

4. Environment Values and Management of Impacts

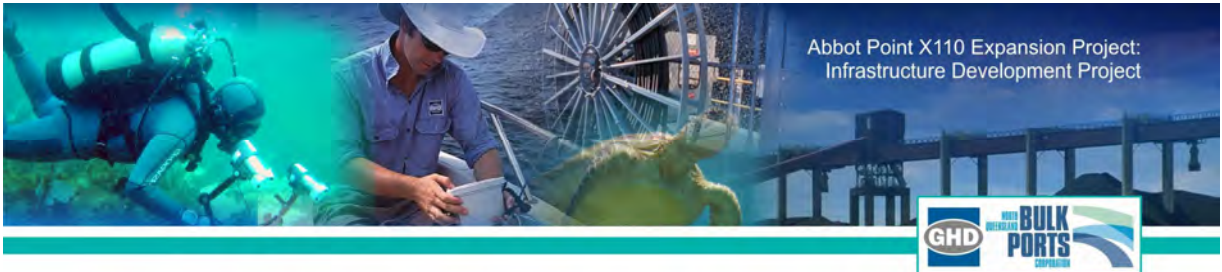
4.1 Introduction

This section addresses all elements of the environment, such as land, water, air, noise, nature conservation, cultural heritage, waste, health and safety. In presenting this information, this section:

- » Describes the existing environmental values of the area which may be affected by the proposal. Environmental values are described by reference to background information and studies;
- » Describes the potential adverse and beneficial impacts of the proposal on the identified environmental values;
- » Describes any cumulative impacts on environmental values caused by the proposal, either in isolation, or by combination with other known existing or planned sources of impact; and
- » Examines viable alternative strategies for managing or mitigating identified potential impacts.

Special attention is given to those mitigation strategies designed to protect the values of any sensitive areas and any identified ecosystems of high conservation value within the area of potential impact.

Requirements and recommendations of the relevant State planning policies, environmental protection policies and national environmental protection measures are addressed. Cumulative impacts on the environmental values are described and discussed. Control, monitoring and auditing programs are described where appropriate and mitigation and management strategies are described to provide environmental protection.



4.2 Land

4.2.1 Description of Environmental Values

4.2.1.1 Topography/geomorphology

The topography of the site is dominated by a prominent foredune up to 9 m AHD located along the coastal fringe of the NQBP land (refer to Figure 4-1). The area of proposed on-shore development comprises gently undulating sand drifts and a sandy plain with minor crest/swale formation, with an elevation variation of generally less than 0.5 m. The topography of the area shows that the elevation of the development site is generally between 2.5 m to 5 m AHD.

4.2.1.2 Geology and Soils

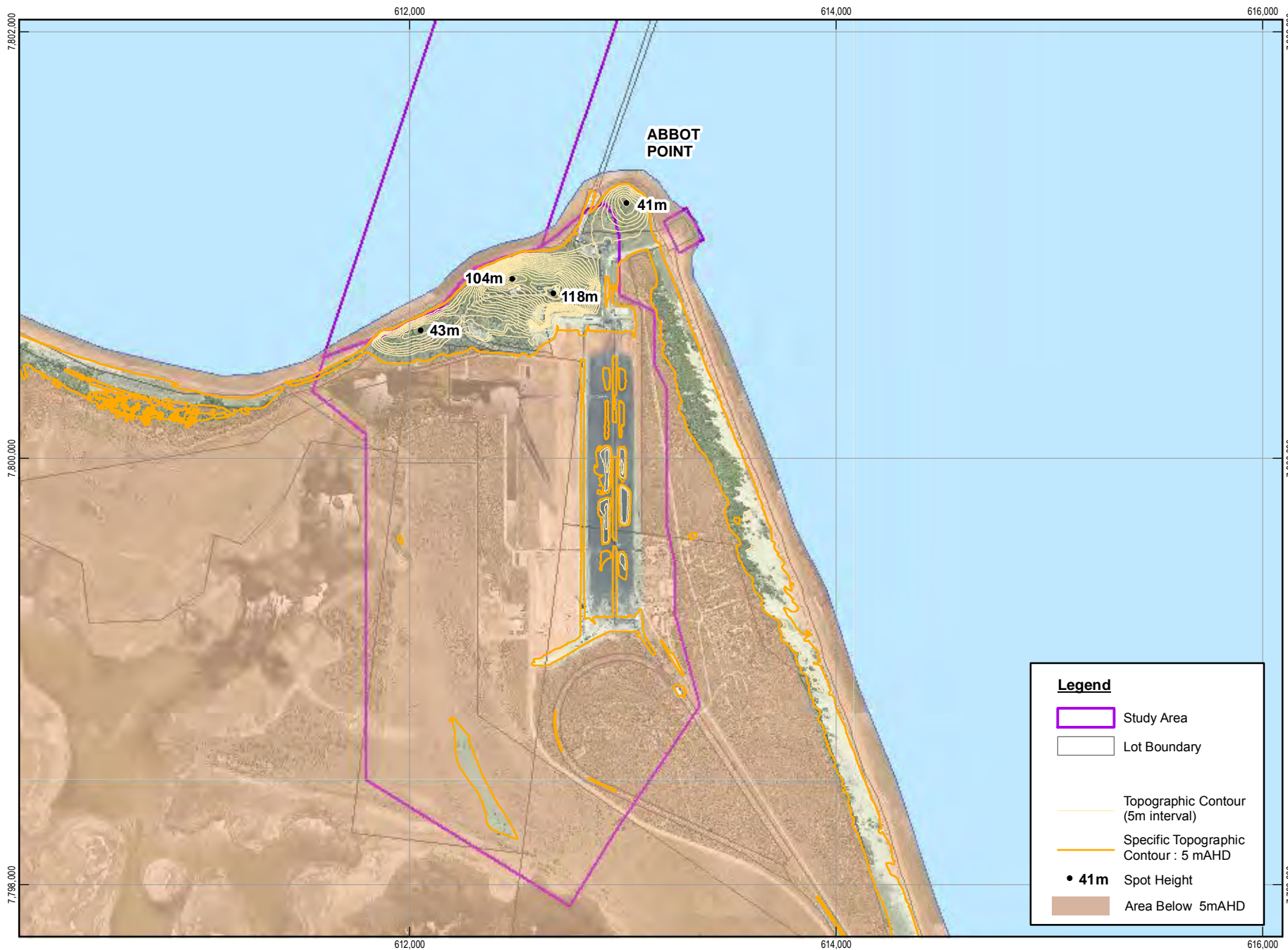
The digital mapped geology for the site and surrounding area is shown in Figure 4-2. The soils in the immediate vicinity of the study area are mapped as Tenosols and Hydrosols. These soil orders are typically poor soils that are not normally associated with good quality agricultural land (i.e. suitable for cropping or horticulture). Agricultural land uses of these soils are generally limited to grazing and in some parts of Australia, forestry for Tenosols. Details of these soils are included below and indicative areas are included on Figure 4-3 (Australian Soil Classification system map)¹.

- » Tenosols are soils with generally weak pedologic organisation apart from the A horizons (topsoil layer). They encompass a rather diverse range of soils, including areas commonly referred to as red and yellow sand-plains. Typically they have poor water retention and are therefore mainly utilised for the grazing of native pastures and limited areas sustain forestry.
- » Hydrosols include soils that are seasonally or permanently wet soils whereby the greater part of the profile is saturated for at least 2-3 months in most years. They typically have low permeability, or poor site drainage and contain high levels of organic materials. Hydrosols are commonly present in wet drainage depressions and seepage areas on lower slopes, and low lying narrow coastal plains that are regularly inundated by saline tidal waters. In coastal areas, these soils are often used for sugar cane production and grazing.

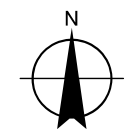
Other soils that are mapped to occur within 5 kms of the site include Sodosols and Dermosols.

- » Sodosols have a strong texture contrast between A horizons (topsoil) and B horizons (subsoil) and are typified as having sandy topsoil that is underlain by a sodic subsoil. These dispersive and sodic subsoils result in low permeability and seasonally perched water tables. The sodic subsoils are prone to gully and tunnel erosion.
- » Dermosols have structured B2 horizons but lack a strong texture contrast between A and B horizons. This soil group can include soils that are deep, well drained with good structure and moderate to high chemical fertility and water-holding capacity. Soils within the Dermosols generally have a diverse range of agricultural potentials including cropping, forestry and grazing.

¹ Soil information is obtained from the CSIRO Australian Soil Resource Information System (ASRIS). ASRIS is an online information system of soil and land resource for Australia. Soils information available is based on the Atlas of Australian Soils, which is broad scale mapping at a scale of 1:2,000,000. Soil orders and descriptions are based on the on the Australian Soil Classification.

