624	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1625 A	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1625 B	107	110.8	106.4	106.4	110.4	106.4	103.2	94.2	86.7	111.3
Drive P1626 Stacker18 A	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
Drive P1626 Stacker18 B	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1650 Reclaimer14 A	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1650 Reclaimer14 B	106.9	108.6	108.5	108.5	103.4	106.5	99.2	90.6	85.1	109
Drive P1651A	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1651B	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
Drive P1652	103.5	111	109.9	106.4	107.7	108.9	95.9	91.9	85.7	110.9
LRP4	121.5	124.5	117.8	113.4	108.6	104.8	101.5	96.2	87.3	111.5
LRP5	121.5	124.5	117.8	113.4	108.6	104.8	101.5	96.2	87.3	111.5
P1100	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1101	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1102 Stacker16	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1102 Stacker16 Chute	87.6	89.6	86.2	85.8	85.4	82.1	79	72.1	64.5	106.3
P1103 Reclaimer13	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1103 Reclaimer13 Bucket Drive	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	111
P1103 Reclaimer13 Chute	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	106.1
P1104	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1105	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1106	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1107	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1110	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1111	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1112 Shiploader9	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1200	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1201	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1202 Stacker17	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1202 Stacker17 Chute	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	106.3
P1203 Reclaimer15	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1203 Reclaimer15 Bucket Drive	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	111
P1203 Reclaimer15 Chute	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	106.1
P1204	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
P1205	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1210	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1211	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1212 Shiploader10	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1300	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1301	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1302 Stacker20	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1302 Stacker20 Chute	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	106.3
P1303 Reclaimer16	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1303 Reclaimer16 Bucket Drive	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	111
P1303 Reclaimer16 Chute	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	106.1
P1304	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1305	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1310	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1311	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1312 Shiploader11	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1400	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1401	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1402 Stacker21	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1402 Stacker21 Chute	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	106.3
P1403 Reclaimer17	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1403 Reclaimer17 Bucket Drive	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	111
P1403 Reclaimer17 Chute	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	106.1
P1404	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1405	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1410	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1411	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1412 Shiploader12	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1610	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1611	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1612	91.9	91.8	90.1	87.8	87.2	84.7	80.4	73.3	71.1	89.3

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
P1613	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1614	87.6	89.6	86.2	85.8	85.4	82.1	79	72.1	64.5	87.2
P1620	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1621	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1622	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1623	91.9	91.8	90.1	87.8	87.2	84.7	80.4	73.3	71.1	89.3
P1624	87.6	89.6	86.2	85.8	85.4	82.1	79	72.1	64.5	87.2
P1625	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1626 Stacker18	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1626 Stacker18 Chute	97.3	105	108.6	105.1	105.4	101.1	96.5	89.2	81.6	106.3
P1650 Reclaimer14	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1650 Reclaimer14 Bucket Drive	99.4	101.4	106.2	106.8	104.7	109.1	101.7	95.9	86	111
P1650 Reclaimer14 Chute	101	98	100.5	101.2	101.4	102.8	98.1	95.1	87.3	106.1
P1651	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1652	88.1	91	93.4	95.1	90.6	85.6	81.3	74.6	67.4	92.1
P1652 Surge Bin	106.2	111.1	110.1	108	113.9	110.9	104.4	97.7	90.8	114.7
TS1100	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1104	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1105_1	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1105_2	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1106	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1110_1	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1110_2	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1150	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1200	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1204	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1300	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1304	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1305_1	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1305_2	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1310_1	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1310_2	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7

Element name	31Hz dB(Z)	63Hz dB(Z)	125Hz dB(Z)	250Hz dB(Z)	500Hz dB(Z)	1kHz dB(Z)	2kHz dB(Z)	4kHz dB(Z)	8kHz dB(Z)	O/A dB(A)
TS1400	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1404	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1612	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1613	80.2	85.1	84.1	81.9	87.9	84.8	78.4	71.7	64.8	88.7
TS1622	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1623	80.2	85.1	84.1	81.9	87.9	84.8	78.4	71.7	64.8	88.7
TS1625	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7
TS1652	100.2	105.1	104.1	101.9	107.9	104.8	98.4	91.7	84.8	108.7

APPENDIX F : NOISE MONITORING CHART

Noise monitors were deployed in March 08 at eleven locations (see Table 11-7) that were representative of noise sensitive locations in the area around the Port Hedland port operation facilities. The noise monitoring equipment was set to continuously record L_{A1}, LA10 and L_{A90} noise levels at 15 minute intervals, where:

- L_{A1} is the noise level exceeded for 1 % of the time;
- L_{A10} is the noise level exceeded for 10 % of the time; and
- L_{A90} is the noise level exceeded for 90 % of the time.

