


Adani Mining Pty Ltd

NORTH GALILEE BASIN RAIL PROJECT

Environmental Impact Statement

Chapter 8 Coastal environment

November 2013

Table of contents

Figure index

8. Coastal environment

8.1 Purpose of chapter

The purpose of this chapter is to describe the coastal environment of Abbot Point in relation to the North Galilee Basin Rail Project (NGBR Project). It provides an overview of the existing environment, identification of approval requirements and an assessment against the relevant policies.

This coastal environment chapter was prepared in accordance with the Terms of Reference (TOR) for the NGBR Project. A table that cross-references the contents of this chapter and the TOR is included as Volume 2 Appendix A Terms of reference cross-reference.

8.2 Methodology

8.2.1 Study area

For the purpose of this chapter, the study area is defined by the NGBR Project footprint, comprised of nominal the 100 m wide final rail corridor and ancillary infrastructure (temporary and permanent). Specifically, for the coastal environment assessment, the NGBR Project footprint study area refers to the coastal zone as identified by the *Coastal Protection and Management Act 1995* (Qld) (Coastal Act).

In relation to the coastal zone, the NGBR Project footprint enters Abbot Point from the south-east adjacent to the Newlands rail system and adjoins with existing and proposed infrastructure at the north-east. Infrastructure associated with the NGBR Project within the coastal zone includes:

- Approximately 8.9 km of standard gauge, rail track located within a nominal 100 m wide final rail corridor
- Connection with the Adani Terminal 0 balloon loop at the Port of Abbot Point in northern extent of the NGBR Project.

The preliminary investigation corridor for the NGBR Project is a nominal 1,000 m wide corridor.

8.2.2 Data sources

The coastal zone within which the NGBR Project occurs has been well studied and current, relevant information is available. As such, baseline investigations were not necessary for the completion of this assessment.

Numerous studies have been carried out at Abbot Point for a variety of projects. The reports of these studies have been evaluated and drawn on to describe the coastal environment in relation to the NGBR Project.

The coastal environment chapter relied on the following data sources:

- Publicly available reports for similar projects including:
  - Abbot Point, Terminals 0, 2 and 3 Capital Dredging Public Environment Report (GHD 2012a)
  - Abbot Point Coal Terminal 0 Environmental Impact Statement (CDM Smith 2012)
  - Kaili (Caley) Valley Wetlands – Baseline Report (BMT WBM 2012)

  - Abbot Point Cumulative Impact Assessment (Eco Logical Australia (ELA) and Openlines 2012)
  - Abbot Point Coal Terminal 3 Matters of National Environmental Significance (MNES) Preliminary Documentation (GHD 2011)
  - Proposed Abbot Point Multi Cargo Facility Environmental Impact Statement (GHD 2010a)
  - Proposed Abbot Point Multi Cargo Facility – Coastal Processes Assessment (GHD 2010b)
  - Waratah Coal China First Project – Aquatic Ecology (E3 Consult 2010)
  - Abbot Point Coal Terminal, Stage 3 Expansion, Environmental Impact Statement (WBM Oceanics 2006)
- Government literature and mapping available on the coastal environment of the study area, e.g. mapping associated with the Coastal Management Plan.

8.2.3 Desktop assessment

A desktop assessment sourcing existing information enabled a characterisation of the coastal environment of the nominal 100 m wide final rail corridor and surrounding coastal landscape and aquatic systems. This provided an understanding of the coastal values and assisted in identifying the key values of conservation significance that may be of relevance to the NGBR Project.

The data sources that were used in the production of this coastal environment chapter are outlined in Section 8.2.2.

8.3 Existing environment

8.3.1 General description

Abbot Point is located approximately 32 km to the north-west of Bowen, in central Queensland. Nationally important wetlands at Abbot Point (and in the vicinity of the NGBR Project nominal 1,000 m wide preliminary investigation corridor) include the Caley Valley Wetland at Abbot Point.