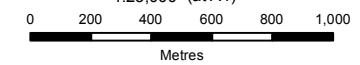


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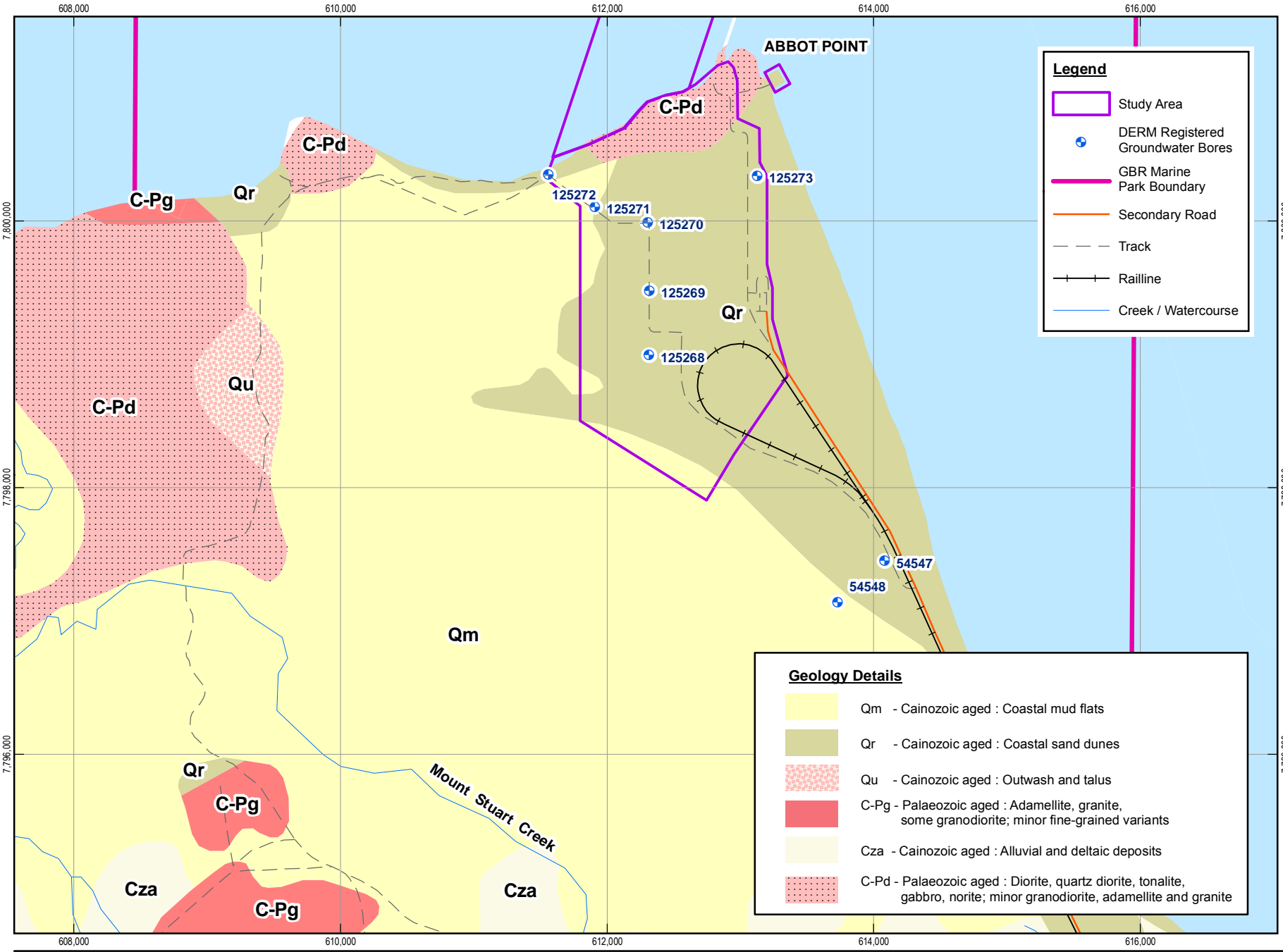


Map Projection: Universal Transverse Mercator
 Horizontal Datum: Geocentric Datum of Australia (GDA)
 Grid: Map Grid of Australia 1994, Zone 55

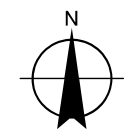
Legend

- Study Area
- Lot Boundary
- Topographic Contour (5m interval)
- Specific Topographic Contour : 5 mAHD
- 41m Spot Height
- Area Below 5mAHD

TOPOGRAPHY
FIGURE 4-1

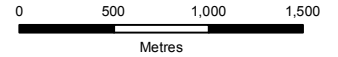


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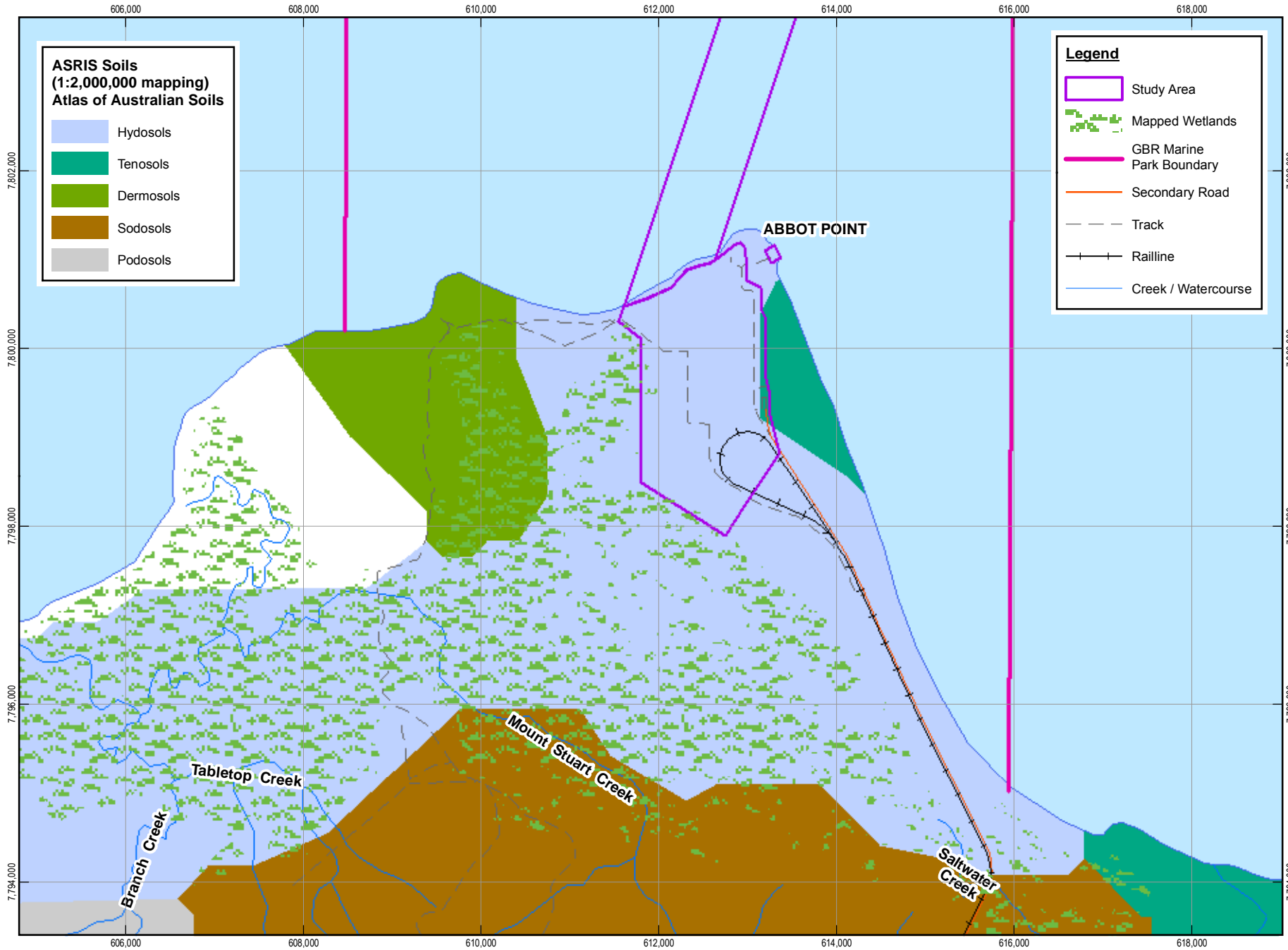
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REGIONAL GEOLOGY

FIGURE 4-2



ASRIS Soils
(1:2,000,000 mapping)
Atlas of Australian Soils

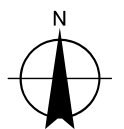
- Hydosols
- Tenosols
- Dermosols
- Sodosols
- Podosols

Legend

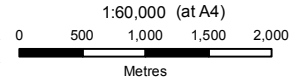
- Study Area
- Mapped Wetlands
- GBR Marine Park Boundary
- Secondary Road
- Track
- Railline
- Creek / Watercourse



