

4.13 Noise and Vibration

4.13.1 Overview

A noise and vibration assessment for the project was undertaken and is included as Appendix H. The assessment investigated the potential noise and vibration impacts resulting from the construction and operation of the X110 Expansion and has been undertaken with consideration to the following publications:

- » Environmental Protection Act 1994;
- » Environmental Protection (Noise) Policy 2008;
- » Planning for Noise Control Guidelines 2004; and
- » Draft Guideline, Noise – Assessment of Low Frequency Noise.

The noise assessment did not investigate the noise from coal trains, as this will be assessed separately by the X110 rail loop expansion proponent, Queensland Rail.

4.13.2 Description of Environmental Values

4.13.2.1 Existing Noise Sources

Significant noise sources in the surrounding area include the following:

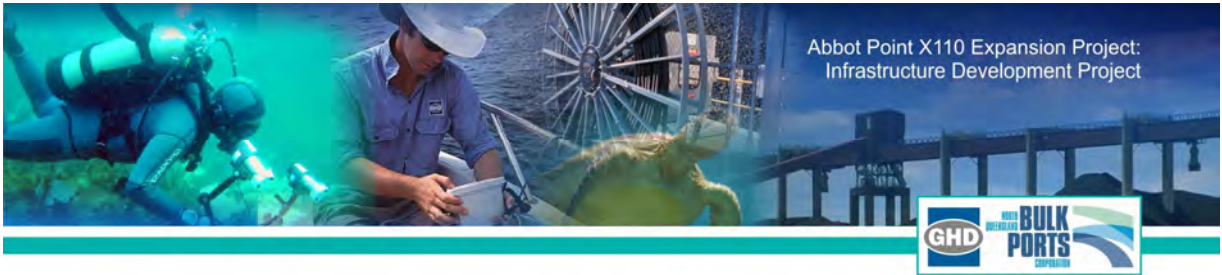
- » Existing port facilities;
- » Rail noise;
- » Road traffic noise from Bruce highway and Abbot Point Road; and
- » Natural noise from wind, birds and insects.

4.13.2.2 Baseline Noise Monitoring

Unattended noise logging was conducted at five locations to establish typical noise levels in the area of the potentially most affected receivers. A summary of noise monitoring locations is provided in Table 4-48. Results of noise monitoring for all locations is summarised in Table 4-49.

Table 4-48 Noise monitoring locations

Site	Location	Detail	Distance to APCT
Location 01	33 Myles Street, Merinda	Residential house located on the Bruce Highway, Merinda	15km
Location 02	27 Skeene Street Merinda	Residential house located within Merinda	15km
Location 03	Abbot Point Road	Residential dwelling located off Abbot Point Road	4,500m
Location 04	Wetland Site	Access track adjacent to wetland to the west of the existing port facility	100m



Site	Location	Detail	Distance to APCT
Location 05	Concrete Slab near Hill	Concrete slab to the north west of the site	2,300m

Table 4-49 Summary of unattended noise monitoring data

Location	Background L_{A90} dB(A)			Ambient L_{Aeq} dB(A)		
	Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)	Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)
Site 1	40	36	28	61	58	58
Site 2	44	38	34	56	47	54
Site 3	40	42	37	58	54	50
Site 4	49	49	46	54	53	51
Site 5	33	36	32	41	46	46

4.13.3 Noise and Vibration Criteria

4.13.3.1 Overview

The *Environmental Protection Act 1994* regulates the protection of Queensland's environment from environmental nuisance. This includes noise disturbance from building work which includes excavating or filling.

DERM has a guideline for setting conditions related to noise emitted from industrial premise, which are intended for planning purposes, *Ecoaccess Guideline Planning for Noise Control, 2004*. The guideline also includes criteria for estimating the probability of sleep disturbance from transient noise.

4.13.3.2 Construction Noise Criteria

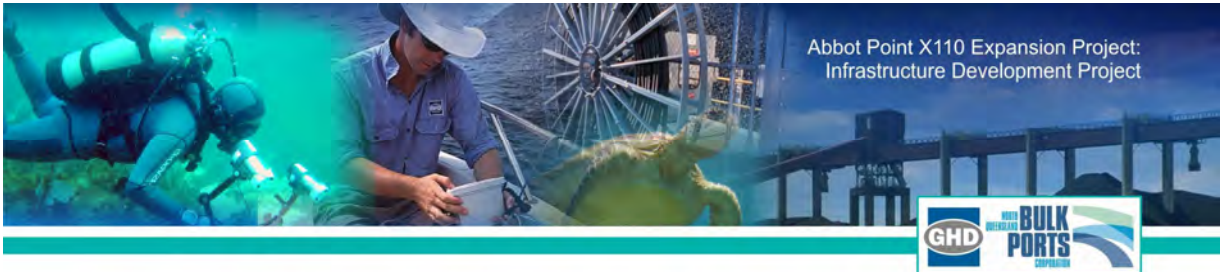
In Queensland, construction activities should be undertaken in accordance with general building work hours as described under Section 440K – “Building Work” of the *Environmental Protection Act 1994*. Under the regulation, no audible noise is permitted:

- » Between 6.30 pm to 6.30 am – Monday to Saturday; and
- » Sundays and public holidays.

The time restrictions are designed to strike a balance between protecting noise amenity and the need to start construction activities early in the morning.

4.13.3.3 Operational Noise Criteria

Guidance on the assessment of operational noise impacts is provided within the *Planning for Noise Control* (PNC) guideline, (EPA 2004). The guideline includes noise criteria that are designed to protect sensitive receivers from noise significantly louder than the background level and to limit the total noise level from all sources near a receiver, hence protecting the amenity.



In line with the abovementioned guidelines, noise from continuous sources should be limited to 3 dB(A) above the background noise level, unless the combined (ambient plus site contribution) noise level would exceed the recommended ambient noise level for the receiver zone. In that case, the noise limit for the site is set so that the combined noise level for the receiver zone does not exceed the recommended level. The specific noise level ($L_{Aeq, 1 \text{ hr}}$) can be calculated using mathematical formula (refer Appendix H).

Abbot Point Road Residential Receiver

Assumptions used in developing X110 project specific criteria using the PNC guideline are listed below:

- » Receiver land use – Residential area on a busy road or near an industrial area.
- » Receiver area dominant land use – Industry.
- » Noise category area has been classified as Z4 – Medium density transportation or some commerce or industry.

Project specific noise goals for the nearest noise sensitive residential receiver are listed in Table 4-50.

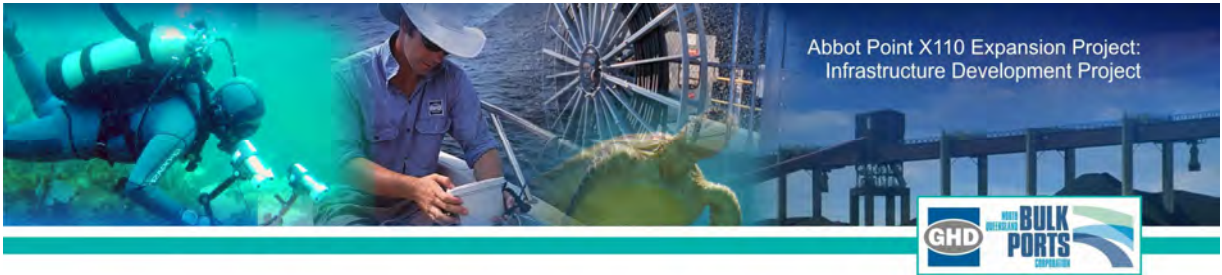
Table 4-50 Project specific noise goals – Abbot Point Road dwelling

Criterion	Time Period		
	Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)
Measured Background (RBL), $L_{A90 \text{ min, 1hr}}$	40	42	36
Recommended Background, $\text{min}L_{A90}$ (PNC Table 1)	55	50	45
Adjusted Background, $\text{min}L_{A90}$ (PNC Table 2)	45	47	41
Measured Existing Level, L_{Aeq}	57	53	49
Recommended PNL, L_{Aeq} (PNC Table 3, Cat Z4)	60	55	50
Adjusted PNL, L_{Aeq} (PNC Table 4)	57	51	44
Project Specific Level, $L_{Aeq} [\text{min } L_{A90, 1 \text{ hr}} + 3]$	48	50	44

Caley Valley Wetland

The Caley Valley Wetland is listed in the *Directory of Important Wetlands of Australia* as a site of national significance. The EPP(Noise) 2008 states that for a protected area, or an area identified under a conservation plan under the *Nature Conservation Act 1992* as a critical habitat or an area of major interest, the acoustic quality objectives are ‘the level of noise that preserves the amenity of the existing area or place’.