The logging was undertaken over two periods from 21 February to 5 March 2008 and from the 6 to the 20th March 2008 as shown in Table 11-7. During this time the temperature for the first logging period varied between 26 ^{0}C and 36^{0}C with a dominate NNE wind with a maximum wind speed of 37 km/h. During the second logging period the temperature varied between 25 ^{0}C and 36^{0}C with a dominate NNE and E wind with a maximum wind speed of 35 km/h.

Table 8-1 Noise Logging Locations

Location	Position	Date
149 Anderson St, Port Hedland	S20^{0}18.633′ E118^{0}36.324′	21/2/08 to 5/3/08
41A Styles Rd, Pretty Pool	S20^{0}19.022′ E118^{0}38.463′	6/3/08 to 20/3/08
HBI Plant	S20^{0}23.046′ E118^{0}32.278′	6/3/08 to 20/3/08
Golf Course	S20^{0}23.972′ E118^{0}34.408′	21/2/08 to 5/3/08
Cooke Point Caravan Park	S 200 18.660′ E 118 38.314′	6/3/08 to 20/3/08
Unit 1 Darlot Street, Port Hedland	S20^{0}18.629′ E118^{0}35.031′	21/2/08 to 5/3/08
Rural Village (Acres)	S20^{0}27.233′ E118^{0}35.706′	20/2/08 to 6/3/08
Telstra Building, South Hedland	S 200 24.476 E 1180 35.742	21/2/08 to 5/3/08
Hospital Engineering Building	S20^{0}18.650′ E118^{0}35.422′	21/2/08 to 5/3/08
Police Station	S20^{0}18.756′ E118^{0}34.610′	21/2/08 to 5/3/08
BGC Yard, Wedgefield	S20^{0}21.887′ E118^{0}35.500′	21/2/08 to 5/3/08

Appendix D provides the results of the ambient noise monitoring recorded at each location. A summary table is provided which gives the average LA10 and L_{A90} values collected over the monitoring period during daytime hours, evening hours and night time hours, and for all periods combined. The standard deviations in the measurement results are also provided. The data has also been analysed to determine the L_{90} of the L_{A90} noise levels for the various time periods. This data provides a good indication of the lowest ambient noise levels. Charts showing the monitored noise data are also presented.