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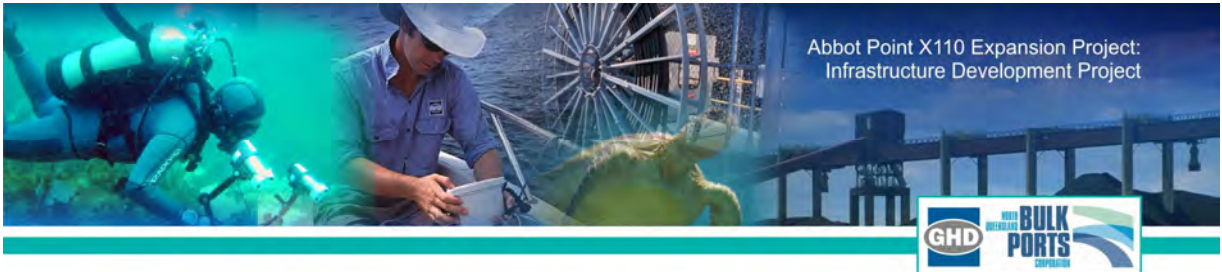
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Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

SOILS
FIGURE 4-3

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Data Source: DERM: cadastral - 2009, DERM: wetland mapping - 2000, ASRIS: soils - 2006. Created : jvc
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4.2.1.3 Acid Sulfate Soils

Overview

The topography of the area shows that the elevation of the development site is generally between 2.5 m to 5 m AHD. Thus, land with an existing elevation of below 5 m AHD is likely to be disturbed as a result of the proposed expansion.

The following have been used in the preparation of the acid sulfate soils section of the EA:

- » Mapped geology of the site and surrounding area (1:250,000 Scale Ayr, Sheet SE 55-15);
- » Abbot Point Coal Terminal Stage 3 Expansion, Environmental Impact Statement, WBM, March 2006;
- » Abbot Point Coal Terminal Stage 3 Supplement to the Environmental Impact Statement, prepared by WBM, October 2006;
- » Acid Sulphate Soil Investigation Report and Management Plan. APCT X80 & X110, Aurecon Hatch (2009); and
- » Limited field investigations undertaken by GHD, August 2009, within the wetland area to be developed (located at the western extent of the development area).

Filling of lands involving 500 m³ or more of material with an average depth of 0.5 m or greater and/or excavations totally more than 100 m³ conducted within the X110 area, will require assessment under the State Planning policy 2/02: Planning and Managing Developments Involving Acid sulfate soils (SPP2/02), for the following reasons:

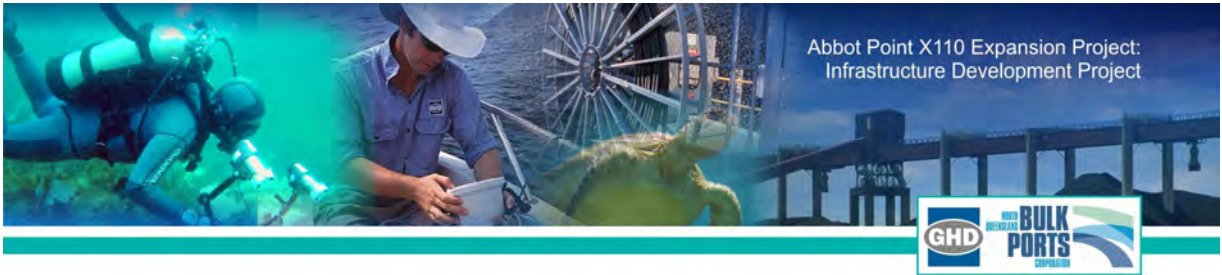
- » The natural ground level for the footprint of the X110 area is less than 20 mAHD with elevations typically below 5 mAHD;
- » The X110 area is characterised by young (<2.5 million years) Quaternary-aged coastal deposits; and
- » Proposed works on the site fall under the *Integrated Planning Act 1997*.

Occurrence of Acid Sulfate Soil

Mapped geology at 1:250 000 scale (Bureau of Mineral Resources, Geology and Geophysics 1961) indicates that the outcrop geology of the X110 site and the surrounding area is characterised by Quaternary-aged coastal sand dunes (Qr) and coastal mudflat (Qm) deposits. Acid Sulfate Soils (ASS) occur mainly in Quaternary aged sediments of marine or estuarine origin and are predominantly confined to coastal lowlands with elevations typically below 5 m AHD. The project area contains Quaternary aged coastal sediments and lands with an elevation below 5m AHD. Broad scale soil mapping information of soils obtained from the CSIRO's Australian Soil Resource Information System (ASRIS) identified that the study area contains a *high* probability of containing ASS.

The primary areas that acid sulfate soils were identified generally correspond with the geology Quaternary coastal mud flat (see Figure 4-2) and hydrosol soils. This only occurs on a relatively small portion of the X110 Expansion area along the western and south western boundaries where low lying wetlands are infringed.

The secondary area of acid sulfate soils is within the existing rail loop are, however, the occurrence appears intermittent occurring in only four (4) or the thirty-three (33) test locations.



4.2.1.4 Land Ownership and Tenure

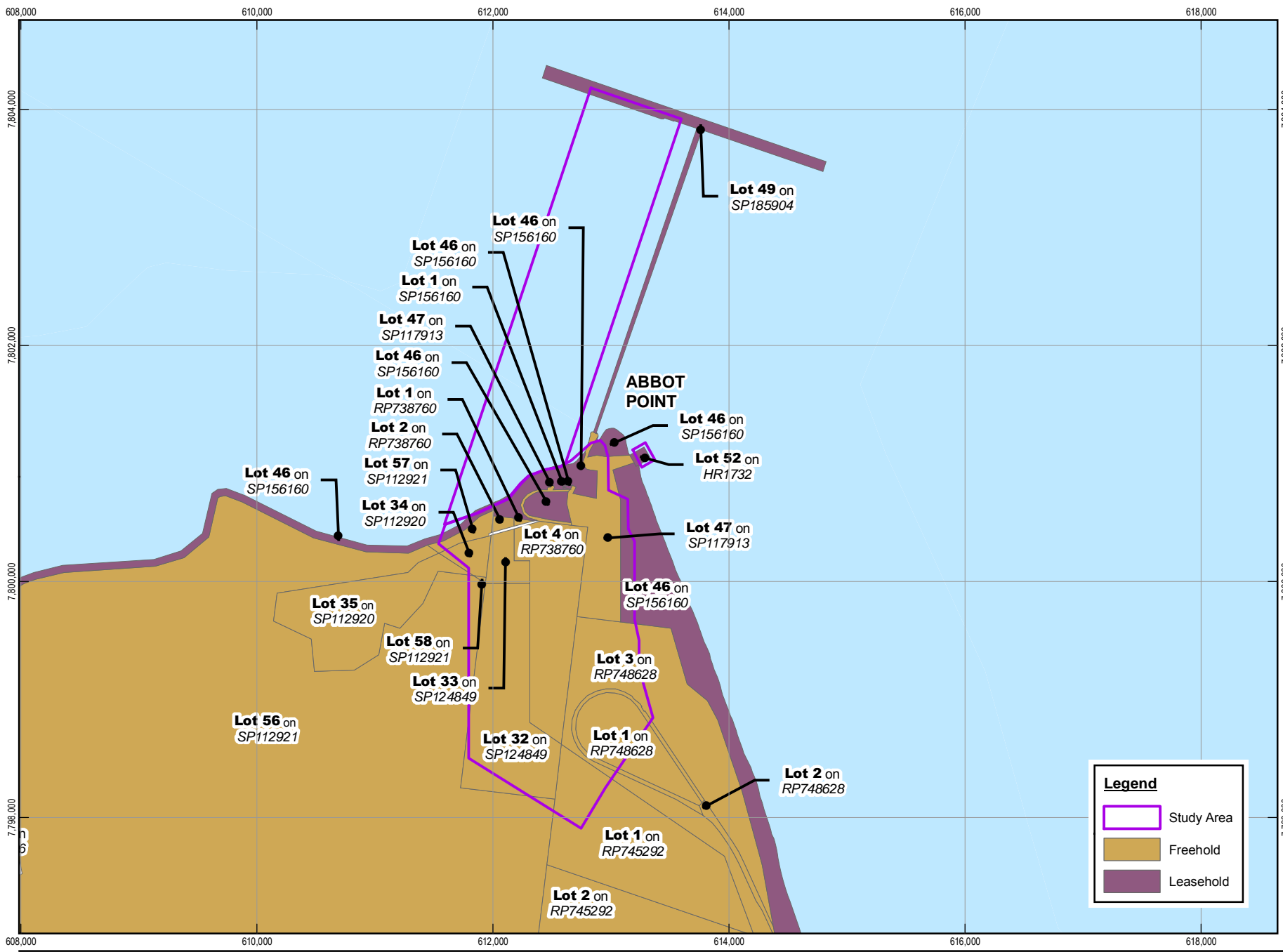
Most of the land required for on-shore development is freehold land owned by NQBP (refer to Table 4-1 and Figure 4-4). However, part of the neighbouring land holdings to the west, will be required for the expanded stockpile area. This land is owned by Colinta Holdings, a subsidiary of Xstrata Coal. NQBP is investigating options for ownership of the land. The new off-shore jetty structure will be built above unallocated State land. NQBP is currently seeking a perpetual lease over this land from the Queensland Government and have included the area in the Abbot Point Land Use Plan review.