8.3.2 Protected Areas

Protected areas, present within the coastal region of Abbot Point (discussed further in Volume 1 Chapter 7 Matters of National Environmental Significance) include:

- Caley Valley Wetland
- Great Barrier Reef World Heritage Area
- Great Barrier Reef Marine Park (Commonwealth)
- Great Barrier Reef Coast Marine Park (State).

The Great Barrier Reef World Heritage Area and commonwealth and state marine parks have overlapping boundaries and ecological values.

8.3.3 Coastal habitat

Abbot Point is characterised as a rocky outcrop with a variety of sand and rock beaches. Beaches in the study area include:

- Abbot Bay beach, an open coastal beach along the eastern edge of Abbot Point
- Dingo beach a semi-sheltered small beach comprising sand overlying rocky rubble on the western edge of Abbot Point
- Sandy beaches west of Mount Luce that are part of a large estuary
- Northern facing beaches with sand overlain with scattered rocks and boulders
- Raised coarse sandstone zone on the lower edges of some of the northern beaches.

The dominant sediments of these regions range from fine silty to coarse sands, fine gravel and boulders (WBM Oceanics 2006; GHD 2012a). Most of the beaches at Abbot Point are backed by low sandy vegetated dunes (E3 Consult 2010).

The predominant coastal rock type forming most of the hills of the area, such as Abbot Point, and Mount Luce, are granodiorites and granites (WBM Oceanics 2006; E3 Consult 2010). In the intertidal zones of some of the northern facing beaches, raised coarse grained sandstone has developed. Clark Shoal is a prominent feature of the coastline and is approximately six metres below Australian Height Datum (AHD) extending out over five kilometres before dropping off sharply to 20 m below AHD (GHD 2012a).

Coastal mud flats are also common in the area at elevations of five m below AHD (E3 Consult 2010).

Abbot Point – Caley Valley Wetland is listed under the Directory of Important Wetlands and has a total catchment approximately 76,750 ha (GHD 2009a). The NGBR Project preliminary investigation corridor, due to its 1,000 m width, crosses the western part of the wetland (Figure 8-1); however, the final rail corridor does not traverse any part of this wetland.

A number of creeks drain directly into the Caley Valley Wetland, and the wetland itself drains into Abbot Bay and the Coral Sea. A narrow band of coastal dunes create a barrier between the beach and the wetland and a small section of open coast between Mount Stewart Creek and Branch Creek contains coastal open waters, sandy beaches and dune associated vegetation communities (BMT WBM 2012). The Caley Valley Wetland has diverse aquatic habitats, which provide habitat for aquatic and terrestrial fauna and flora. The Caley Valley Wetland has, however, been modified from its natural state by the placement of bunds to retain surface water and increase ponding (GHD 2010a).

Other coastal habitats identified at Abbot Point include coastal scrub regions which were characterised as having moderate to high ecological significance for the area and were potential habitat for a variety of fauna including birds, reptiles and small mammals (GHD 2011). Additionally, coastal rocky hill habitat was described as low value habitat, as it was disturbed and had numerous weed species, but was still considered to provide potential habitat for a variety of fauna (GHD 2011).

8.3.4 Coastal flora and fauna

Previous desktop and field investigations of Abbot Point have identified that the region supports a variety of coastal fauna and flora. These include amphibians, aquatic and terrestrial reptiles, fish, crustaceans, avifauna, and terrestrial and aquatic mammals.

The Caley Valley Wetland at Abbot Point represents an important habitat for coastal fauna and flora, as discussed in Section 8.3.3. It is known as a feeding, nesting and resting habitat for migratory and wetland birds. Previous bird surveys have identified 59 migratory and marine bird species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) primarily associated with the Caley Valley Wetland and the habitat created by the sedimentation ponds constructed as part of the Abbot Point Coal Terminal (GHD 2010a; BAMM 2012). Migratory and wetland species observed during field investigations for the NGBR Project are detailed in Volume 2 Appendix F Nature conservation.