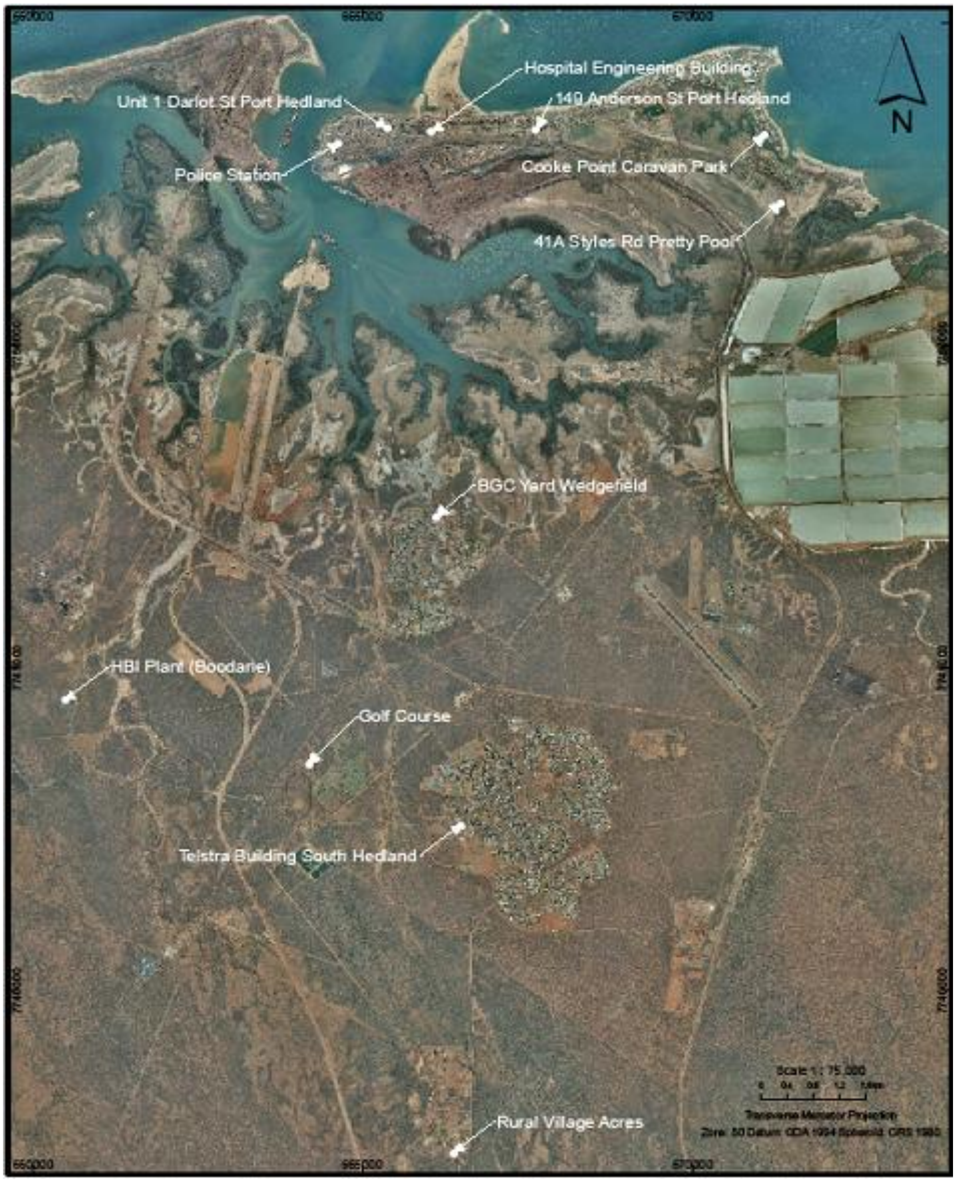


Figure 8-3 Noise Logging Positions in the Port Hedland area

Appendix F-1 : Measured Background Noise Levels

The measured noise logging data statistics for the 11 noise logging positions is presented in Table 11-8 and the following paragraphs.

Table 8-2 Summary of Noise Logging Data showing the LA10, L_{A90} and L_{A90} of L_{A90}

Location	Period	Average L_{A10} dB(A)	Standard Deviation of the L_{A10} dB	Average L_{A90} dB(A)	Standard Deviation of the L_{A90} dB	L_{90} of L_{A90} dB(A)
Hospital Engineering Building	Day (07:00 to 19:00 hrs)	56.9	3.3	50.1	3.4	46.0
	Evening (19:00 to 22:00 hrs)	53.2	2.6	47.9	2.3	45.5
	Night (22:00 to 07:00 hrs)	54.6	3.5	51.9	3.6	46.5
	All data	55.3	3.5	50.4	3.6	46.0
Police Station	Day (07:00 to 19:00 hrs)	55.9	3.5	48.3	3.1	44.5
	Evening (19:00 to 22:00 hrs)	52.2	3.3	45.6	3.0	42.5
	Night (22:00 to 07:00 hrs)	51.1	4.1	47.2	3.6	41.9
	All data	53.3	4.3	47.3	3.4	43.0
149 Anderson St, Port Hedland	Day (07:00 to 19:00 hrs)	53.9	4.9	44.6	4.2	38.5
	Evening (19:00 to 22:00 hrs)	50.6	6.2	43.2	4.9	35.7
	Night (22:00 to 07:00 hrs)	49.1	5.8	44.8	5.0	37.0
	All data	51.4	5.9	44.4	4.7	37.0
41A Styles Rd, Pretty Pool	Day (07:00 to 19:00 hrs)	54.5	4.2	44.1	4.9	37.5
	Evening (19:00 to 22:00 hrs)	51.1	4.4	42.8	4.2	37.5
	Night (22:00 to 07:00 hrs)	48.0	5.2	42.8	5.0	36.0
	All data	51.3	5.5	43.4	4.9	37.0
Cooke Point Caravan Park	Day (07:00 to 19:00 hrs)	46.8	7.1	39.1	6.8	29.5
	Evening (19:00 to 22:00 hrs)	46.6	6.6	39.0	5.5	32.0