Table 4-1 Land use designation and tenure

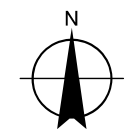
Property Description	Tenure	Landowner
Lot 52 on HR1732	Leasehold	NQBP
Lot 47 on SP117913	Leasehold	NQBP
Lot 1 on SP156160	Leasehold	NQBP
Lot 46 on SP156160	Leasehold	NQBP
Lot 4 on RP738760	Freehold	NQBP
Lot 3 on RP748628	Freehold	NQBP
Lot 1 on RP748628	Freehold	NQBP
Lot 2 on RP748628	Freehold	NQBP
Lot 1 on RP745292	Freehold	NQBP
Lot 32 on SP124849	Freehold	NQBP
Lot 33 on SP124849	Freehold	NQBP
Lot 2 on RP738760	Freehold	NQBP
Lot 1 on RP738760	Freehold	NQBP
Lot 57 on SP112921	Freehold	NQBP
Lot 34 on SP112920	Freehold	NQBP
Lot 58 on SP112921	Freehold	NQBP
Lot 56 on SP112921	Freehold	Collinta Holdings
Lot 35 on SP112920	Freehold	NQBP

4.2.1.5 Native Title

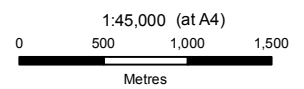
No Native Title claims are current over the area of proposed development. The majority of the on-shore area to be developed is held under freehold title and therefore not subject to Native Title. Off-shore areas are held under unallocated State land. At the time of granting a perpetual lease over the off-shore areas, the Queensland Government will undertake a Native Title notification.



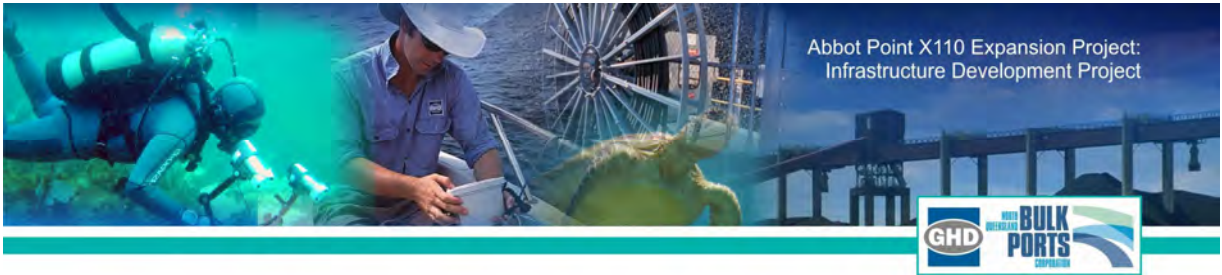
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4.2.1.6 Conservation Areas

Conservation areas protected under legislation that are of relevance to the Project are shown in Figure 4-5 and are summarised as follows:

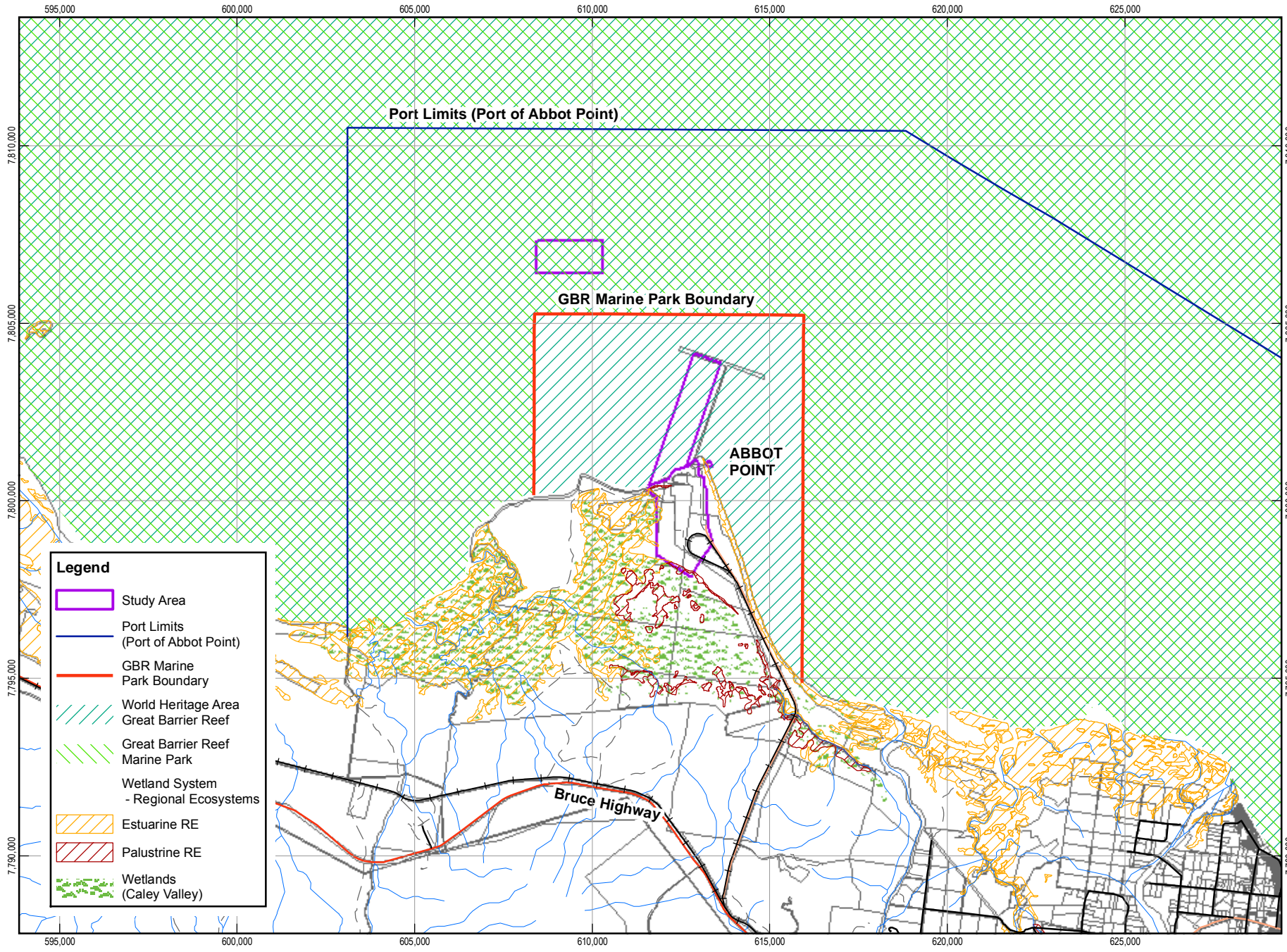
- » The major proportion of the offshore Port of Abbot Point lies within the GBRMP. However, the existing port facilities and the proposed X110 development are outside the GBRMP. All the Marine Park area within the Port of Abbot Point limits is designated as 'General Use' zone.
- » The Great Barrier Reef World Heritage Area is on the Register of the National Estate and extends to mean low water.
- » The Abbot Point – Caley Valley Wetland Aggregation is listed as a Wetland of National Importance in the Directory of Important Wetlands.
- » The nearest Fish Habitat Area (FHA) is at Edgecumbe Bay, approximately 15 km south of Abbot Point.
- » The nearest Dugong Protection Area (i.e. the Edgecumbe Bay Dugong Sanctuary) is also at Edgecumbe Bay, approximately 15 km south of the port.
- » There are several DERM designated Environmentally Sensitive Areas adjacent to the study area with one Category B area and World Heritage Area present in the study area.
- » There are no Conservation or National Parks in proximity to the Project.
- » There are no European heritage sites in the area listed on the DERM Heritage Register.

Great Barrier Reef Marine Park

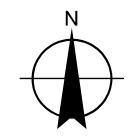
The GBRMP extends from the top of Cape York to the north of Fraser Island. The *Great Barrier Reef Marine Park Zoning Plan 2003* is the primary planning instrument for the conservation and management of the Marine Park.