The coastal marine zone and beaches on the eastern edge of Abbot Point are known foraging and nesting areas for turtles (Bell 2003; GHD 2012a). A 12 month study at Abbot Point indicated the most frequently observed turtles were the green (*Chelonia mydas*) and the flatback (*Natator depressus*) turtles (GHD 2009b). It was considered likely that the green turtle inhabits this area all year round, with varying abundance, while the flatback turtle was likely to be a resident mainly during the nesting period (November – February) (GHD 2009b). An important foraging area for marine turtles has also identified as the rocky reef zones off the north-easterly tip of Abbot Point and that extend for approximately four kilometres along the shoreline (Bell 2003; GHD 2012a).

A likelihood of occurrence assessment was undertaken for threatened and migratory species listed under the EPBC Act that have the potential to occur within the preliminary investigation corridor. Those species identified and those with potential habitat occurring within the preliminary investigation corridor and coastal zone of Abbot Point have been further discussed and illustrated in Volume 1 Chapter 7 Matters of National Environmental Significance.

Surveys conducted at the Caley Valley Wetland and adjacent areas identified extensive areas of mangroves, saltwater couch grassland (RE 11.1.1) and samphire forbland (RE 11.1.2). Marine plants were also present in the coastal dunes (RE 11.2.2). Mangroves are dominant aquatic flora along the tidal creek lines to the west of the Caley Valley Wetland (GHD 2009a).

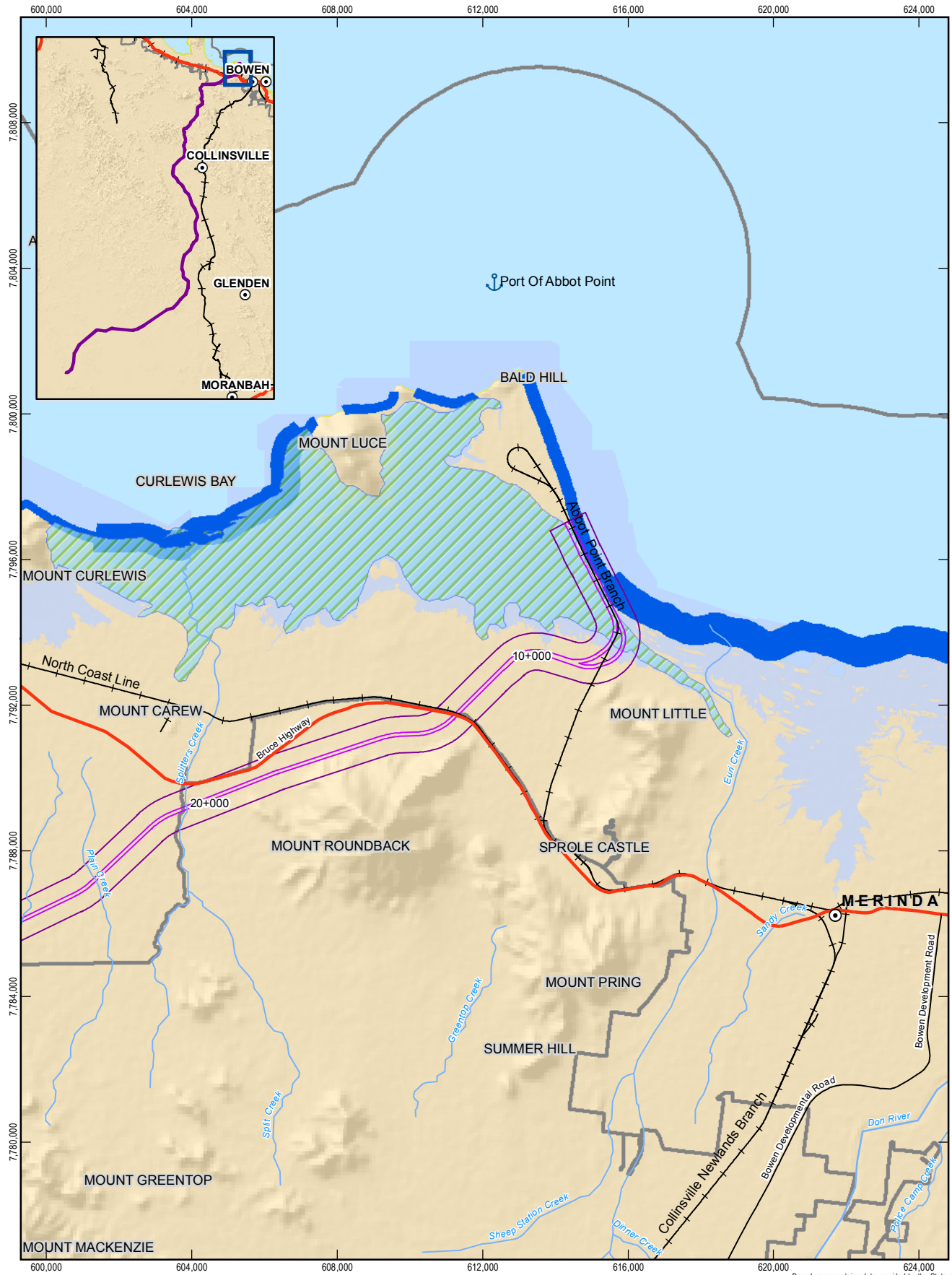
A semi-evergreen vine thicket community was observed during field surveys for the NGBR Project in the Caley Valley Wetland area, immediately north of Saltwater Creek. This area has