Location	Period	Average L_{A10} dB(A)	Standard Deviation of the L_{A10} dB	Average L_{A90} dB(A)	Standard Deviation of the L_{A90} dB	L_{90} of L_{A90} dB(A)
	Night (22:00 to 07:00 hrs)	41.9	5.6	37.2	5.2	30.0
	All data	45.0	6.9	38.4	6.0	30.0
Telstra Building, South Hedland	Day (07:00 to 19:00 hrs)	54.1	2.9	49.3	2.3	46.0
	Evening (19:00 to 22:00 hrs)	51.4	2.7	47.4	2.2	44.5
	Night (22:00 to 07:00 hrs)	50.1	2.5	47.9	2.9	44.0
	All data	52.0	3.3	48.4	2.7	44.7
HBI BGC Yard, Wedgefield	Day (07:00 to 19:00 hrs)	49.0	4.5	40.9	4.5	35.0
	Evening (19:00 to 22:00 hrs)	45.2	5.6	37.9	3.8	33.0
	Night (22:00 to 07:00 hrs)	43.4	3.8	39.1	3.6	34.5
	All data	46.1	5.1	39.6	4.3	34.5
HBI Plant	Day (07:00 to 19:00 hrs)	49.4	8.3	42.8	7.4	33.5
	Evening (19:00 to 22:00 hrs)	47.2	7.0	41.9	6.4	34.5
	Night (22:00 to 07:00 hrs)	44.4	8.7	41.5	8.7	32.5
	All data	47.0	8.5	42.1	7.8	33.0
Rural Village (Acres)	Day (07:00 to 19:00 hrs)	44.2	7.4	34.0	4.8	29.0
	Evening (19:00 to 22:00 hrs)	44.7	7.5	35.1	3.8	31.0
	Ni.ght (22:00 to 07:00 hrs)	36.8	4.2	31.8	2.9	29.0
	All data	41.4	7.4	33.4	4.2	29.0

Appendix F-2 : Hospital

The results show a typical daily cycle of noise levels with higher levels experienced during daytime hours. The L_{A90} was found to be on average 50.4 dB(A) with the highest value at night where the L_{A90} was found to be 51.9 dB(A). The high L_{A90} noise level observed could be either due to a localized noise source or due to the consistent emissions from the BHP Billiton Iron Ore facility which is a 24/7 operation.

An interesting observation is that the background noise measurements at the Hospital are a lot less than the predicted noise levels from the model. This can be attributed to the fact that the model is making predictions for the worst case meteorological condition and that the model is making a prediction based on the assumption that all plant equipment is working simultaneously. The last assumption is rarely (if ever) the case for Port Operations as there is always equipment undergoing maintenance and different configurations are being used depending on operational equipments. It is therefore a worst case prediction.

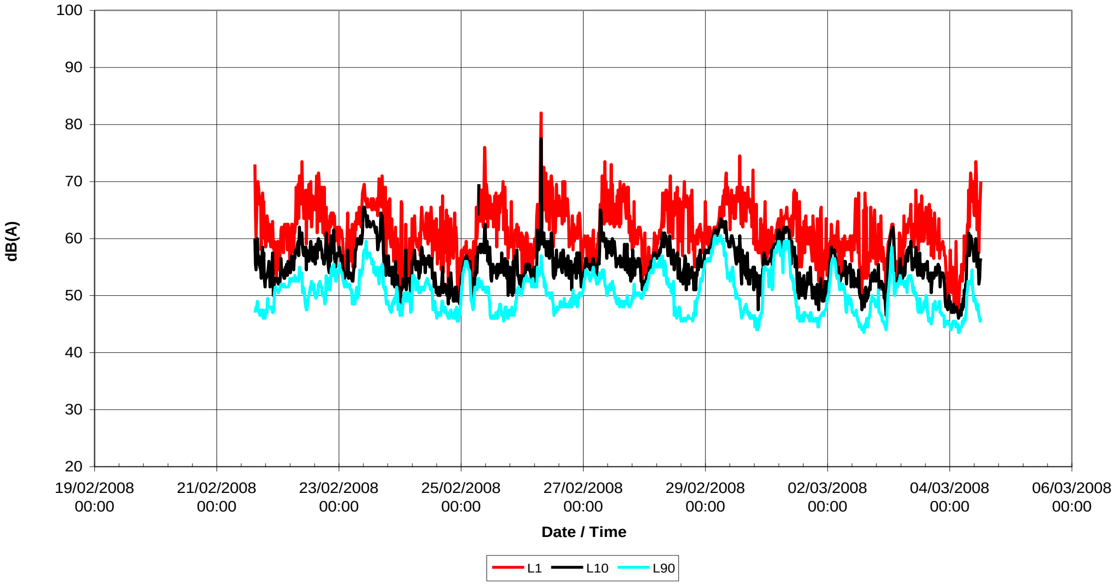


Figure 8-4 Hospital noise monitoring results for week 1 and week 2

Appendix F-3 : Police Station

The results show a typical daily cycle of noise levels with higher levels experienced during daytime hours. For significant periods during the monitoring, L_{A90} noise levels were consistent at approximately 47.3 dB(A), possibly indicating the presence of a localized noise source. The 85 dB(A) peak shown in Figure 8-5 is probably attributed to some localized noise source that was in close proximity of the noise logger for a short duration of time.