The Port of Abbot Point is located in the Townsville/Whitsunday management area of the Plan. Whilst the operational areas immediately surrounding the port infrastructure at Abbot Point and Bowen are each outside the Marine Park, the surrounding areas have largely been designated as a 'General Use' zone under the GBRMP Act. To the southeast of Bowen, there is a 'Habitat Protection Zone', which encompasses Edgecumbe Bay. A designated 'Conservation Park Zone' surrounds Gloucester Island. Another Habitat Protection zone exists to the west of Abbot Point and Cape Upstart is surrounded by two 'Marine National Park Zones' and a Conservation Park Zone (PCQ 2005).

Any activities carried out in the Marine Park need to be consistent with the zoning uses allowed for the Marine Park area. No works associated with the Project covered by this environmental assessment will occur within the GBRMP.



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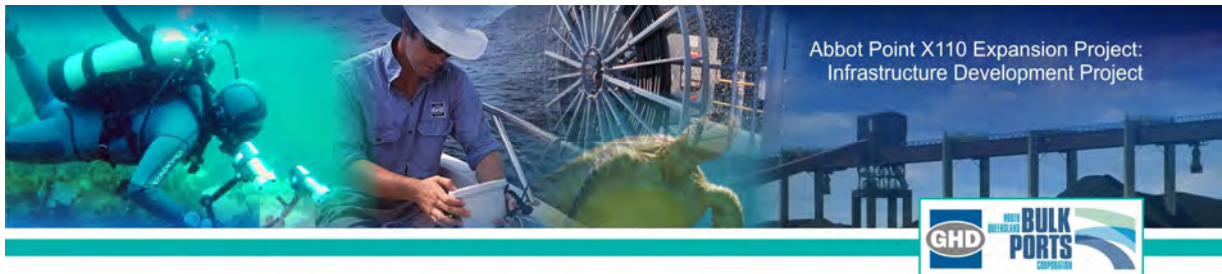
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CONSERVATION AREAS

FIGURE 4-5



Great Barrier Reef World Heritage Area

The Great Barrier Reef World Heritage Area (GBRWHA) encompasses all of the GBRMP extending to the low water mark along the Queensland coast, to the east beyond the continental shelf where the seaward edge of the GBRMP lies. The areas of the port that are outside the GBRMP are included in the GBRWHA. A discussion on the world heritage values of the area that may potentially be impacted by the project is included in Section 4.11.

Great Barrier Reef Coast Marine Park

The Queensland State Government created the Great Barrier Reef Coast Marine Park (GBRCMP) in November 2004, which replaces the previous set of State marine parks. The GBRCMP extends for the full length of the coast from Bundaberg to Cape York. The park extends the GBRMP zoning from low water to high water (or the seaward edge of mangrove forests), but not into rivers, creeks, estuaries or channels (PCQ 2005).

In the Port area, the GBRCMP replaces the previously existing Townsville/ Whitsunday Marine Park, which was established in 1987. Where as previously the zonings differed between the State and Commonwealth plans, the new zonings and usage permissions under the GBRCMP are the same as those in the adjacent GBRMP in the area (PCQ 2005).

Directory of Important Wetlands

The Abbot Point – Caley Valley Wetland Aggregation is listed as a Wetland of National Importance in the Directory of Important Wetlands. The listing highlights the recognised ecological importance of this area and the need to manage any development that may adversely impact on its values. Listing on the Register does not provide specific protection under State or Commonwealth legislation, unlike Ramsar wetlands which are protected under the EPBC Act (WBM 2006).

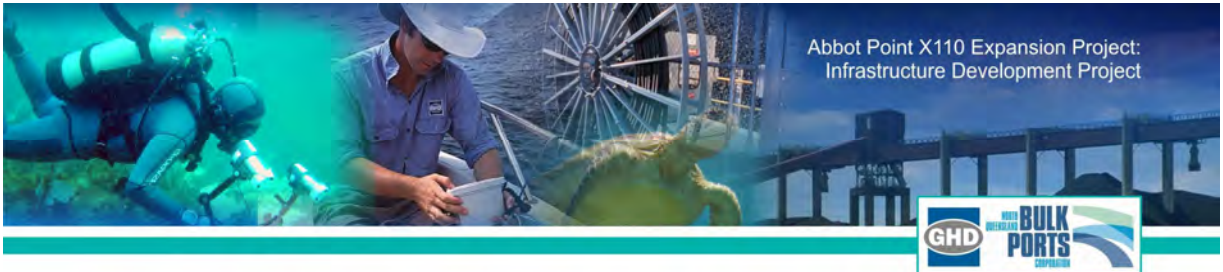
The Abbot Point – Caley Valley wetland surrounds the port land at Abbot Point to the south and west. The wetland is 18 km long and up to 6 km wide, covers an area of approximately 5,000 ha and comprises “a complex continuous wetland aggregation of subtidal and intertidal marine and estuarine wetlands, with large fresh and brackish water wetlands within an artificial impoundment” (PCQ 2005).

The wetland contains a number of habitats, including shallow water marine systems, beach ridges, mangrove creeks, intertidal and supratidal saline flats, fresh and brackish lake waters and swamps. The seasonal richness of the area as bird habitat justifies the wetland’s conservation significance (PCQ 2005). The existing coal terminal has been operating for around 25 years and there has been no identified significant impact from the coal terminal operations on it.

The Directory of Important Wetlands in Australia also identifies the Edgecumbe Bay wetland, which is located in the southeast corner of Edgecumbe Bay (PCQ 2005). This wetland is described as a “complex of marine, estuarine and fresh or brackish water areas” in the Directory and it covers an area of approximately 5,154 ha. Edgecumbe Bay is located approximately 15 km south of Abbot Point.

Fish Habitat Area

Currently, there is only one Fish Habitat Area (FHA) within port limits – the Edgecumbe Bay FHA approximately 15 km south of Abbot Point. This area, which is declared under the *Fisheries Regulation 1995*, extends from Adelaide Point to Cape Gloucester and includes the coastal wetland systems of the Emu, Yeates, Greta, Eden Lassie and Miralda creeks and the Gregory River. Legislation limits the



purposes for which approval may be given to undertake works within the FHA, however, the project area is well distanced from the FHA and no port operations occur nearby. Should any activities be undertaken within the FHA, approval from QPIF through IDAS would be required prior to the commencement of works (PCQ 2005).

Dugong Protection Areas

In addition to the standard levels of protection provided by the GBRMP, two dugong protection areas were also established in the area by the Great Barrier Reef Ministerial Council. The first is 'Dugong Sanctuary A', which is located outside of port limits in Upstart Bay (approximately 25 km northwest of Abbot Point). The second is 'Dugong Sanctuary B', which extends over most of Edgumbe Bay, (approximately 15 km south of Abbot Point). Both these areas are not located near the Port of Abbot Point and will not be impacted by the project..

Environmental Sensitive Areas

One category A area is located proximate to the study area, that is, the Great Barrier Reef Marine Park and State Marine Park (excluding general use zones). The project is not located near this area and is therefore not within the environmentally sensitive area. Further discussion on matters relating to general marine ecology matters are provided in Section 4.11.

Several category B areas are located within or proximate to the study area, these include:

- » The Great Barrier Reef World Heritage Area, which is located within the offshore part of the study area. A discussion on the world heritage values of the area potentially impacted is included in Section 4.11.
- » The Great Barrier Reef Marine Park and State Marine Park General use zones, located within the offshore part of the study area. A discussion on the marine ecological impacts on these areas is included in Section 4.8 and 4.11.
- » Marine plants located both within the offshore development area and in the adjacent Caley Valley Wetland. A discussion on impacts on marine plants is provided in Section 4.10 and 4.11.
- » Endangered Regional Ecosystems located south of the APCT. These will not be affected by the development.

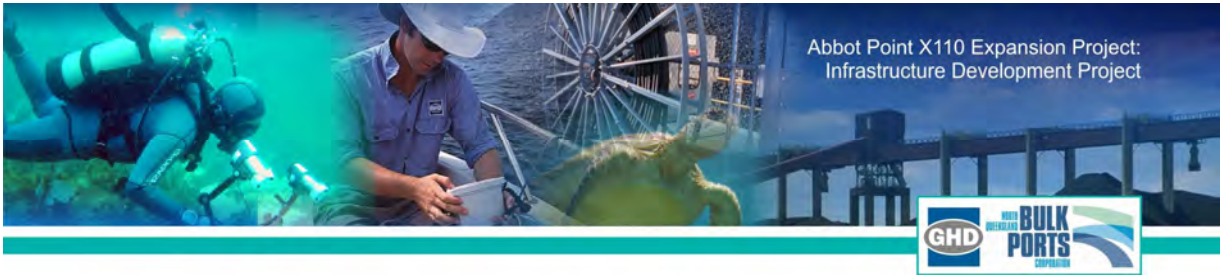
One category C area is located adjacent to the study area, that is, the Coastal Management Control District along the foreshore east of the X110 development.