been identified in previous studies (GHD 2011). The littoral vine thicket community was identified on a series of dune and swales and the main body of this vine thicket community was located to the east of the road. However, sections of vine thicket were established within the preliminary investigation corridor on the western side of Abbot Point Road and the Abbot Point branch of the Newlands system. This vine thicket community is analogous with the Threatened Ecological Community 'Semi-evergreen vine thickets of the Brigalow Belt North and Nandewar Bioregions', which is listed as 'endangered' under the EPBC Act. Further information on this endangered community is provided in Volume 2 Appendix F Nature conservation.

8.3.5 Coastal hazard areas

Coastal hazard areas are designated under the Coastal Act. Coastal hazard zones include areas of temporary inundation from storm tides and permanent inundation due to shoreline erosion or sea level rise. Based on the Department of Environment and Heritage Protection coastal hazard maps, all beaches at Abbot Point are categorised as erosion prone storm impact and long term trends of sediment loss and channel migration (Figure 8-1). Additionally, the coastal beaches are categorised as high hazard areas for storm inundation (Figure 8-2).

In relation to the preliminary investigation corridor within the coastal zone, the beaches to the east of the corridor are erosion prone while to the west of the corridor, erosion and permanent tidal inundation is indicated to be due to sea level rise (based on Intergovernmental Panel on Climate Change sea level rise of 80 cm by 2100) (Figure 8-1). Storm inundation hazard is high to the east, west and a section to the south of the preliminary investigation corridor. However, a narrow strip where the existing Newlands rail corridor occurs is not indicated to be a hazard area (Figure 8-1).



LEGEND

- Population Centres
- Major Port
- Highway
- Main Road
- Carmichael Project (Rail)
- Watercourse (Major)
- Watercourse (Minor)
- Caley Valley Wetlands
- Erosion due to storm impact and long term trends of sediment loss and channel migration
- Erosion due to permanent tidal inundation from sea leavel rise
- Coastal Zone
- North Galilee Basin Rail 1000m Corridor
- North Galilee Basin Rail 100m Corridor

1:150,000 @ A4

0 2 4

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Adani Mining Pty Ltd
North Galilee Basin Rail Project