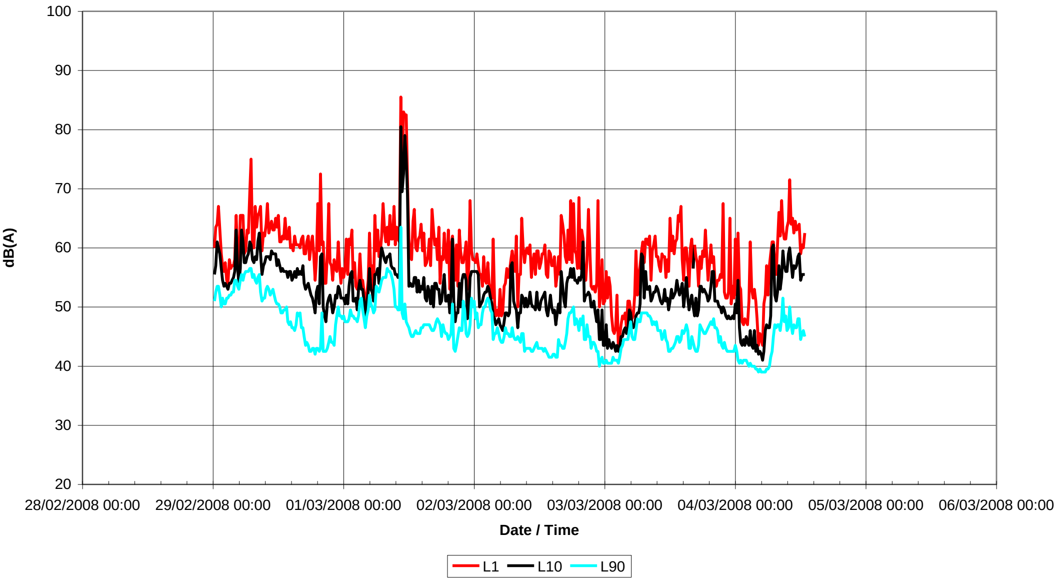


Figure 8-5 Police Station noise monitoring results for week 1 and week 2

Appendix F-4 : 149 Anderson Street Port Hedland

The results show a typical daily cycle of noise levels with higher levels (i.e. LA10) experienced during daytime hours. The L_{A90} were found to be on average 44.4 dB(A) with the highest value at night where the L_{A90} was found to be 44.8 dB(A).

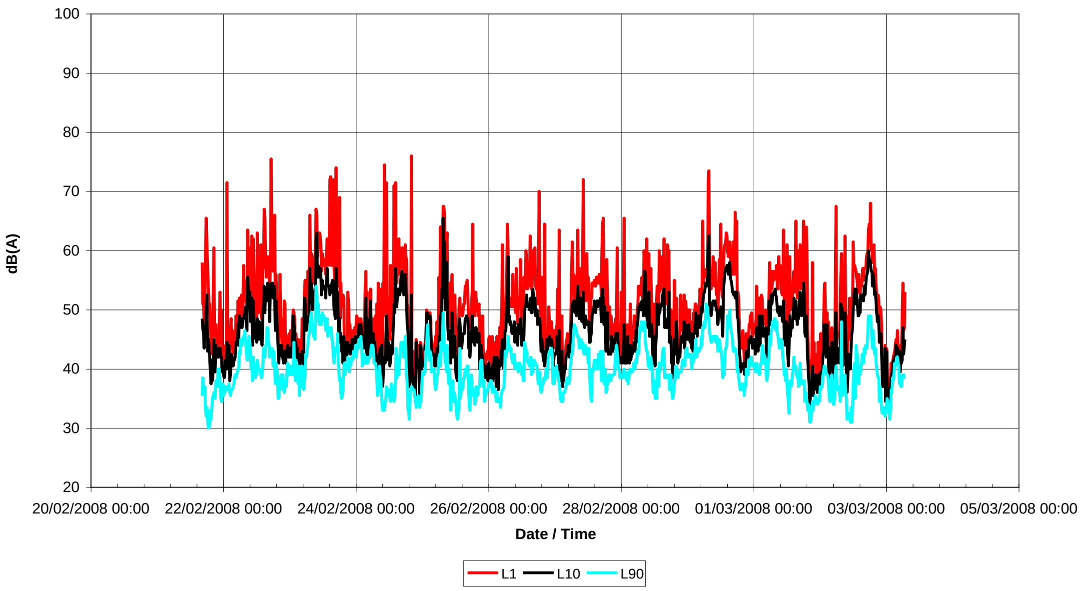


Figure 8-6 149 Anderson St noise monitoring results for week 1 and week 2

Appendix F-5 : Pretty Pool

The results show a typical daily cycle of noise levels with higher levels (i.e. LA10) experienced during daytime hours. The L_{A90} was found to be on average 43.4 dB(A).