4.2.1.7 Existing Land Use and Infrastructure

The area proposed to be developed is currently vacant land adjacent to the existing Abbot Point Coal Terminal. The APCT is the only area of developed land in the port vicinity. The remainder of surrounding land is utilised for grazing or is undeveloped.

4.2.1.8 Land Contamination

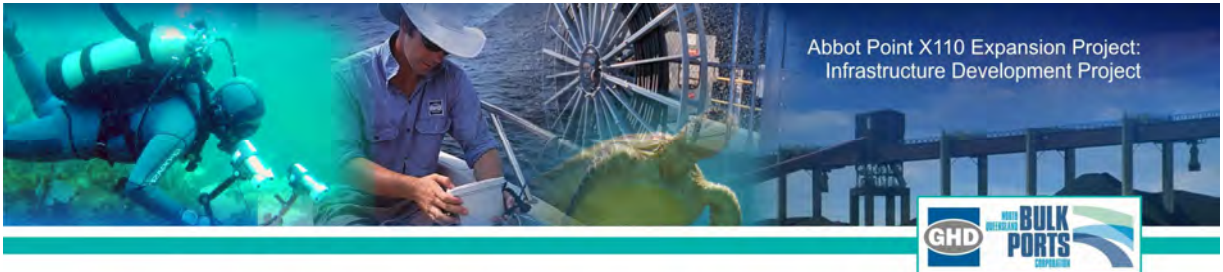
A search of the DERM Environmental Management Register (EMR) and Contaminated Land Register (CLR) confirmed that 7 of the 18 lots within the on-shore X110 infrastructure development area are currently on the EMR under the *Environmental Protection Act 1994* (Table 4-2). Land which has been used for a 'notifiable activity' pursuant of Section 374 of the *Environmental Protection Act 1994* or has been shown through a site investigation to have some contamination, are listed on the EMR.



No lots were identified as being on the CLR.

Table 4-2 Summary of EMR/CLR search results

Lot	Included on EMR and/or CLR	Details of Notifiable Activity/Comments
Lot 52 on HR1732	-	Not included on either registers
Lot 47 on SP117913	EMR	Abrasive Blasting – carry out abrasive blast cleaning or disposing of abrasive blasting material
Lot 1 on SP156160	-	Not included on either registers
Lot 46 on SP156160	-	Not included on either registers
Lot 4 on RP738760	EMR	Livestock Dip or Spray Race Landfill – disposing of waste (excluding inert construction and demolition waste)
Lot 3 on RP748628	EMR	Abrasive Blasting – carry out abrasive blast cleaning or disposing of abrasive blasting material Petroleum Product or Oil Storage
Lot 1 on RP748628	EMR	Railway Yards – operating a railway yard including goods handling yards, workshops and maintenance areas Lot 3 on RP748628 has been subdivided from Lot 4 on RP745292
Lot 2 on RP748628	EMR	Railway Yards – operating a railway yard including goods handling yards, workshops and maintenance areas. Lot 3 on RP748628 has been subdivided from Lot 4 on RP745292
Lot 1 on RP745292	EMR	Petroleum Product or Oil Storage
Lot 32 on SP124849	-	Not included on either registers
Lot 33 on SP124849	-	Not included on either registers
Lot 2 on RP738760	-	Not included on either registers
Lot 1 on RP738760	EMR	Petroleum Product or Oil Storage
Lot 57 on SP112921	-	Not included on either registers
Lot 34 on SP112920	-	Not included on either registers
Lot 58 on SP112921	-	Not included on either registers
Lot 56 on SP112921	-	Not included on either registers
Lot 35 on SP112920	-	Not included on either registers



Based on the EMR/CLR search results, the notifiable activities within the on-shore development area include abrasive blasting in the eastern portion of the site, railway yards in the southern end and petroleum product or oil storage in three other parts of the development area.

4.2.2 Potential Impacts and Mitigation Measures

4.2.2.1 Soil Erosion

Potential Impacts

The proposed expansion area is relatively flat and low-lying, so it is intended that fill material will be imported to the site to increase the elevation of the base of the stockpile area. It is planned that a perimeter bund will be constructed to surround the stockpile area and any stormwater from within the stockpile area will be directed to sediment basins.

The majority of the proposed expansion area is low-lying with elevations ranging between 2.5 to 5.0 m AHD and very low gradients of <1%. Runoff from the low-lying areas is expected to flow in a westerly direction at relatively low velocities towards the Caley Valley Wetland. To the north of the site, Bald Hill has an elevation of approximately 50 m AHD. The southerly aspect of Bald Hill contains slopes with moderate-high gradients of 10-20% that drain towards the expansion area. Runoff from the areas of Bald Hill with elevated gradients has the potential to generate high velocity flows and the potential to cause erosion.

An assessment of erosivity and dispersivity parameters has been made based on the soil types identified through the desktop assessment. Hydrosols in tidal zones can exhibit dispersive properties, but as they are restricted to low lying areas erosion potential tends to be low. Sodosols contain sodic and dispersive subsoils and are prone to tunnel erosion and have a high potential to erode when topsoil is removed.

For the fill material being imported to the site, it is recommended that erosion potential be considered. Any clay and silty materials that will be exposed to runoff should be selected to have low dispersive properties, plus the surface should be protected from the erosive forces of raindrop impact and overland flow through stabilisation (e.g. groundcover, gravel, hardstand, or chemical binders).

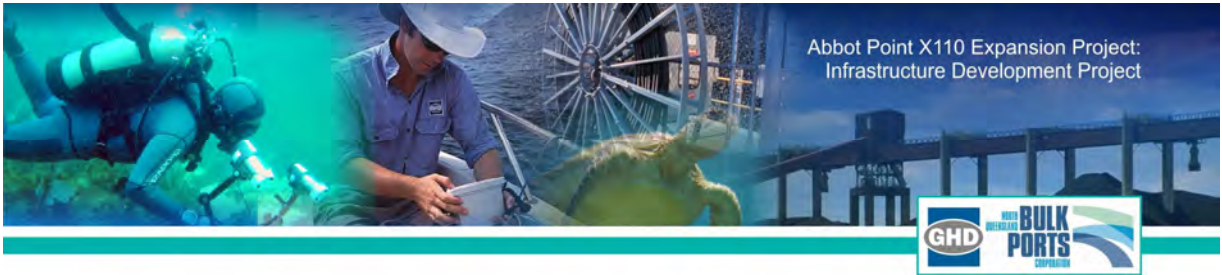
The area has a subtropical climate that is dominated with monsoonal rains in the summer months. The wettest months are December to March, with median rainfalls between 67 mm to 219 mm/month and daily rain ranging between 6 to 9 days/month.

The sensitive areas that may potentially be impacted from erosion at the site include Abbot Point Caley Valley Wetland and coastal marine waters that are part of the GBRWHA.

Management Measures

The following control measures are considered necessary to mitigate potentially adverse impacts to sensitive areas from soil erosion during the earthworks phase of the project. The siting and requirement for these controls will need to be determined by the contractor and revised throughout construction.

A range of potential mitigation measures are recommended in the following sections and provide the basis for a draft erosion and sediment control plan which would be finalised in consultation with DERM by the Contractor prior to works commencing.



Drainage Control

The aim is to separate the clean water and dirty water runoff at the site. Clean water is to be directed and discharged in a manner that does not cause erosion. Dirty water is to be directed and treated prior to being discharged off-site.

Table 4-3 Drainage controls

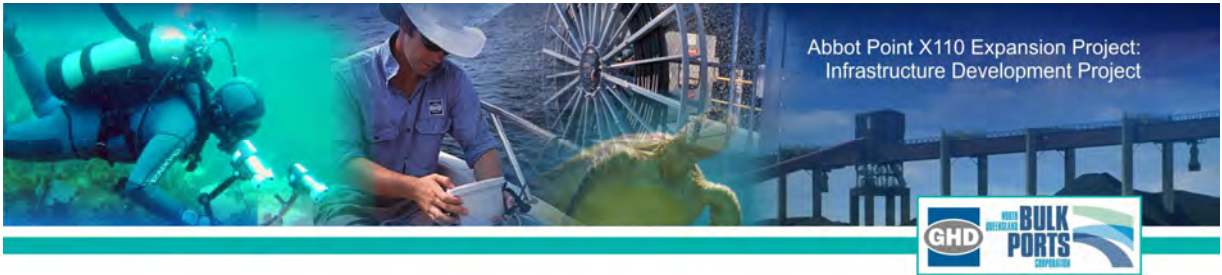
Control Measure	Application
Catch Drain/Perimeter Banks <small>clean</small>	Catch drains or perimeter banks to divert water from undisturbed areas with low sediment loads off-site.
Catch Drain/Perimeter Banks <small>dirty</small>	Catch drains or perimeter banks where required to direct surface flows from disturbed areas (dirty water) towards the sediment basin.
Grading of roads and surfaces.	Roads and relatively flat surfaces are recommended to be graded such that dirty runoff if directed into designated areas.