The X50 Noise Assessment (Huson and Associates 2005) predicted noise levels at Caley Valley Wetland to be between 55 dB(A) adjacent to the port, to approximately 35 dB(A) at the southern extent of the wetland.



Great Barrier Reef Marine Park

The Great Barrier Reef Marine Park is protected by the *Great Barrier Reef Marine Park Act 1975* and the appropriate noise criteria is specified in the EPP(Noise) 2008 as being 'the level of noise that preserves the amenity of the existing Marine Park'.

The Abbot Point Coal Terminal is located within 2 km of the GBRMP. There are no identified noise sensitive receivers with the GBRMP that would be impacted by the construction or operation of the X110 Expansion Project.

enHealth Council

The enHealth report *The Health Effects of Environmental Noise – Other than Hearing Loss* (HEEN, 2004), highlights several key areas of concern in relation to noise pollution. These include:

- » Annoyance, reduced quality of life.
- » Sleep disturbance.
- » Performance and learning of school children.
- » Cardiovascular disease.
- » Mental health.
- » Neurophysiological stress.

Any specific noise levels stated in this report are addressed by other adopted noise criteria such as the EPP (Noise). Similarly, the report refers to specific criteria where noise sensitive receivers are proximate to noise generating activities. Due to the remoteness of the site and lack of sensitive receivers, these criteria are not applicable to this assessment.

4.13.3.4 Low Frequency Noise

The Ecoaccess Draft Guideline, Noise - Assessment of Low Frequency Noise, provides guidance in assessing annoyance and discomfort to persons at noise sensitive places caused by low frequency noise comprised in the 10Hz to 200 Hz range.

The Low Frequency Noise draft guideline separates the assessment of low frequency noise based on the frequency content of the noise and whether the noise is tonal or broadband. For non-tonal, low frequency noise in the range of 10Hz to 200Hz, the draft guideline suggest that the noise is considered to be acceptable if the contribution of low frequency noise within a room (LpA, LF) does not exceed the level shown in Table 4-51.

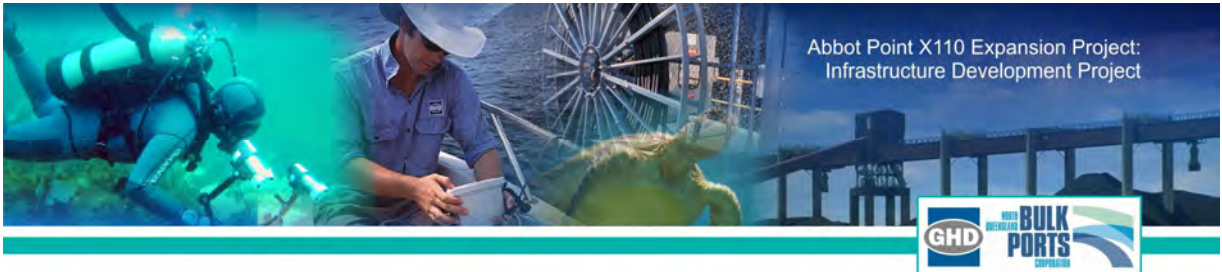


Table 4-51 Recommended limits for non-tonal low frequency noise within a room (LpA,LF)

Type of Space	L _{pA, LF} dB(A) ^{2,3}
Dwelling, evening and night	20
Dwelling, day	25
Classroom, office etc.	30
Rooms within commercial enterprises	35

Source: Jacobsen, 2001

4.13.3.5 Sleep Disturbance Criteria

Maximum noise levels over the night time period should be restricted to prevent sleep disturbance. The current DERM policy (Planning for Noise Control Guideline, 2004) is to limit the external maximum noise impact level, according to the number of occurrences likely to occur and the potential noise reduction from outside – inside.

The policy recommends that instantaneous internal sound pressure levels do not exceed in the order of 45 dB(A) L_{max} more than 10-15 times per night as a rule in planning for short-term or transient events.

On this basis, a “mid range” external noise level of 55 dB(A) L_{max} more than 10-15 times per night is considered appropriate for assessment purposes, as a 10 dB outside – inside reduction in noise level through a partially open window is typical.

Most noise sources onsite are steady sources operating continuously, therefore there is little risk for sleep disturbance, provided the overall site noise impact at the nearest receivers complies with the noise criteria outlined in Section 4.13.3.3 above. Therefore sleep disturbance is not further discussed in this report.

4.13.3.6 Vibration Criteria

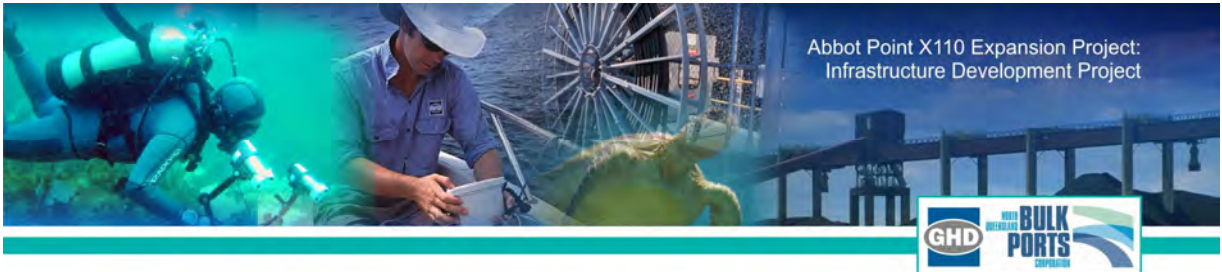
In the absence of specific QLD guidelines addressing vibration issues, consideration was given to the following publications for the determination of monitoring sites and appropriate measurement parameters:

- » NSW Department of Environment and Climate Change (DECC) Assessing Vibration: A Technical Guideline, 2006;
- » British Standard BS6472:1992 Guide to evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz);
- » British Standard BS7385-2:1993 Evaluation and Measurement for Vibration in Buildings, Part 2 - Guide to damage levels from ground borne vibration; and
- » German Standard DIN 4150 – 3:1999 – Structural Vibration, Effects of vibration on structures.

The above standards are typically adopted by industry in Australia for the assessment of construction and operational vibration impacts. Due to the distances between the source and the receivers vibration

² Averaged over 10 minutes.

³ If the noise has an impulsive character (e.g. drop forge, disco music), the limits are reduced by 5 dB.



impacts are not likely to be a significant impact and are not discussed in detail in this chapter. Vibration criteria and potential impacts are discussed in more detail in the noise and vibration technical report (Appendix H).

4.13.4 Potential Impacts and Mitigation Measures

4.13.4.1 Construction Noise

Typical noise levels produced by construction plant anticipated to be used on site were sourced from AS 2436 – 1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites and from GHD’s internal database. Anticipated noise levels compare to existing daytime ambient noise levels at all noise monitoring locations for all plant activity. The nearest noise sensitive residential receiver is approximately 8 km away and was also a long term noise monitoring location, so construction noise impact will not likely be an issue. Construction noise impact on the Caley Valley Wetland and GBRMP will be similar to the noise levels currently being experienced as part of the X50 expansion. Background monitoring was undertaken during construction of the X50 Project and therefore captured the noise associated with that development. As shown in the discussion of background noise levels (see Section 4.13.2) these levels are below recommended background levels for the relevant sensitive receivers.

4.13.4.2 Operational Noise

The noise model was run assuming no noise control measures implemented on site (Scenario 1), under neutral and noise-enhancing meteorological conditions with consideration of the DERM Planning for Noise Control Guideline 2004. Noise impacts were calculated at 1.5 m above ground. The purpose of Scenario 1 is to determine and quantify the need for any noise mitigation on site.

Noise impact at all noise sensitive receivers are summarised in Table 4-52 below, which includes the results obtained for noise-enhancing meteorological conditions. Results are presented in terms of 24-hours operations (ie. same impact over day, evening or night-time) and assessed against the night-time project specific noise goals, as these are the most stringent. No exceedences were predicted. Table 4-53 details the frequency content of noise levels received at Receiver 1 for Scenario 1 under the neutral weather conditions addressed in the model.