Job Number	41-26457
Revision	A
Date	28 Aug 2013

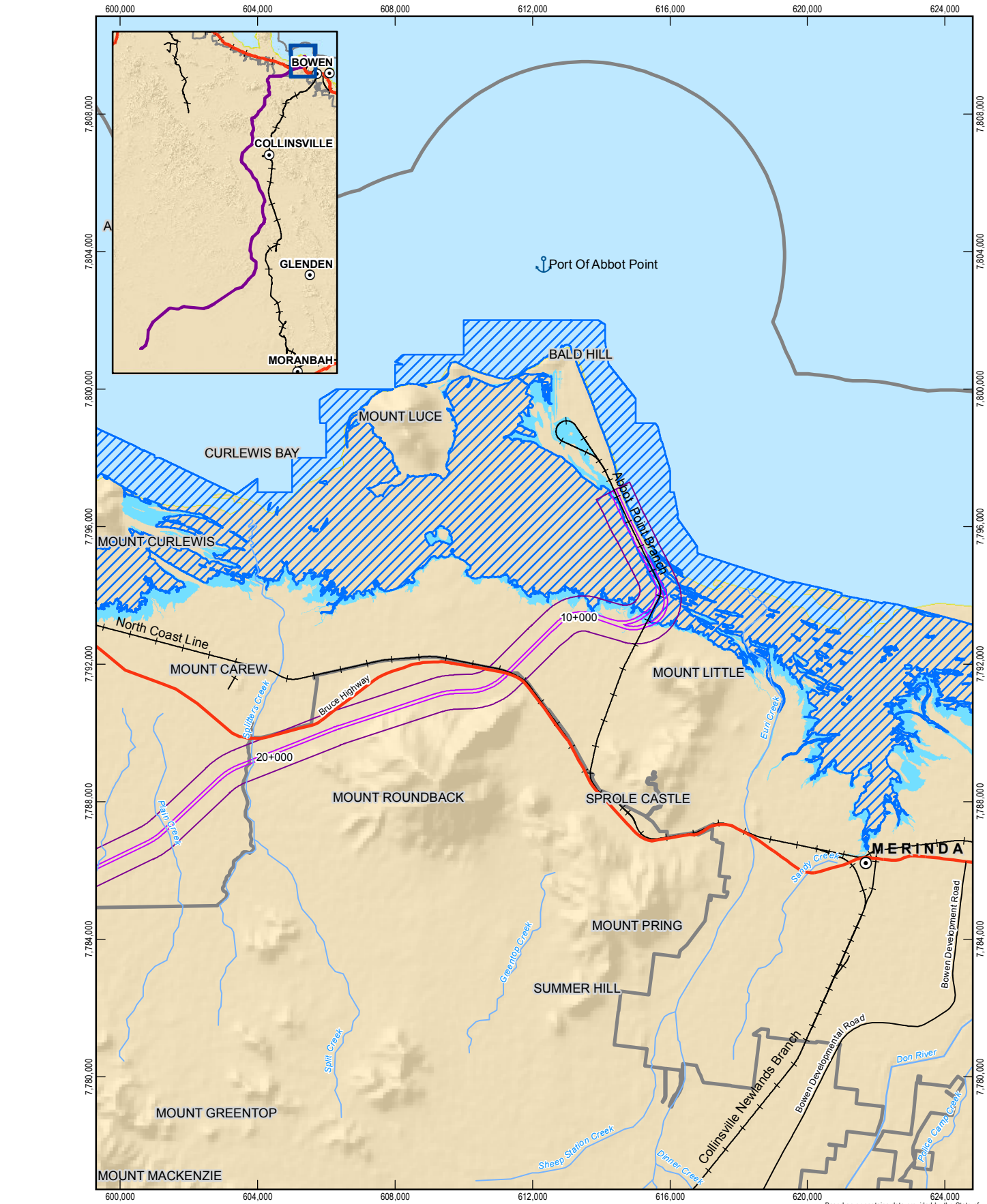
Erosion prone areas

Figure 8-1

G:\41\26457\06 GIS\Maps\MXD\1700_Coastal_Environment\41_26457_1700_rev_b.mxd

145 Ann Street Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: GA: Populated Places, Railway/2007; Adani: NGBR Corridor 13/05/2013, NGBR Corridor 06/06/2013, DNRM: Roads/2010, Gazzetted Places/2012, Coastal Plan/2012. Created by:MS