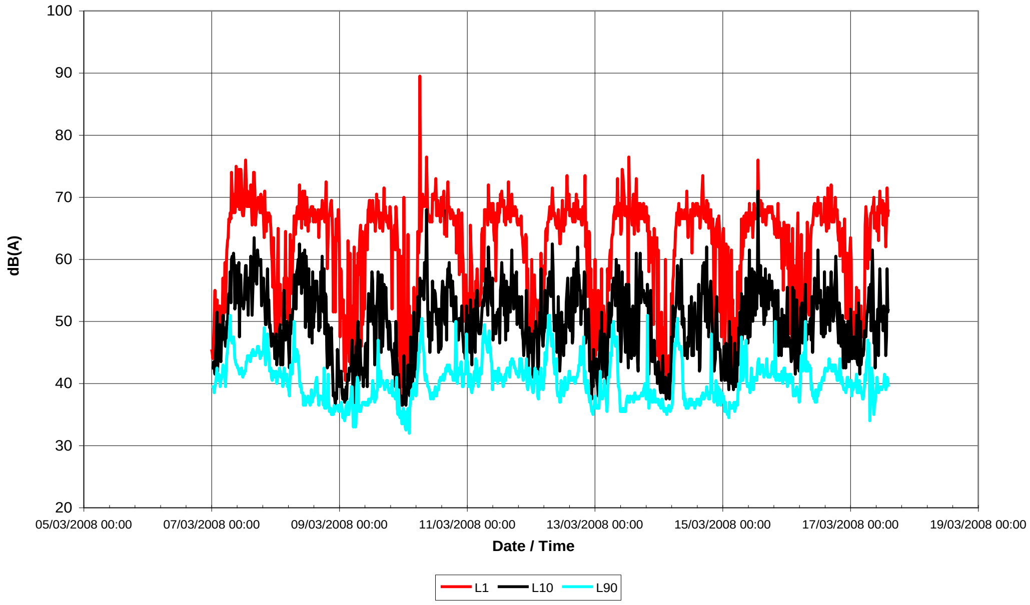


Figure 8-7 Pretty Pool noise monitoring results for week 1 and week 2

Appendix F-6 : Cooke Point

The results show a typical daily cycle of noise levels with higher levels (i.e. LA10) experienced during daytime hours. The L_{A90} was found to be on average 38.4 dB(A) with the highest average value being during daytime hours where the average L_{A90} was calculated as 39.1 dB(A).

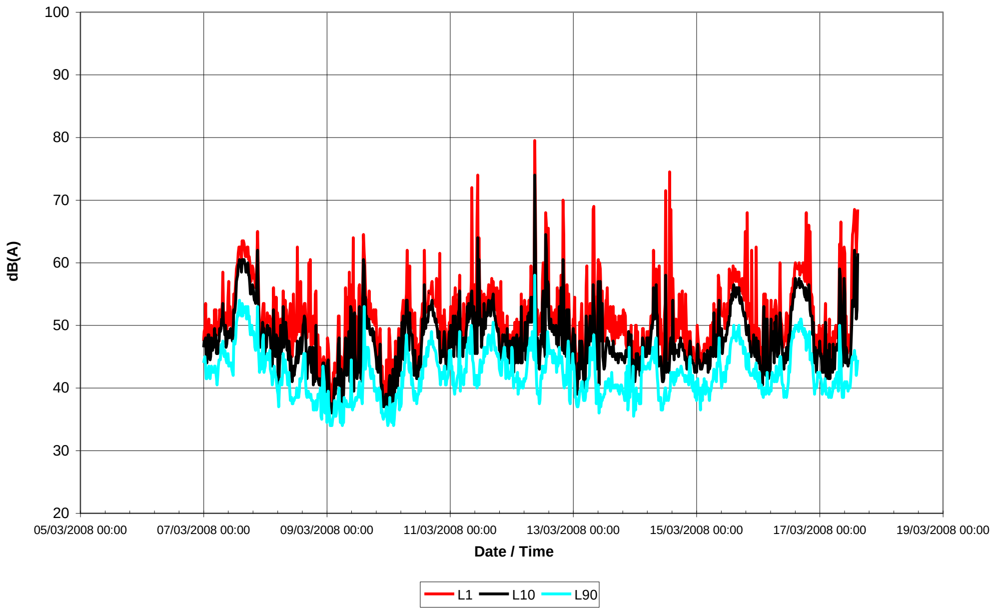


Figure 8-8 Cooke Point noise monitoring results for week 1 and week 2

Appendix F-7 : South Hedland

The results show a typical daily cycle of noise levels with higher levels (i.e. LA10) experienced during daytime hours. The L_{A90} was found to be on average 48.4 dB(A) with the highest average value being during daytime hours where the L_{A90} was found to be 49.3 dB(A).