Table 4-52 Scenario 1 summary of results dB(A) – 1.5 m above ground - no mitigation applied

Rec	24-Hours Noise Impact [dB(A) SPL re:20µPa]				Project Specific Noise Goals
	Neutral	3m/s Wind ¹	Temperature Inversion ²	3m/s Wind and Temperature Inversion ^{1,2}	Night-time period
1	36.4	43.5	43.5	42	44

Notes: ¹ Worst case wind direction was modelled as North Westerley

² Temperature inversion was modelled for F-Class Pasquill stability

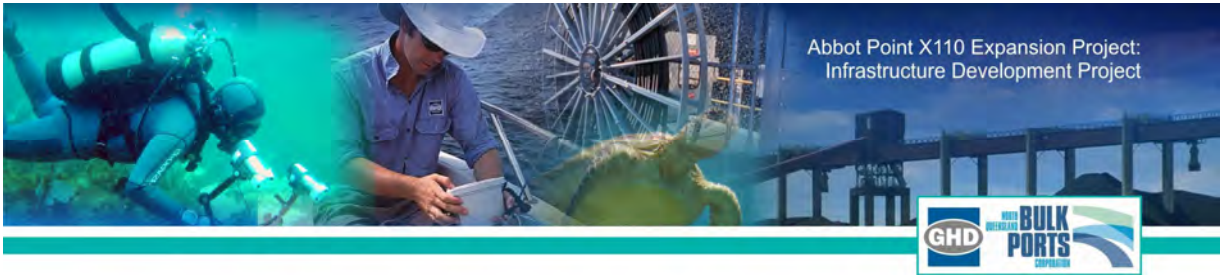


Table 4-53 Scenario 1 - Detailed modelling results dB(A)_{Leq} – neutral conditions

	Octave Band Centre Frequency (Hz)									Overall
	31.5	63	125	250	500	1k	2k	4k	8k	
Receiver 1	12.6	26.9	30.6	31.5	29.5	25.8	-7.5	-123.5	-509	36.4

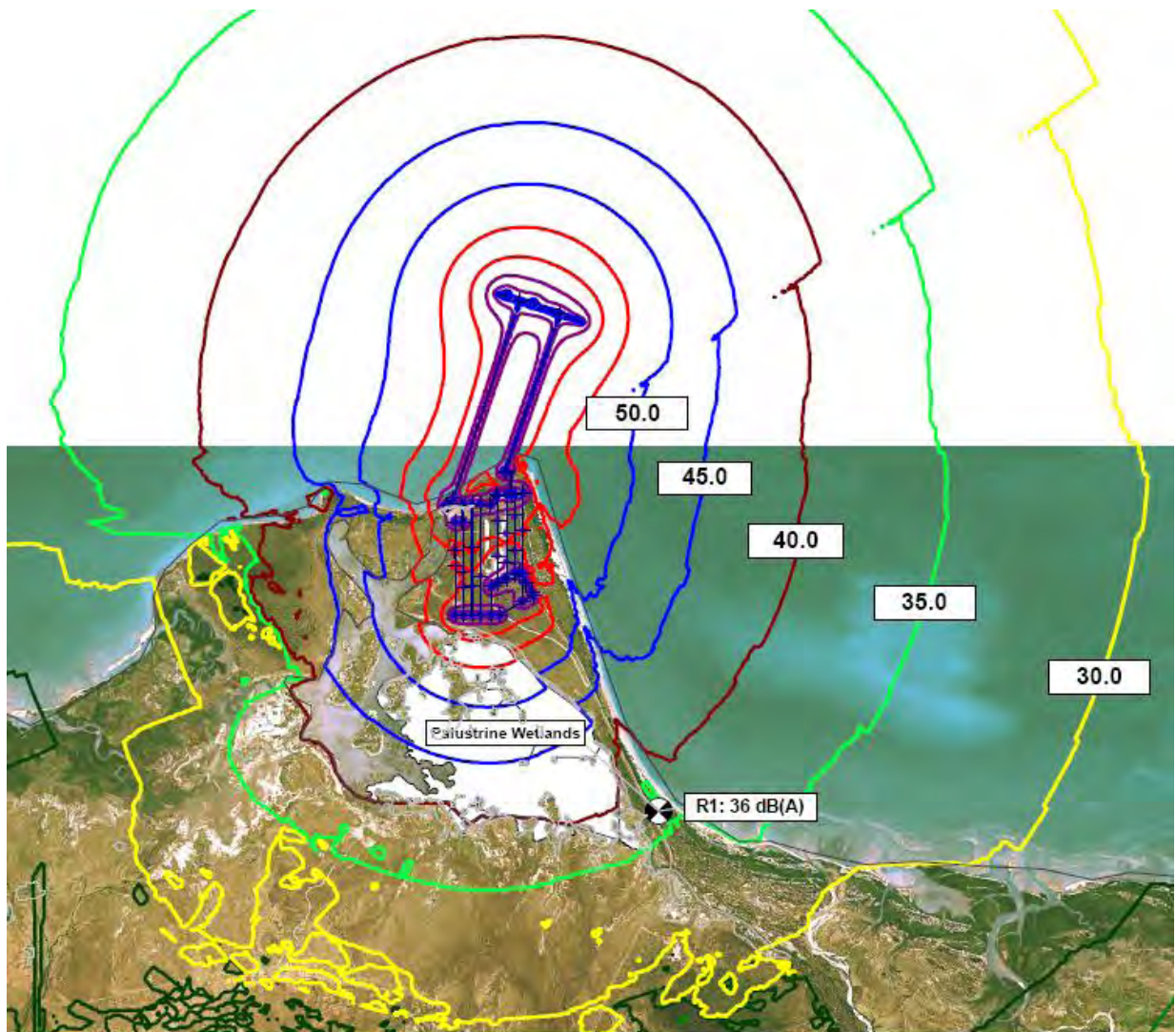
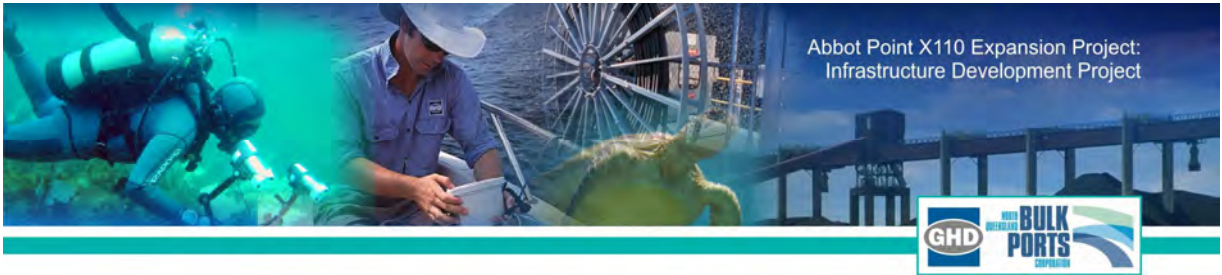


Figure 4-63 Scenario 1 – No mitigation applied – neutral conditions



Low Frequency Noise

Predicted low frequency noise (between 10 and 200Hz) outside the nearest sensitive receiver is shown in Table 4-53. The internal low frequency criteria is 20 dB(A). Sound transmission through common building materials are listed in Table 4-54 and as an indicative estimate, the predicted low frequency internal noise expected at the nearest sensitive receiver (outside and inside - assuming fibreboard dwelling) is shown in Table 4-55.

Table 4-54 Sound transmission loss through common materials (Bies and Hansen, 1988)

Material	63 Hz	125 Hz
6mm glass	17	11
Fibreboard	10	12

Table 4-55 Predicted low frequency noise at receiver 1 dB(A)

Frequency	Outside	Inside
63 Hz	26.9	16.9
125 Hz	30.6	18.6

The estimated low frequency noise inside the dwelling of the nearest noise sensitive receiver is below the DERM guideline level of 20dB(A) (see Table 4-55).