LEGEND

- Population Centres
- Major Port
- Highway
- Main Road
- Carmichael Project (Rail)
- Watercourse (Major)
- Watercourse (Minor)
- Storm Tide Inundation Area (including projected climate change impacts to 2100)
  - High hazard area (greater than 1.0 m water depth)
  - Medium hazard area (less than 1.0 m water depth)
  - Coastal Zone
- North Galilee Basin Rail 1000m Corridor
- North Galilee Basin Rail 100m Corridor

1:150,000 @ A4

0 1 2 4

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Adani Mining Pty Ltd

North Galilee Basin Rail Project

Storm tide inundation areas

Job Number	41-26457
Revision	B
Date	28 Aug 2013

Figure 8-2

145 Ann Street Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: GA: Populated Places, Railway/2007; Adani: NGBR Corridor 13/05/2013, NGBR Corridor 06/06/2013, DNRM: Roads/2010, Gazzetted Places/2012, Coastal Plan/2012. Created by:MS

8.3.6 Potential acid sulfate soils

Potential acid sulfate soils within the preliminary investigation corridor were identified as:

- 9.3 km portion (chainages 3.4 km to 12.7 km), which has multiple minor ephemeral creeks, including Saltwater Creek
- 3.6 km, between chainage 19.1 km and chainage 22.7 km, associated with Splitters Creek.

These areas are located within the coastal zone and are further discussed in Volume 2 Appendix E Topography, geology, soils and land contamination.

8.3.7 Bathymetry

The near-shore bathymetry to the north of Abbot Point in the region of Clark Shoal is approximately six metres below Australian Height Datum (AHD) extending out over five kilometres before dropping off sharply to 20 m below AHD (GHD 2012a).

To the north-east and north-west of Abbot Point the bathymetry is steeper, dropping sharply from the coast at roughly six metres below AHD to over 20 m below AHD within approximately two kilometres offshore (WBM Oceanics 2006; GHD 2012a; CDM Smith 2012).

8.3.8 Longshore transport

Longshore transport in the Abbot Point region is influenced by tidal flows and locally generated waves and storm events. Under existing conditions, marine sediments move in a northerly or up-coast longshore direction along the beaches, driven mainly by the predominant south-easterly waves (CDM Smith 2012; GHD 2010b). Finer sediments continue to move along the western coastline and accumulate in the southern area of Abbot Bay. Coarser sediments tend to remain in the northern and eastern areas of Abbot Point, and over time move offshore into deep waters (GHD 2010b). Sedimentation offshore from the eastern beach south of Abbot Point is an ongoing process.

Sedimentation to the coastal region of Abbot Point is inputted from terrestrial environments via various small waterways, including Mount Stuart Creek.

8.3.9 Wave and wind climate

Being inshore of the Great Barrier Reef, Abbot Point is generally protected from high energy or long period swell waves. However, extreme waves are present during cyclonic activity which is often annual (WBM Oceanics 2006; GHD 2012a; CDM Smith 2012).

Locally Abbot Point is exposed to predominantly south easterly swell waves of heights between 0.5 and 1.5 m, and range in period from two to 13 seconds (GHD 2010b; CDM Smith 2012) However, heights in excess of five metres could be expected during cyclone events (WBM Oceanics 2006).

The dominant wind directions at Abbot Point are from the east and southeast, in relation to duration and magnitude (CDM Smith 2012). Prevailing conditions of the region are considered to be from the southeast.

The regions to the north-east and north-west of Abbot Point where the bathymetry is steeper are more prone to stronger wave energy (CDM Smith 2012).

8.3.10 Tidal conditions

The tides at Abbot Point are generally semi-diurnal, with a maximum tidal range of 2.4 m and tidal currents averaging 0.3 m/s, but up to a maximum of 0.4 m/s during spring tides (GHD 2012a; GHD 2010b). Hydrodynamic modelling by GHD (2010b) showed that tidal flows are generally parallel to the coastline and significant flood and ebb tide flows occur close to Abbot Point (GHD 2010b).