Erosion Control

Erosion and sedimentation control measures are required to reduce the velocity of water to prevent scouring and allow coarser sediments to settle. It is noted that the Abbot Point site is quite flat and consequently velocities within drains is low. Check dams would be utilised on an as needed basis only, taking into consideration the low flow velocities on site which can result in check dams becoming backed up.

Table 4-4 Erosion controls

Control Measure	Application
Check Dams	<p>Check dams are recommended along catch drains to reduce flow velocities. The following needs to be considered when selecting appropriate materials for check dams.</p> <ul style="list-style-type: none"> » A minimum of 100 mm freeboard (height difference between top of the check dam and the top of the channel) is required for water to pass. » Sand/gravel bags are suitable in drains less than 500 mm deep. » Rock should be used in channels greater than 500 mm deep. » Recessed rock dams should be used in wide shallow, high velocity drains. » Spacing is dependant on slope and the dimensions the channel. They should be located such that the crest of the check dam is at the same elevation as the toe of the up-gradient check dam. » Any sediment build up behind check dams should be removed during maintenance.



Control Measure	Application
Rock Scour Protection	<p>Rock scour protection should be placed at the discharge of any un-piped stormwater flow to dissipate the flow energy of the discharge, thereby reducing the potential for erosion.</p> <p>At the outlets of catch drains, rock scour protection is recommended.</p>
Gravel/mulch/grass surface cover	<p>Gravel and mulch can be utilised on bare surfaces as a surface cover to prevent erosion by protecting the soil surface from raindrop impact and inhibiting sheet flow. On areas where heavy traffic is anticipated, covering with gravel is recommended.</p> <p>On battered slopes, soil stockpiles and on bare portions of the site where disturbance has ceased, grass may be established to stabilise the soil.</p>

Sediment Control

Sediment control devices are recommended to reduce the volume/concentration of suspended solids and other gross pollutants leaving the site. Where possible, the intention is to trap the sediment as close to the source as possible.

Table 4-5 Sediment controls

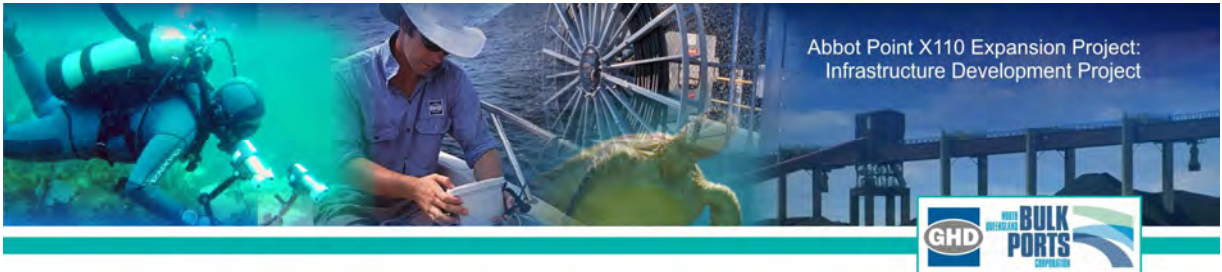
Control Measure	Application
Sediment Basin	Sediment basins act to trap and retain sediment laden water to reduce the coarse sediment load and turbidity levels of discharge waters that enter the surrounding environments.
Sediment Fencing	Sediment fencing to trap coarse sediments close to their source. The location of sediment fencing will be determined on an as needs basis, but in general will be required down the hydraulic gradient of stockpiles, battered slopes and locations where soil or turbid water has the potential to migrate off-site.
Stabilised Exit	A stabilised exit (e.g. crushed rock pad, rumple bars, etc) is to be located at the main site entrance. This serves to remove excess soil from vehicles as they leave the construction site.

4.2.2.2 Acid Sulfate Soils

Potential Impacts

Investigations have classified the acid sulfate soils of the X110 area as Potential Acid Sulfate Soils (PASS). Disturbance of PASS by excavation or lowering of the water table may result in the oxidation of the sulfide minerals producing Actual Acid Sulfate Soils (AASS), potentially generate sulphuric acid and hence significant quantities of acidity. These soils will need to be managed appropriately to ensure that environmental harm does not occur. The following construction activities have the potential to disturb ASS at the site.

- » Construction of the new southern Primary and Secondary Sedimentation ponds will involve excavation of soil for the pond areas and construction of bund walls to contain runoff water. The



majority of the soil in the area of the ponds is residual soil and has been assessed as not containing ASS. However, ASS have been identified in the lower lying areas along the south western boundary of the ponds and any disturbance or excavation of these soils will need to be done in accordance with an ASS Management Plan.

- » X110 Expansion area earthworks will include levelling of the area and filling in of low lying areas that fringe the wet land. The majority of the soil in the area of the ponds is residual soil and has been assess as not containing ASS. However, ASS have been identified in the lower lying areas along the western boundary of the development and any disturbance or excavation of these soils will need to be done in accordance with an ASS Management Plan.
- » Construction of the Stormwater Return Dam will involve excavation of soil to permit water storage. ASS have been identified in this area, however, their occurrence appears to be relatively small. Excavation and management of soil will need to be done in accordance with an ASS Management Plan.

Without appropriate management measures being in place, the surrounding Caley Valley Wetlands may receive acidic runoff after rain and metals such as aluminium and iron, as arsenic, cadmium and mercury may become mobilised. The net result can be significant degradation of ecosystems, contamination of water bodies, as well as unsightly discolouration of surface waters and associated substrates. Acidic conditions can also corrode concrete and steel (pipes, bridge abutments, underground services, and other infrastructure) and can result in the rapid deterioration of asphalt surfaces where they overlie ASS.

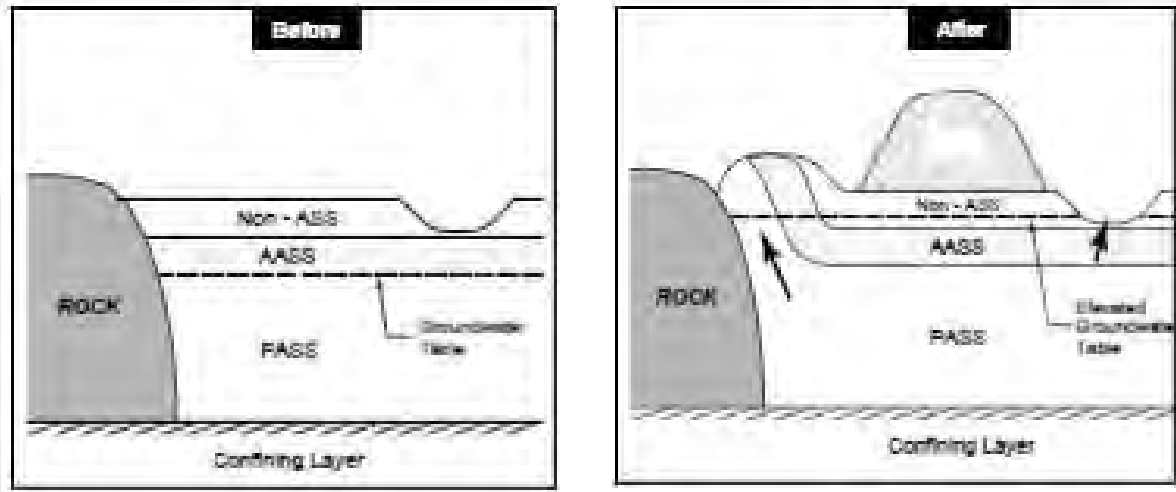
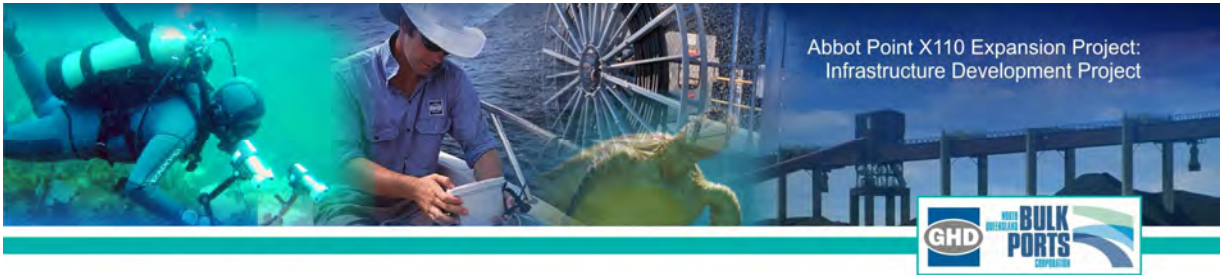
Filling activities may disturb *in situ* ASS by:

- » bringing AASS into contact with the groundwater (and thus potentially mobilising and transporting existing acidity out of the AASS into the groundwater);
- » displacing or extruding previously saturated PASS above the groundwater table and aerating these soils or sediments; and/or
- » raising acidic groundwater tables with the short-term release of acid into waterways.