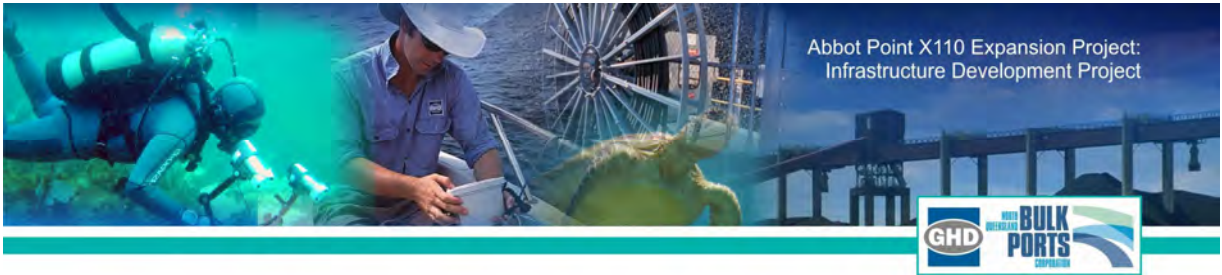
Caley Valley Wetland

Noise contours illustrated in Figure 4-63 show that predicted noise levels within the wetland will range from 60 dB(A) near the port facility, to approximately 40 dB(A) near the southern extents. This represents an approximate 5 dB(A) increase when compared to noise level predictions for the X50 expansion.

Studies of birds (Larkin, 1996) have shown that they will habituate to loud noises that are not biologically meaningful for them. For example if the noise is associated with possible harm such as thunder on a cloudy day, birds will avoid it, but routine noises such as traffic will not disturb them. Examples are provided of sea-birds that voluntarily co-exist with relatively loud noise environments, such as around airports and birds roosting on light-posts above busy motorways.

Attempts at using noise to deliberately scare birds away from an area, for example to protect farming crops, have been shown to grow less effective over time as birds habituate to the noise. Larkin (1996) suggests that keeping the noise as consistent as possible, both in the sound produced and the frequency with which it occurs, may also help mitigate its effects on birds.

Noise from the port facility is constant in nature and wildlife in the area will likely adjust to the gradual increases in noise expected at the APCT.



Great Barrier Reef Marine Park

Noise modelling predictions suggest noise levels within the GBRMP boundary from port activities will be approximately 45 – 50 dB(A). There are however, no noise sensitive receivers within close proximity to the port and noise impacts from port operations are not expected to be an issue.

Vibration

There are no identified vibration sensitive receivers in proximity to the proposed X110 expansion. The nature and levels of vibration emitted by the site will vary with the activities being carried out on site, however, due to the distances between the source and receivers, vibration impacts are not likely to be an issue.

4.13.5 Conclusion

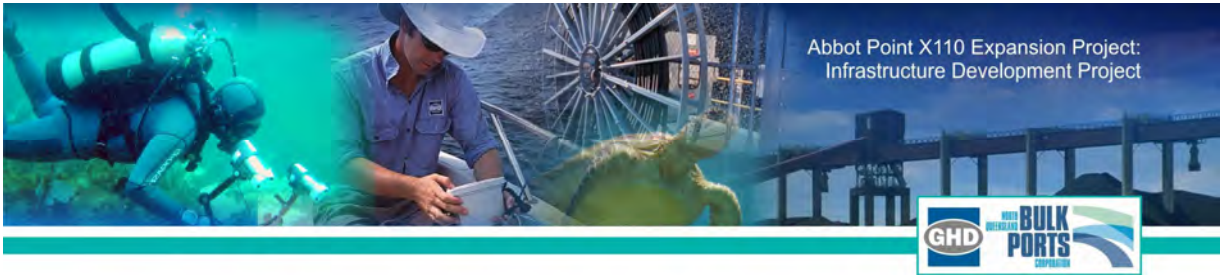
The results of the assessment indicate that the proposed X110 Infrastructure Development Project operational noise impact will comply with the project specific operational noise criteria during the day, evening and night-time periods.

Indicatively estimated low frequency noise within the dwelling of the nearest noise sensitive receiver is predicted to be below the DERM guideline level of 20dB(A).

Predicted noise levels within the Caley Valley Wetland range from 60 dB(A) near the port facility, to approximately 40 dB(A) near the southern extents. This represents an approximate 5 dB(A) increase when compared to noise level predictions for the X50 expansion. Noise from the port facility is constant in nature and wildlife in the area will likely adjust to the gradual increases in noise expected at the APCT from the X110 expansion.

Noise modelling predictions suggest noise levels within the GBRMP boundary from port activities will be approximately 45 – 50 dB(A). There are however, no noise sensitive receivers within close proximity to the port and noise impacts from port operations are not expected to be an issue.

The nature and levels of vibration emitted by the site will vary with the activities being carried out on site, however, due to the distances between the source and receivers, vibration impacts are not likely to be a significant impact.



4.14 Waste Management

4.14.1 Waste Generation – Construction Phase

Table 4-56 summaries the primary waste materials, along with the source and description that are likely to be associated with the construction phase.

Table 4-56 Construction phase waste materials

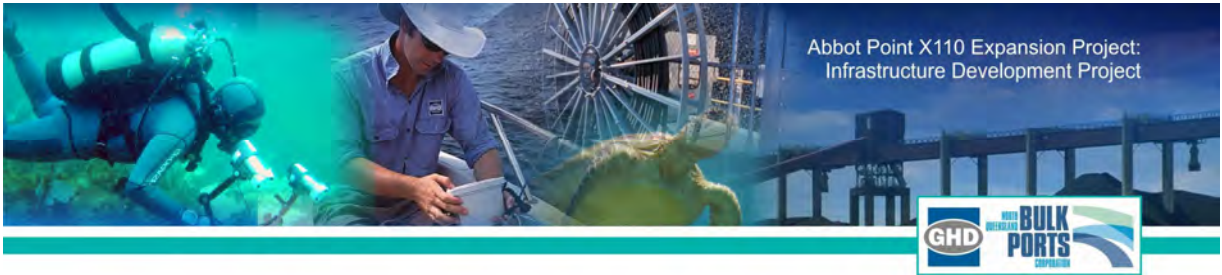
Material	Source/Description
Vegetation	Leaves, branches and logs. Includes materials that have been processed eg sawn, chipped, mulched or composted.
Fill	Excavated material such as clay, gravel, sand, soil and rock that has been mixed with another waste, or excavated from areas that are contaminated with manufactured chemicals, as the result of industrial, commercial, mining or agricultural activities.
Concrete	Mixture of cement, sand and aggregates. May include additives or substitutes such as fly ash.
Asphalt	Any materials containing bituminous hydrocarbons. May contain additives such as concrete. Includes recycled asphalt pavement (RAP).
Timber	Wood materials used for formwork or other construction purposes.
Steel	Metal building products and materials e.g. reinforcing steel, sheet roofing, structural columns and beams etc.
Non-ferrous metal	Metal building materials other than steel e.g. aluminium, brass, copper etc.
Mixed waste	Mixed waste of which no one material comprises 50% or more of the load.

4.14.2 Waste Generation – Operational Phase

Table 4-57 summaries the primary waste materials, along with the source and description that are likely to be associated with the operational phase.

Table 4-57 Operational phase waste materials

Material	Source/Description
Mixed waste	Mixed waste of which no one material comprises 50% or more of the load. Glass, paper, cardboard, plastics and other packaging products, aluminium and steel cans.
Steel	Metal building products and materials e.g. reinforcing steel, sheet roofing, structural columns and beams etc.
Non-ferrous metal	Metal building materials other than steel e.g. aluminium, brass, copper etc.



Material	Source/Description
Fuels (petroleum hydrocarbons)	Machinery operation, maintenance and repair (including engine maintenance and repair).
Other chemicals	Solvents, acids/alkalis and detergents.

It is expected that only minor quantities of hazardous wastes such as paints and oils will be generated during the operational phase of the project and authorised waste contractors can readily manage these.