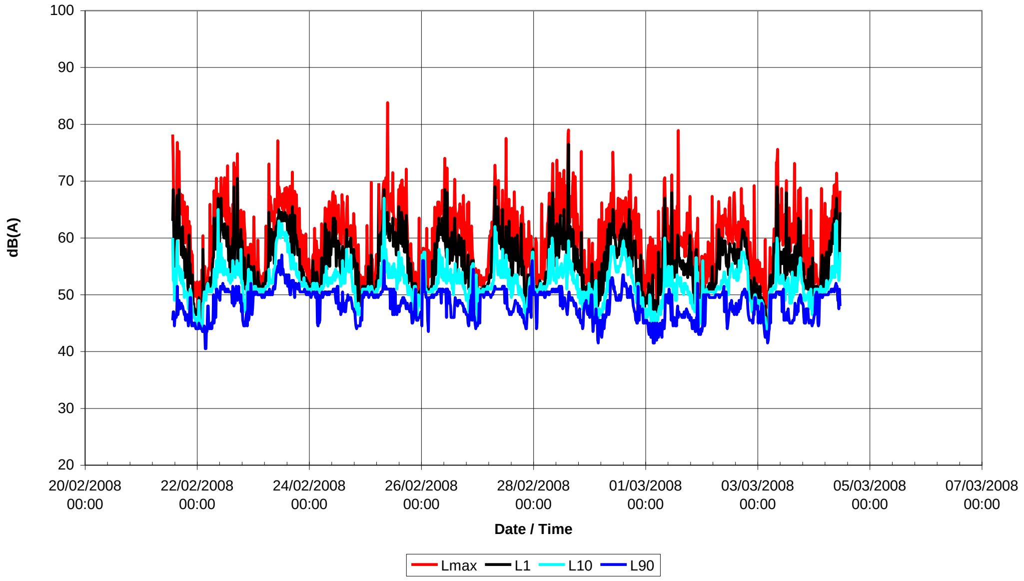


Figure 8-9 South Hedland noise monitoring results for week 1 and week 2

Appendix F-8 : Wedgefield

The results show a typical daily cycle of noise levels with higher levels (i.e. LA10) experienced during daytime hours. The L_{A90} was found to be on average 39.6 dB(A) with the highest value during daytime where the L_{A90} was found to be 40.9 dB(A). As Wedgefield is an industrial area the data seems to indicate that most of the industrial activities take place during daytime hours..

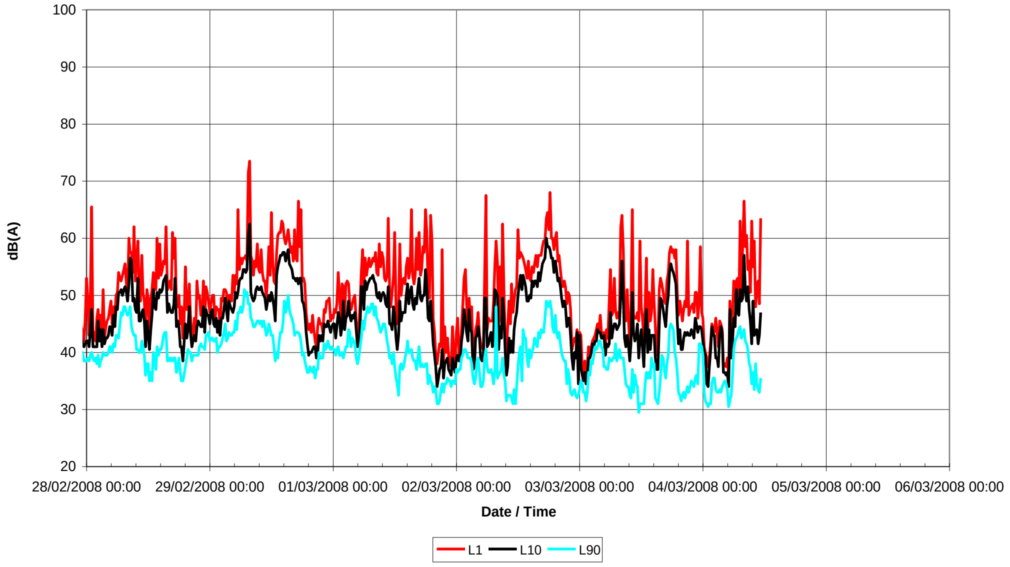


Figure 8-10 Wedgfield noise monitoring results for week 1 and week 2

Appendix F-9 : HBI Plant

The results show a typical daily cycle of noise levels with higher levels (i.e. LA10) experienced during daytime hours. The L_{A90} was found to be on average 42.1 dB(A) with the highest value during daytime where the L_{A90} was found to be 42.8 dB(A).