Loading fill on clayey ASS can be problematic because some clayey soils have a high water content (up to 70 to 80% on a volume basis) and low hydraulic conductivities. Under load, such clayey soils may flow like gels resulting in subsidence at the load point. Some of the displaced soils may be pushed upwards outside the load areas into oxidising environments. In extreme situations, the fill materials may sink into the mud. This is of particular concern in areas where heavy infrastructure is constructed on such material.

Figure 4-6 shows a schematic of impacts associated with filling over ASS. Prior to filling, AASS is above the groundwater table and PASS is below the groundwater table (see left schematic). Following filling, the groundwater table is raised, the AASS is brought into contact with the groundwater and PASS and AASS are displaced above the groundwater table (see right schematic).

It is always preferable to use clean, non-ASS fill rather than using treated ASS on site from a risk minimisation point of view.



Source: QASSIT, 2002.

Figure 4-6 Schematic of impacts associated with filling over ASS

Table 4-6 provides an assessment of the risk associated with disturbance or filling over ASS.

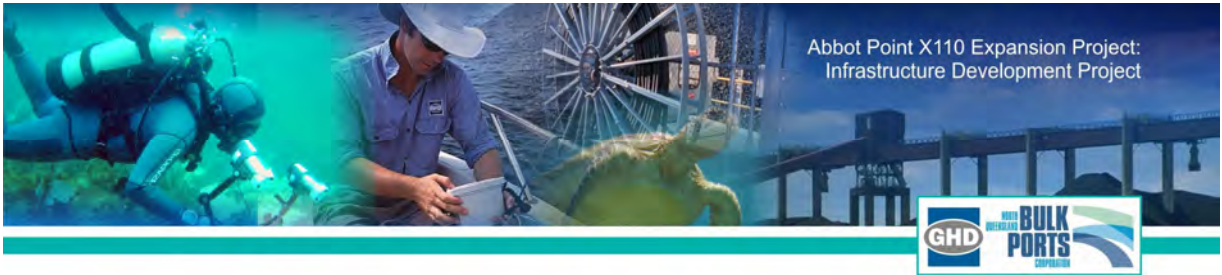
Table 4-6 Significance assessment – disturbance of ASS

Environmental Risk	Likelihood	Consequence	Significance
Without Mitigation	Likely	Major	High
With Mitigation:			
» Minimise disturbance	Unlikely	Minor	Low
» Adherence to ASS Management Plan following QASSIT Technical Guidelines			

Management Measures

Earthworks associated with construction of the X110 Expansion area and construction of the new Sedimentation Ponds will need to be done in accordance with an ASS Management Plan that includes provision for filling over *in situ* ASS. An outline of the ASS Management Plan is provided in Section 5, however, a detailed plan will need to be developed and approved by DERM prior to works commencing. Acid sulfate soils will need to be managed appropriately to ensure that environmental harm does not occur.

The level of treatment to neutralise the types of soils present on the site in the majority of circumstances is rated as *very high* level (5-25 kg/t), with some areas requiring soils an *extra high* level of treatment (>25 kg/ha).



4.2.2.3 Land Use Suitability

The construction and operation of the Project will change existing land uses within the Project area and adjacent areas. The following provides a discussion in relation to the suitability of the site for the Project from a land use perspective.

The proposed X110 expansion is located at the existing Port of Abbot Point and adjacent to the Abbot Point Coal Terminal. The project will be developed along side the existing coal terminal located at the Port. This coal terminal has been in operation since 1984. The Port is currently surrounded by grazing land and the Caley Valley wetland. A majority of this land now forms part of the APSDA, which is land designated for industrial development. The Project will be an extension of existing uses to the immediate east and will play a significant role in increasing coal export capacity to service mining activities of the Bowen and Galilee basins.

Abbot Point Land Use Plan

A Land Use Plan for the Port of Abbot Point, developed in accordance with the *Transport Infrastructure Act 1994*, regulates development of Strategic Port Land.

The proposed development is consistent with the Land Use Plan and therefore does not trigger the requirement for approval of a MCU under the NQBP Land Use Plan for the area that is on strategic port land. A discussion on the consistency of the proposal with the land use plan is provided in Section 2.4.1.

Abbot Point State Development Area Land Use Plan

The Abbot Point State Development Area Land Use Plan provides for the planning and management of development within the APSDA. The land use plan identifies a number of elements which form the intent of the Land Use Plan as well as defining objectives.

The proposed X110 Infrastructure Development Project does not significantly compromise the purpose of the Environmental Management/Materials Transportation Precinct. Further the proposed development, which meets the definition of an Infrastructure Facility, is specifically identified within Schedule 1 of the Scheme as being a use envisaged to develop within the Precinct and which may meet the purpose of the precinct.

A discussion on the consistency of the proposal with the Land Use Plan is provided in Section 2.4.2.

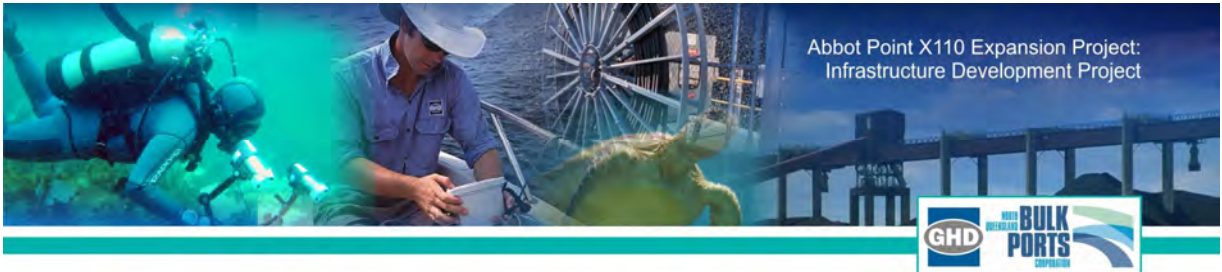
4.2.2.4 Land Contamination

Potential Impacts

The proposed expansion will result in a significant increase in stockyard area, greater number of stockyard machines, additional rail dump stations and in-loading conveyors, transfer towers, surge bins, and additional water settlement ponds. There may also be additional fuel facilities for refuelling terminal vehicles and machinery.

The impact of the proposed development upon the quality of the soil on site could occur during the construction phase, when clearing and levelling of the area will be undertaken for the lay down, storage and preparation of equipment. Potential impacts may also occur during operations, particularly associated with any new fuel storage areas.

The existing APCT operates under an Integrated Environmental management System (IEMS) whereby appropriate procedures, measures and design are put in place to control spillage of coal and dust



generation, particularly in the stockyard and during loading operations. Runoff from the operation is also controlled by appropriately designed drainage and sediment ponds. The IEMS is implemented by Xstrata as operator of the APCT.

Metal coating and abrasive blasting operations are likely to be undertaken throughout the site during construction and operation. This work will be subject to an ERA approval and will be managed through development conditions imposed by DERM. It is likely these conditions will be similar to those already in place at the APCT. Blasting and painting of movable equipment is currently undertaken in a centralised yard within the existing APCT. Control measures include:

- » the use of lead and isocyanate free paint and coating products;
- » the use of clean garnet (or equivalent) as the abrasive blasting medium with the medium to meet DERM guidelines;
- » storage of spent abrasives in an enclosure in a designated area prior to contaminants testing and off site disposal;
- » placement of mesh screens around the centralised coating and blasting yard to minimise dust generation and overspray drift as well as around work areas where possible;
- » limiting the size of the working area; and
- » carrying out blasting and painting only under favourable wind conditions.

Mitigation Measures

During operation of the coal terminal, the current procedures and system design for dust and spill management will need to be updated to include management of the new infrastructure. The storage of any fuel and oils should be in designated parts of the site, in bunded areas or suitably sized spill trays and other chemicals should be stored in enclosed containers in accordance with relevant regulations and standards. For new fuel facilities, the fuel storage areas will need to be suitably bunded and lined and new tanks and the associated pipeworks will also need to be designed in compliance with Regulations and appropriate standards. Updates to the current spill response and reporting procedures will also be necessary to take the additional facilities into account and the need to upgrade the current triple oil water interceptors and the associated drainage and sediment control systems will also need to be assessed.

With the implementation of the mitigation measure outlined above, it is assessed that potential adverse effects upon the quality of the soil as a result of construction and operation of the site can be effectively managed.

It is not proposed at this stage to have large quantities of chemicals stored on site, however, in the event that this is required, the proponent will obtain the relevant ERA approval from DERM.