4.14.3 Management of Impacts

4.14.3.1 Construction Phase

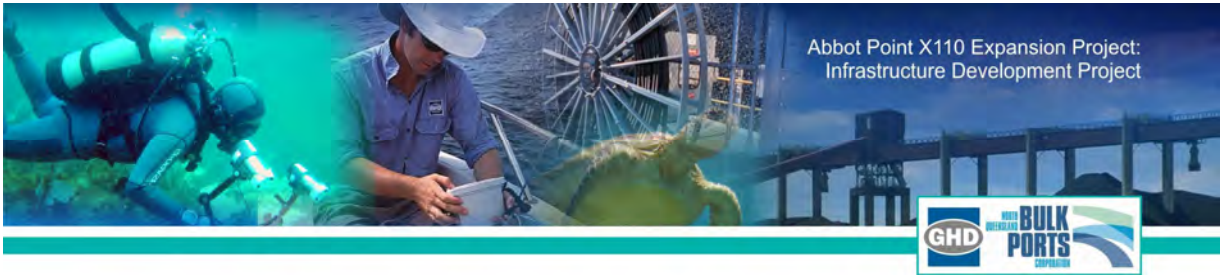
In order to best manage the impacts of the construction of the project and to minimise the amount of waste generated by the construction process, it is recommended that a waste minimisation strategy be developed for the construction phase. A number of key items are required to be addressed in order to achieve waste minimisation and capitalise on recycling opportunities, these are as follows:

- » Coordinate and communicate the strategy to site project managers, supervisors, workers and contractors;
- » Appoint a responsible person (site manager) to oversee implementation of the waste minimisation plan, promote the plan and reward performance where possible;
- » Develop reporting arrangements to monitor waste minimisation, or alternatively, ensure disposal and recycling contractors separate, monitor and recycle all site waste as far as possible, so that the objectives of the plan are met;
- » Involve the site waste contractor before construction commences, to ensure waste management strategies are compatible with collection systems; and
- » Provide relevant training and ongoing education to ensure the strategy is effectively implemented.

In addition to the overall objectives of the waste minimisation strategy, specific options that can be utilised to address the principles of the waste management hierarchy in order of preference, are provided below:

Waste Avoidance

- » Use designs that minimise the generation of waste during construction and allow waste management facilities during the building's operation.
- » When selecting a product or material, consider the durability of materials and future cost savings of buying an item once, but reusing it in a number of ways over the life of the development.
- » Include clauses in contracts that discourage over-supply of materials and generation of waste.
- » As far as possible accurately estimate the quantities of materials required for the job to avoid over-supply.
- » Work around land features to avoid unnecessary excavation, removal of vegetation cover etc.
- » Minimise the handling and transport of materials on and off-site.



Waste Reuse

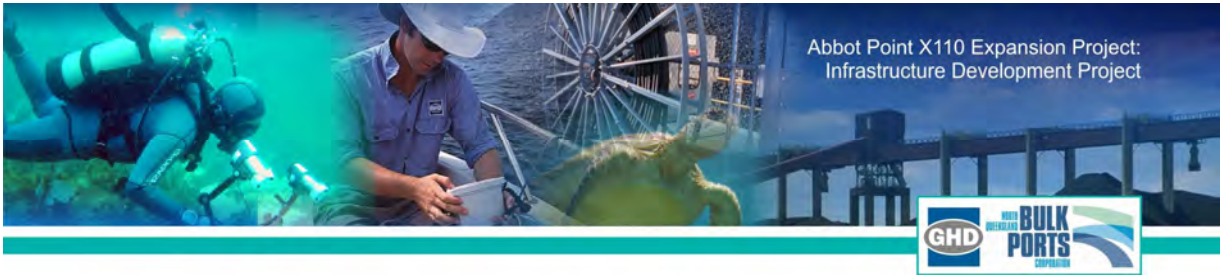
- » Ensure waste is separated into recoverable and non-recoverable streams. Also ensure new and undamaged recovered waste materials are kept separate.
- » Establish a specific area within the site for the storage and removal of different streams of recovered waste materials. It should be secure and access restricted to authorised personnel.
- » Mulch or chip and reuse vegetation wastes in landscaping.
- » Crush large quantities of concrete, bricks and hard materials and use as roadbase, footings (if they meet the specification) retaining walls, drainage etc.
- » Organise pallet returns with follow on deliveries with suppliers where possible.
- » Plan to use excess or waste materials effectively, for example:
 - Identify which waste materials will be generated (eg concrete, timber, plasterboard, fill etc) and determine how they could be reused.
 - Coordinate use of materials between jobs – excess materials can be used on other sites if necessary.
 - Consider how excess or waste materials could be used if they become available eg. fill, drainage material, soil conditioners, framing, protective coverings, etc.
 - Maximise separation of wastes and minimise contamination of recoverable materials.
- » Stockpile unused or waste materials for future use. Ensure stockpiles are well managed.
- » Reuse off-cuts where possible and store appropriately in the interim.
- » Engage a recovery contractor to remove recoverable materials from the site.

Waste Recycling

- » Consider using recycled content products and materials where possible. Check the performance of recycled content products to ensure they meet engineering specifications.
- » Notify suppliers that recycled content products are preferable where other technical specifications are also met.
- » Return over-supplied quantities to the supplier.
- » Use fixtures/materials in fit-outs that can be reused in later refurbishments.
- » Consider using fly ash, as a component of concrete to reduce the use of virgin materials.

Waste Disposal

- » Collect data and record the movement of waste and recovered waste materials on and off the site. Require contractors to supply this information as part of the contract.
- » Identify the specific location of potential sources of waste material (eg, site sheds and offices, particular trades, particular work activities or areas).
- » Develop disposal procedures such as the types of containers to be employed, clear and appropriate signs, a suitable location for bins and stockpile sites.
- » Provide relevant training and ongoing education to ensure efficient disposal (eg, minimal contamination problems, maximum resource recovery).



- » Early installation of stormwater control devices and cut off drains to manage runoff from construction areas to ensure appropriate disposal and handling of stormwater sources.
- » Ensure regulated waste is recorded and tracked in accordance with legislative requirements.

4.14.3.2 Operational Phase

Operational waste will be managed to minimise the amount of waste generated on site through development and implementation of a waste minimisation strategy. The waste management strategy should be based on the following key items in order to achieve waste minimisation and capitalise on recycling opportunities:

- » Coordinate and communicate the strategy to site operators, supervisors, and workers;
- » Appoint a responsible person (site manager) to oversee implementation of the waste minimisation plan, promote the plan and reward performance where possible;
- » Develop reporting arrangements to monitor waste minimisation, or alternatively, ensure disposal and recycling contractors separate, monitor and recycle all site waste as far as possible, so that the objectives of the plan are met; and
- » Provide relevant training and ongoing education to ensure the strategy is effectively implemented.

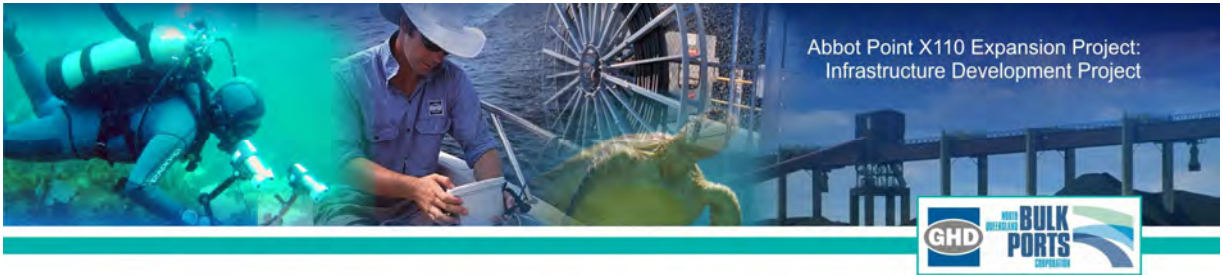
In addition to the overall objectives of the waste minimisation strategy, specific options that can be utilised to address the principles of the waste management hierarchy in order of preference, are provided below:

Waste Disposal

- » Collect data and record the movement of waste and recovered waste materials on and off the site.
- » Identify the specific location of potential sources of waste material (eg, site sheds and offices, particular trades, particular work activities or areas).
- » Develop disposal procedures such as the types of containers to be employed, clear and appropriate signs, a suitable location for bins and stockpile sites.
- » Provide relevant training and ongoing education ensure efficient disposal (eg, minimal contamination problems, maximum resource recovery).
- » Ensure regulated waste is recorded and tracked in accordance with legislative requirements.

Quarantine Waste

Ship's quarantine waste is not currently accepted at the Port of Abbot Point as no facilities for management of these wastes are available at the site. There is no intent to develop a quarantine waste facility at the port until such time as volumes of ship's quarantine waste are such that further facilities are demanded. The future development of a quarantine waste facility at the port would be subject to assessment as a separate project.