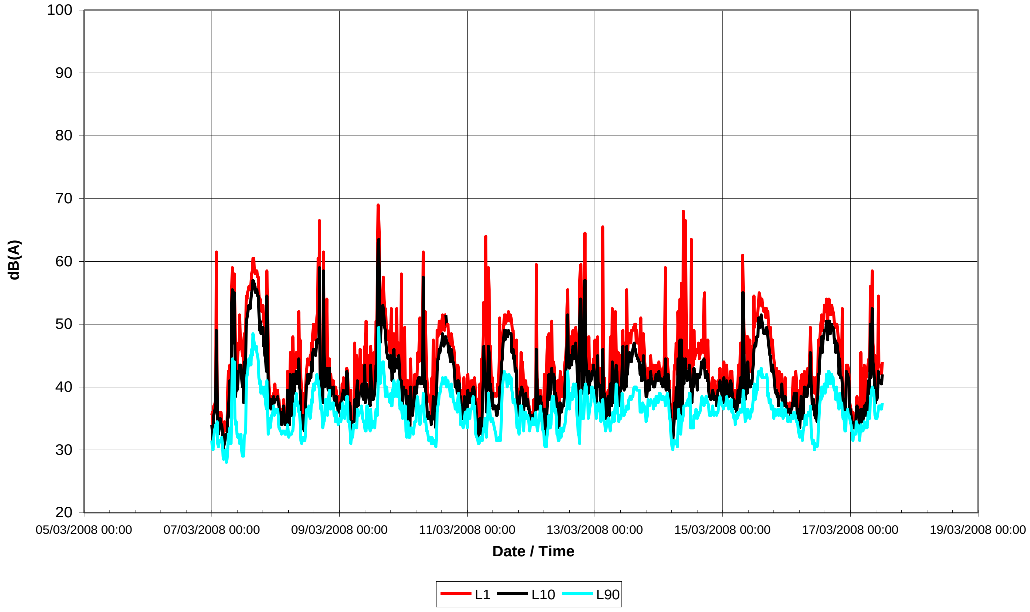


Figure 8-11 HBI PLant noise monitoring results for week 1 and week 2

Appendix F-10 : Rural Village

The results show a typical daily cycle of noise levels with higher levels experienced during daytime and evening hours and lower levels at night-time. The underlying background noise (i.e. L_{90} of L_{A90}) was typically of the order of 29 dB(A), irrespective of the time of day.

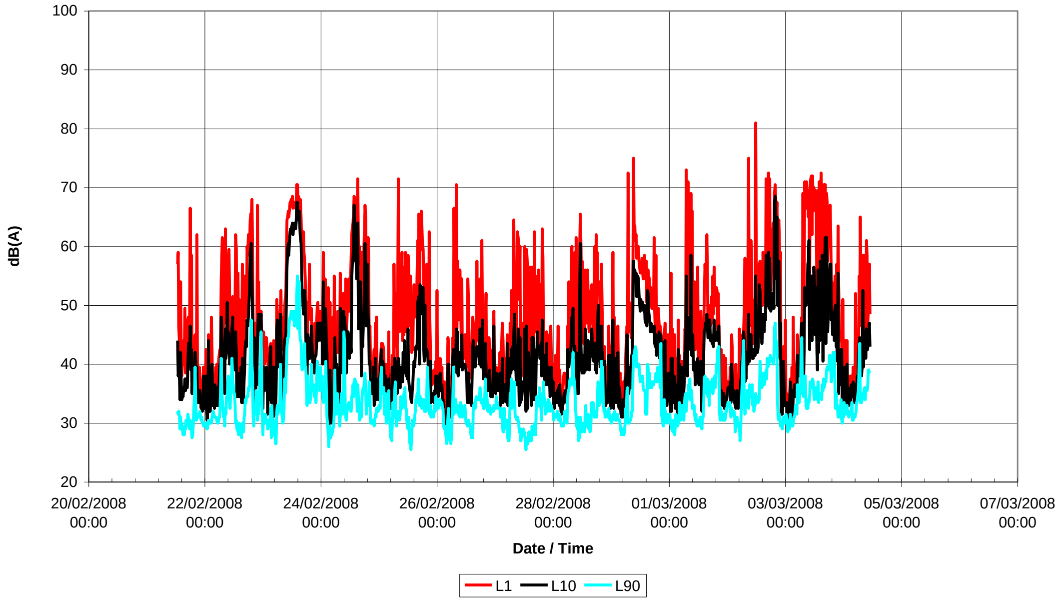


Figure 8-12 Rural Village noise monitoring results for week 1 and week 2