8.4 Approval requirements

Details of approval requirements for the NGBR Project are provided in Volume 1 Chapter 20 Legislation and approvals. This section refers specifically to those elements of the NGBR Project occurring within the coastal zone.

The Coastal Act provides for the protection, conservation, rehabilitation and management of the coast including its resources and biological diversity. The NGBR Project footprint occurs within the declared coastal zone of the Coastal Act (Figure 8-1).

The Coastal Act development assessment process is aligned with the Integrated Development Assessment System (IDAS) under the *Sustainable Planning Act 2009* (SP Act) and *Sustainable Planning Regulation 2009* (SP Reg). The necessity for approval under the act is triggered by works undertaken in tidal areas or a coastal management district. This would include development which is operational works within a coastal management district, such as earthworks associated with the final rail corridor.

Where development occurs outside a local planning scheme area, such as Strategic Port Land or State Development Areas, the material change of use application does not trigger assessment under SP Act. Regardless, the assessment manager in these instances (namely the port authority for Strategic Port Land or the Coordinator-General for the State Development Areas) would seek that the application demonstrates compliance with the Coastal Act as part of the assessment and compliance with the State Policy for Coastal Management.

No part of the NGBR Project footprint is proposed to occur within tidal waters and no reclamation of land within tidal waters is proposed to be undertaken, as such, the NGBR Project does not trigger approval under the Coastal Act for tidal works. However, the NGBR Project footprint does occur within a coastal management district, and elements of the NGBR Project such as filling and excavating will trigger the requirement for assessment against the Coastal Act under the SP Act.

The coastal management district includes:

- All land under tidal water (and below the ordinary high water mark at spring tides)
- Matters of environmental significance such as coastal wetlands
- Land contained within erosion prone areas excluding built-up areas where the Department of State Development, Infrastructure and Planning (DSDIP) has a high confidence that permanent structures will be defended from coastal erosion.

As the NGBR Project footprint occurs adjacent to the Caley Valley Wetland, the potential to impact upon this coastal environmental value requires assessment. Assessment of the potential impacts from NGBR Project construction and operation activities on the Caley Valley Wetland and other matters of national environmental significance in the coastal environment have been undertaken and is presented in Volume 1 Chapter 7 Matters of National Environmental Significance.

As sections of the NGBR Project footprint occur within erosion prone and storm inundation areas, the nature of the hazard must be determined (temporary or permanent) and the extent of the inundation (depth and area). Figure 8-1 and Figure 8-2 show the areas where the NGBR Project footprint overlaps with erosion prone and storm inundation areas.

Furthermore, the impact of the inundation on the NGBR Project must be determined by way of a risk assessment, considering the structural integrity over the life of the development, the safety and wellbeing of people, effect on short and long term operations and whether the development is an essential community service. The risk assessment should account for all potential coastal hazards for a given event in order to determine the vulnerability, which is related to the type, nature and extent of the NGBR Project. Finally, mitigation measures for the NGBR Project that address the coastal hazard and associated risks must be identified and implemented.

8.5 Assessment against Queensland Coastal Plan

The Coastal Act makes provisions for the development of the Queensland Coastal Plan. The Queensland Coastal Plan comprises two parts:

- State Policy for Coastal Management
- *Coastal Protection State Planning Regulatory Provision*

The State Policy for Coastal Management provides direction and guidance for the management of coastal land in Queensland and applies to coastal land and its resources within the coastal zone.

The *Coastal Protection State Planning Regulatory Provision* is a state planning coastal protection policy made under the SP Act and aims to ensure development in the coastal zone is managed to protect environmental, social and economic coastal resources. A detailed assessment of the NGBR Project against the requirements of the regulatory provision is included in Volume 1 Chapter 20 Legislation and approvals.