4.15 Cultural Heritage

4.15.1 Introduction

A Cultural Heritage Impact Assessment has been undertaken for the Project to achieve the following objectives:

- » To undertake a literature review of relevant cultural heritage data and provide a contextual framework for the current project;
- » To carry out a systematic archaeological survey of the proposed X110 development areas, in conjunction with representatives of the Juru Aboriginal Parties;
- » To identify and record any cultural heritage sites, places, items and/or values within the disturbance areas that may be impacted by the proposed project;
- » To provide a significance assessment for any cultural heritage sites, items or values identified within the project areas;
- » To undertake consultation with the Juru Aboriginal Parties to determine the indigenous cultural values of the project areas and to provide feedback to the development proponent on any major Aboriginal concerns, issues or constraints relating to the development project;
- » To assess the potential impacts of the proposed development on (existing and potential) cultural heritage sites, places and values; and
- » To formulate recommendations in consultation with the Juru Aboriginal Parties and in accordance with the relevant cultural heritage legislation, to mitigate any adverse impacts to identified cultural heritage sites, places or values as a result of the proposed project.

The work has been completed having regard to, and in accordance with, relevant legislative requirements for cultural heritage assessment and management, including those under the *Queensland Heritage Act 1992*, the *Aboriginal Cultural Heritage Act 2003*, and the *Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.

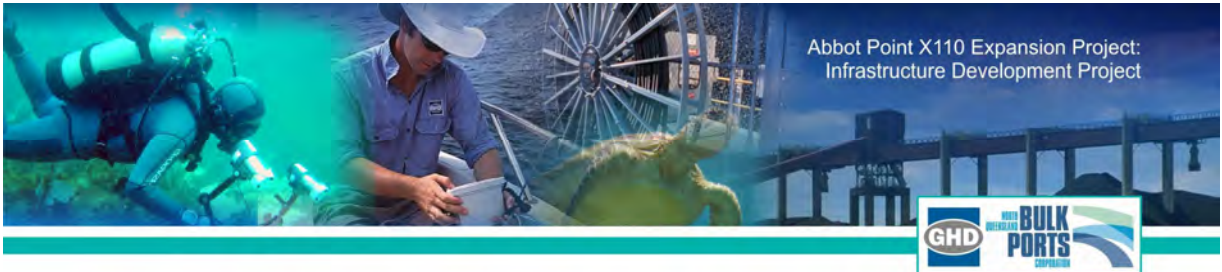
4.15.2 Description of Existing Environment

4.15.2.1 Indigenous Cultural Heritage

Literature Review and Database Searches

Previous cultural surveys have been conducted in and around the study area. The first systematic surveys of the Abbot Point area appear to have been conducted by Hill in 1978. While the full results of this initial research are not available, it is known that surveys were conducted on the north and eastern faces of Mount Little and various alternative routes for the existing rail spur and access road. Hill (1978) reported that *“the location of a campsite at the foot of Mount Little and a very light scatter of artefacts along the dune area were the only significant discoveries made at Abbot Point”*.

In 1999, Barker and Juru Traditional Owner representatives carried out a detailed cultural heritage survey of lands within the NQBP Abbot Point Coal Terminal. Barker (1999) concluded *“the Abbot Point*



region shows evidence of extensive and large scale prehistoric/historic Aboriginal activity". Two main areas of Aboriginal cultural heritage value were identified during the 1999 field surveys.

- » Aboriginal middens located on the deflated dune system from the northern part of Abbot Point Beach opposite the seawall, extending to a distance of some 3.5 km southward (Barker's site 1; see Figure 6 in Barker 1999).
- » Beach ridges in the mangroves behind the beach in the buffer zone (Lot 47) (Barker's site 2).

A more recent survey was conducted in 2005 with regards to the proposed X50 Expansion Project (NAE 2005). During that survey, no archaeological evidence for Aboriginal cultural sites or materials was discovered and the apparent dearth of sites was attributed to two main factors. Firstly, the high level of previous landscape disturbance and modification in the targeted survey areas and secondly, Aboriginal subsistence strategies (in summary, people preferred to establish their base camps on the coastal margins on sand dunes and beach ridges, rather than in the flood prone low-lying hinterland).

A cultural heritage search request was submitted to DERM in January 2009 for all parcels of land to be impacted by the proposed X110 Expansion project. The search request included the following lands: Lot 46 SP156160, Lots 1 and 2 RP748628, Lot 33 SP124849, Lot 4 RP738760, Lot 47 SP117913, Lots 34 and 35 SP112920, Lots 56, 57 and 58 SP112921, Lot 1 RP745292.

The DERM cultural heritage search revealed that there are three (3) Aboriginal cultural heritage sites listed for the broader project area at Abbot Point (see Appendix I). These sites include:

- » GKA10 Fish trap.
- » GK:A11 Artefact scatter.
- » GK:A34 Shell midden.

The specific location of these sites is expressly excluded from this report in order to respect the Traditional Owners of the land.

It is noted that the project archaeologist also carried out searches of the Australian Heritage Database and the Register of the National Estate as part of this cultural heritage assessment. Internet searches of these databases/registers have revealed that no significant indigenous cultural heritage sites or values are listed for the X110 project area.

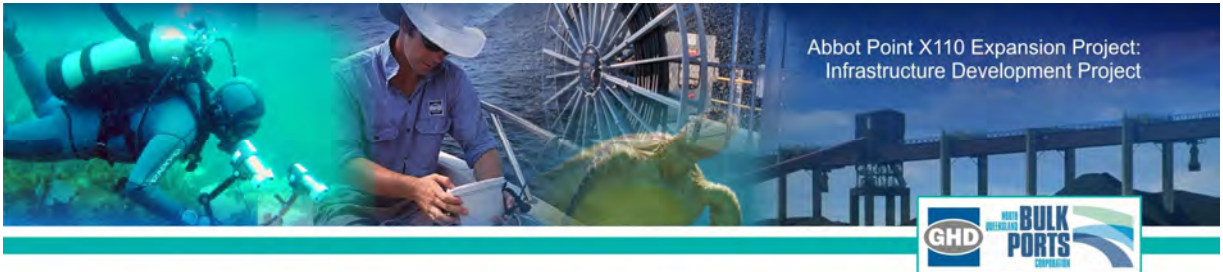
GK:A10 Fish trap

The grid references for the GK:A10 fish trap, indicate it is located on the coastal margins fronting the low hills at Lot 1 SP156160, however, the field survey undertaken for the X110 project did not identify it within this location, but some 500 m west of the listed location. The fish trap is situated in the intertidal zone fronting a remnant beach ridge containing shell midden material.

Information provided by the Cultural Heritage Coordination Unit of DERM (Jim Gaston on 14 April 2009) revealed that Aboriginal Ranger, Bruce Butler first recorded this fish trap in 1974 (without GPS).

GK:A11 Artefact scatter

The grid references for the GK:A11 artefact scatter indicate that it is located well west of the proposed X110 development area. During the cultural survey, a broad buffer area (of at least 250 m) was surveyed to the west of the planned development boundaries, as a safeguard measure against the possible inaccuracy in the DERM grid references for the artefact scatter. No archaeological evidence for



this site was found within the boundaries of the development area, or in the immediate surrounds. This would suggest that it is indeed located outside the boundaries of the proposed development areas.

GK:A34 Shell midden

The shell middens at site GK:A34 are located well east of all proposed development areas for the X110 Project. The middens are situated on the coastal beach ridges and dunes to the east of the rail loop. These cultural sites are currently managed by NQBP in consultation with the Juru people under an existing (2005) CHMP and the Port of Abbot Point Environmental Management Plan (EMP) (see also Barker 1999 and Bird 2005).

Archaeological Survey Results

Cultural heritage field surveys of the X110 Expansion area were carried out over a period of four (4) days from 14 to 17 April 2009. For each day of the survey, the cultural team included the project archaeologist with five (5) Juru Cultural Field Officers, as nominated by the Endorsed Aboriginal Parties. At least one (1) Elder attended the survey and over the course of the four days, some 13 Juru Field Officers took part in the surveys.

Details of the method utilised during the surveys follow those of Barker (1999) and Bird (1995).

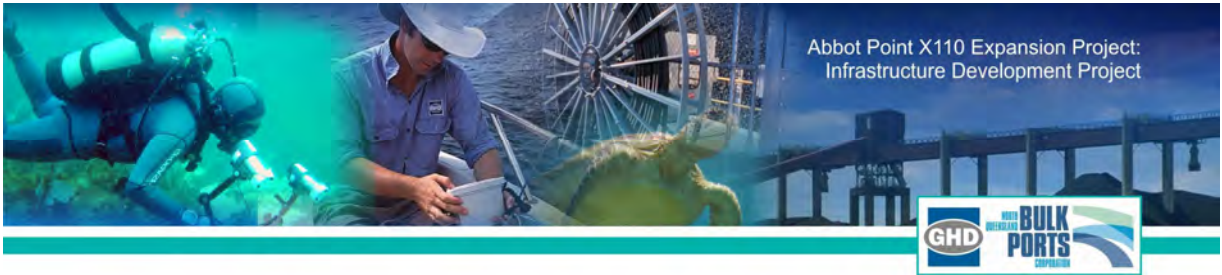
The identified cultural sites and values in the X110 project area include:-

- » Shell midden and artefact scatter (JU 1).
- » Stone-wall tidal fish trap (JU 2 and JU 2a).
- » Habitat tree (JU 3).
- » Native woodland vegetation (JU 5).

Shell midden and artefact scatter

Site JU 1 is a continuous low-density shell midden/scatter located on the surface of the beach ridges along the northern coastal margins of the development area. The beach ridges are elevated (generally 1 to 1.5m in height), running parallel with the shoreline. It is highly likely that the stone-wall fish trap at site JU2 is contemporaneous with, and directly associated with, this shell midden. The shell midden is located along a strip of dune some 400 to 500m in length.

The shell midden at site JU 1 is located within a remnant stand of native coastal vine forest, which in itself has a high level of cultural significance to the Juru Traditional Owners. Whilst this vine forest is largely intact with few introduced weeds, other nearby areas on the hills to the east are heavily infested with rubber vine and woody weeds. Areas to the south have been largely cleared and are now open paddocks, again with many weed species. The Traditional Owners noted that the remnant vine forest contains many bush tuckers and other useful plants such as Burdekin plum (*Pleiogygium timorense*), bush fig (*Ficus spp.*), native cherry (*Exocarpos latifolius*) and helicopter tree (*Gyrocarpus americanus*). They have no doubt that Aboriginal people would have targeted this forest with its many ethnobotanical species for a range of food and plant resources (including bush medicines and wood for making artefacts).



Stone wall tidal fish trap

Site JU 2 is a stone-wall tidal fish trap located on sandy flats in the intertidal zone (Photo 4-22 and Photo 4-23). The fish trap at site JU 2 is an arc-shaped (or U-shaped) arrangement of stones measuring some 40 m in length. The structure is fully exposed at low tide. The trap is well preserved, with a wall standing approximately 40 to 50 cm in height. It is constructed from the local boulders (available on-site on the sandy tidal flats). It appears that the trap has been constructed by placing rocks of roughly uniform size between some of the larger naturally positioned boulders. The structure still appears to be functioning as a fish trap on the receding tide, although there appears to be some sediment build-up on the landward side of the wall, which may be reducing its overall efficiency and effectiveness.

As previously noted, the fish trap at site JU 2 was originally recorded in 1974 by Bruce Butler and it is listed on the DERM cultural heritage database (site GK:A10). The location recorded by Butler however, was some distance from Site JU 2.

Juru Cultural Field Officers identified a second possible fish trap, or remnant of a fish trap, to the west of site JU 2 (this second site denoted as site JU 2a). A possible 'line of stones' was identified about 100 m from the well-preserved fish trap. What appears to be a natural depression in the sandy bed of the intertidal zone at this location gives the impression of a stone formation. However, there is no definitive archaeological evidence for a non-natural (cultural) stone formation or arrangement at this location.

The stone-wall tidal fish trap at site JU2 is assessed as a highly significant cultural site on the basis of both scientific, archaeological criteria and Aboriginal cultural heritage values.

From an archaeological point of view, this site is a well-preserved example of an important and relatively rare site type. Fish traps are becomingly increasingly uncommon as they tend to be impacted by a range of environmental factors (wind and wave action, sedimentation, cyclones, etc), as well as development pressures.

From the Juru people's point of view, the fish trap has immeasurable cultural significance, providing firm evidence for the past Aboriginal occupation of the Abbot Point coastline. The fish trap provides a tangible connection to country and to the Juru ancestors.

By association, the adjacent shell midden located on the beach ridges at site JU 1 is also viewed by the Juru Aboriginal Parties as a highly significant cultural site. It is likely that the midden and the fish trap are contemporaneous cultural sites. The shell midden and fish trap represent a 'complex' of cultural sites, where a range of subsistence and occupation activities were being carried out – procurement of resources, fishing, collection of shellfish, food preparation (represented by hearth stone, grinding stones and manuports in the archaeological record), stone artefact manufacture and camping.

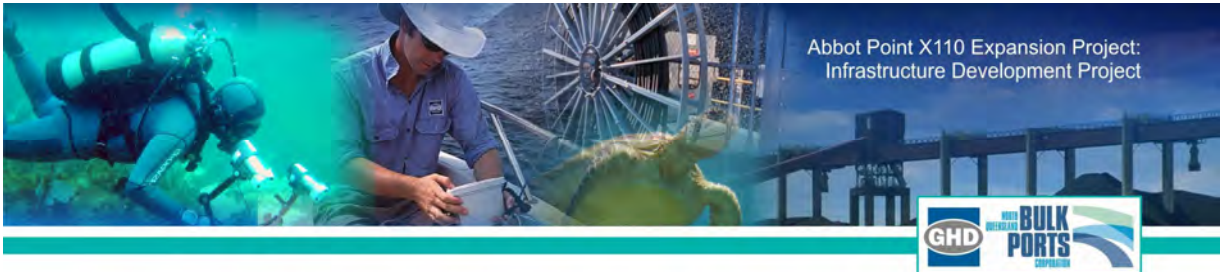
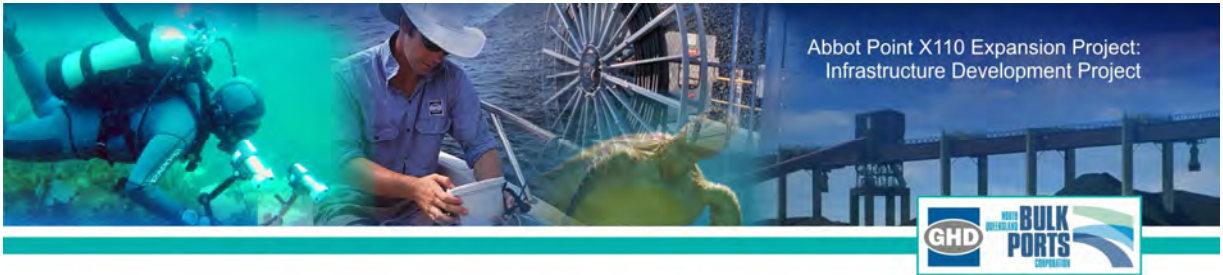


Photo 4-22 View of stone-wall fish trap, facing northwesterly



Photo 4-23 View of stone-wall fish trap, facing southeasterly



Habitat tree

Site JU 3 is a large Moreton Bay ash tree (*Eucalyptus tessellaris*) located near the western boundary of the X110 development area near the edge of the wetlands. Traditional Owners noted that this is an old growth specimen and have identified it as a 'habitat tree'. The tree contains many hollows suitable for habitation by native mammals and nesting birds (such as cockatoos).

Native Woodland Vegetation

Similarly, the Traditional Owners have noted the native woodland vegetation along the western margins of the X110 development area at Lot 32 SP124849 (listed as site JU 5 in this report), as retaining some old growth and mature trees such as Moreton Bay ash and poplar gum (see again Plates 7 and 8 in Appendix I). Many of these trees are habitat trees.

Intact and mature native vegetation is viewed as significant by the Juru Aboriginal Parties as it represents the original vegetation of their homelands. For the Traditional Owners, this vegetation is the 'living heritage' of their homelands and it is an important component of the natural and cultural landscapes. The cultural significance of intact stands of vegetation is becoming increasingly important to the Juru.

Other Observations

Members of the Juru Aboriginal Parties raised a further issue relating to general environmental matters in the APCT area. During a survey for another project for another proponent, a large number of dead freshwater turtles were observed in the coastal woodlands in the area between the bridge crossing on the Abbot Point Road and the western access turn-off. It is noted that these observations were made in early December 2008, before the onset of the wet season. One fresh water turtle shell (relatively fresh) was found in the X110 development area on the surface of the beach ridges within site JU 1. This turtle shell was not associated with the Aboriginal cultural material given its recent age. This matter has been raised with DERM by the Traditional Owners for feedback. An ecological discussion on this is provided in Section 4.10.2.

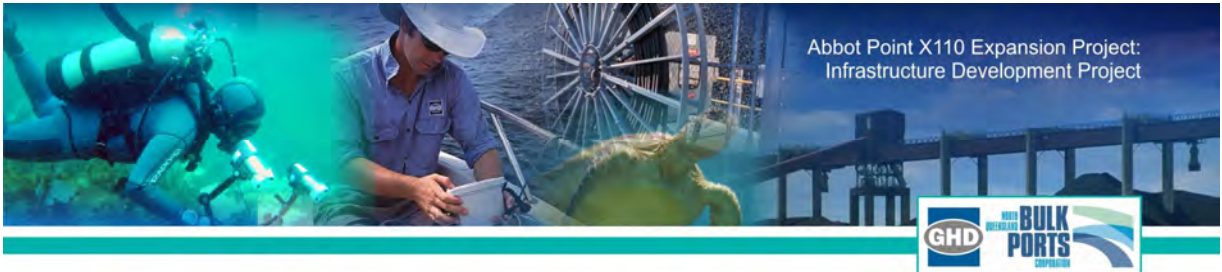
Consultation and Cultural Values

Consultation with the Juru Aboriginal Parties has remained a priority over the duration of the cultural heritage assessment process. Much of the consultation carried out by the project archaeologist took place during the actual field sessions. During the survey, discussions were held with the nominated Field Officers to ascertain if there were any major cultural heritage concerns, issues or constraints that might affect the development project. On-site discussions with the field teams were especially aimed at recording any oral history associated with the development area, any information on known cultural sites, places or values, and any other information directly relevant to the cultural heritage assessment process.

4.15.2.2 European Cultural Heritage

Literature Review and Database Searches

Previous surveys of the Abbot Point area have identified three European historical graves located on NQBP lands. The graves belong to members of the Abbot family (after which Abbot Point was named). The graves are marked with stappickets and are now fenced to prevent any risk of future disturbance. The graves are located between the surge bin and the perimeter fence and are outside the area of impact of the X110 Expansion.



A desktop survey has been undertaken to identify the likely presence of items of European cultural heritage. The desktop survey has included search of the following registers:

- » Australian Heritage Places Inventory; and
- » Queensland Heritage Register;

The searches revealed one site of European cultural heritage in proximity to the project area.

Great Barrier Reef World Heritage Area

The Great Barrier Reef World Heritage Area (GBRWHA) is a listed World Heritage site and is also listed as a site of National Heritage significance.

A discussion on the environmental values of the GBRWHA is provided in Section 4.2.1.6 and 4.11.

Archaeological Survey Results

Cultural heritage field surveys of the X110 Expansion area were carried out over a period of four (4) days from 14 to 17 April 2009. Whilst this survey was primarily targeted at Indigenous Cultural Heritage values, one historical site of European cultural value was also identified, being an historical survey mark (JU4).

Historical survey mark

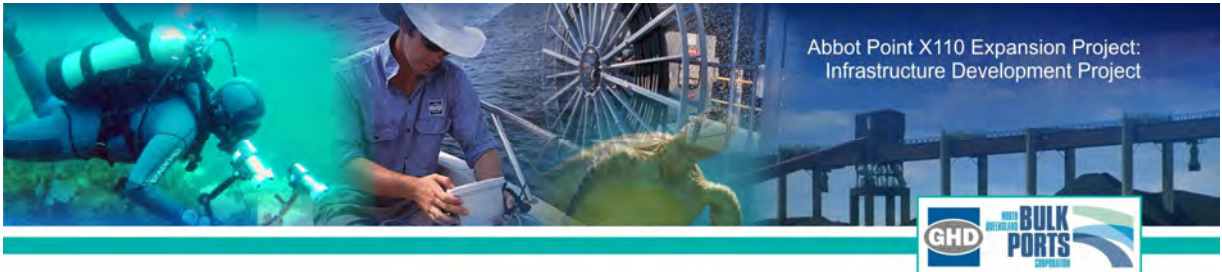
Site JU4 is an interesting 'blaze' on the trunk of a softwood tree on the eastern end of the beach ridge system, along the northern coastline. The blaze appears to be a survey mark with the letter 'T' and the number '27' clearly discernible on the face of the scar. Bark has re-grown over the face of the scar to some considerable extent, possibly obscuring other markings/carvings. The tree (species not identified) is a mature specimen, but it does not appear to be an old growth tree. It is possible that this survey mark may be of some considerable age (> 50 years) and that it may represent a historical survey mark. This feature may have some historical cultural heritage value.

4.15.3 Potential Impacts and Mitigation Measures

4.15.3.1 Potential Impacts

The results of the cultural surveys for the proposed X110 project parallel the results of previous archaeological investigations at Abbot Point (Barker 1999), and also provide further confirmation that the Abbot Point coastline is an area rich in Aboriginal cultural sites and prehistory/history. The shell midden recorded in this current study at site JU 1 is consistent with the midden sites on the eastern coastal margins, similar shell species are represented at the sites and similar intra-site activities are being carried out.

The clear pattern emerging from the archaeological record is that the coastline at Abbot Point, particularly landforms such as beach ridges and dune complexes, are sensitive and likely to contain shell middens and other Aboriginal occupation sites. This current study has confirmed that a stone-wall tidal fish trap is located directly adjacent to, and in association with, the shell midden at site JU 1. Barkers' (1999) theory that this coastline was occupied as a seasonal base camp is supported by the current study. In the form of the fish trap, there is clear evidence for the targeted management of food resources (fish).



As noted, the archaeological record now clearly shows that the wider Abbot Point area contains a complex of cultural heritage sites representing a range of subsistence and occupation activities – resource management and food procurement (fish traps), fishing, shell fishing, stone artefact manufacture, preparation of food (hearthstones, grinding stones and cooking stones) and camping. In the wider hinterland, ceremonial and art sites are located at the base of Mount Roundback and in the vicinity of Cape Upstart. Clear regional patterns are emerging regarding the Aboriginal use and occupation of the cultural landscape and the Abbot Point coastline was certainly an integral and focal part of Juru traditional homelands.

Interestingly, the 2009 and previous cultural heritage studies have noted a general dearth of Aboriginal cultural sites in the hinterland areas of the APCT, compared with the coastal margins. Several hypotheses are put forward below to account for this apparent pattern in cultural site distribution (see also NAE 2005). This pattern may relate to Aboriginal subsistence strategies or other factors relating to site visibility, preservation or taphonomy, or perhaps a combination of all these factors.

Regardless of the archaeological assessment of cultural heritage potential, the Juru Aboriginal Parties maintain some concern that the X110 hinterland development areas may contain (as yet) unrecorded cultural sites or items. On this basis, they are requesting that a cultural monitoring program for clear and grade operations be implemented for the development project, consistent with the monitoring program implemented for the X50 Expansion Project (see recommendations in Section 4.15.3.2).

From both an archaeological and Aboriginal cultural heritage point of view, the coastline at Abbot Point is confirmed as an area with cultural heritage values, containing a complex of significant cultural sites and materials. The consultation for this cultural heritage investigation has indicated that the Juru Aboriginal Parties wish to work cooperatively with the proponent to protect and effectively manage the identified cultural sites, features and values, as well as the natural and cultural landscapes at Abbot Point.

4.15.3.2 Mitigations Measures

The environmental harm to cultural heritage values in the vicinity of the Project should be identified and managed measures proposed. Management measures should be developed as part of the Environmental Management Plan (EM Plan) and should include the following:

- » a process for including Traditional Owners in the protection and management of indigenous cultural heritage;
- » a processes for mitigation, management and protection of identified cultural heritage places and material in the Project areas, including associated infrastructure developments, both during the construction and operational phases of the Project;
- » provisions for the management of the accidental discovery of cultural material, including burials;
- » cultural awareness training or programs for Project staff; and
- » a conflict resolution process agreed upon by the Traditional Owners and the proponent.

In addition to the above general mitigation measures, the proponent will develop a Cultural Heritage Management Plan in conjunction with the Traditional Owners to manage specific matters associated with the X110 Expansion.