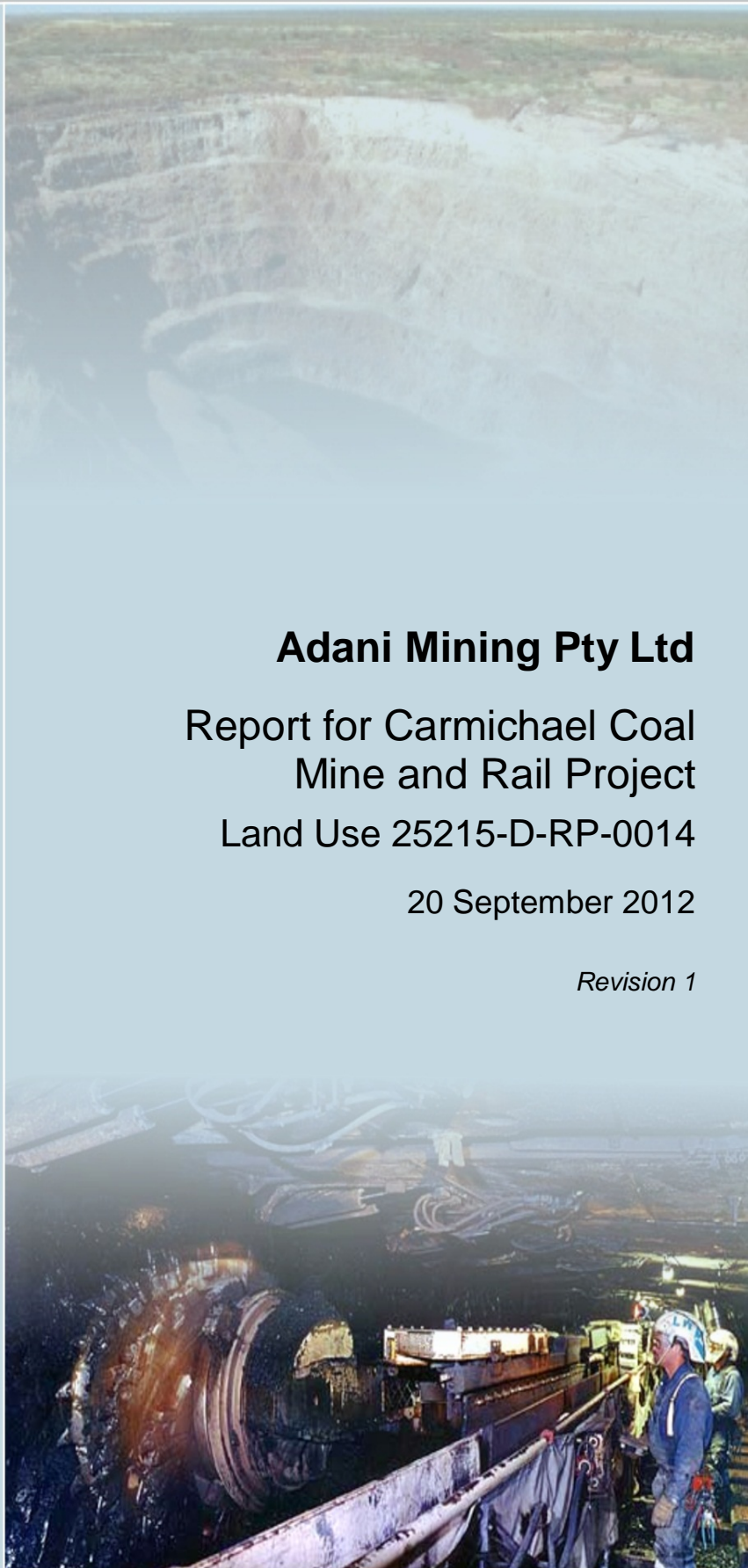




Adani Mining Pty Ltd

adaniTM



Adani Mining Pty Ltd

Report for Carmichael Coal Mine and Rail Project

Land Use 25215-D-RP-0014

20 September 2012

Revision 1





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Abbreviations and Glossary

Project Specific Terminology

Abbreviation/ Term	Definition
the Proponent	Adani Mining Pty Ltd
the Project (Mine)	Carmichael Coal Mine and Rail Project: Mine Component
the Project (Rail)	Carmichael Coal Mine and Rail Project: Rail Component

Generic Terminology

Abbreviation/ Term	Definition
Adani	Adani Mining Pty Ltd
CHMP	Cultural Heritage Management Plan
CMP	Construction Management Plan
DATSIMA	Department of Aboriginal and Torres Strait Islander and Multicultural Affairs
DEEDI	Former Department of Employment, Economic Development and Innovation
DERM	Former Department of Environment and Research Management
DEHP	Department of Environment and Heritage Protection
DIP	Former Department of Infrastructure and Planning
DNRM	Department of Natural Resources and Mines
DIW	Directory of Important Wetlands
DLGP	Department of Local Government and Planning
DTMR	Department of Transport and Main Roads
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPC	Exploration Permit for Coal
EPP	Exploration Permit for Petroleum
Goonyella system	QR National Goonyella Coal Rail System
GQAL	Good Quality Agricultural Land



ILUA	Indigenous Land Use Agreement
IRC	Isaac Regional Council
LGA	Local government area
MDL	Mineral Development Licence
MIW	Mackay, Isaac and Whitsunday
MIWRP	<i>Mackay, Isaac and Whitsunday Regional Plan 2011 – 2031</i>
MR Act	<i>Mineral Resources Act 1989</i>
NC Act	<i>Nature Conservation Act 1992</i>
NT Act	<i>Native Title Act 1993</i>
QI Plan	Queensland Infrastructure Plan 2011
RE	Regional ecosystem
RLRPA	Regional Landscape and Rural Production Area
SP Act	<i>Sustainable Planning Act 2009</i>
SP Regulation	Sustainable Planning Regulation 2009
TI Act	<i>Transport Infrastructure Act 1994</i>
ToR	Terms of reference
TPC Act	<i>Transport Planning and Coordination Act 1994</i>
VM Regulation	<i>Vegetation Management Regulation 2000</i>



Executive Summary

Adani Mining Pty Ltd (Adani) is proposing to develop a 60 million tonne (product) per annum (Mtpa) thermal coal mine in the north Galilee Basin approximately 160 kilometres north-west of the town of Clermont, Central Queensland. All coal will be railed via a privately owned rail line connecting to the existing QR National rail infrastructure at Moranbah, and shipped through coal terminal facilities at the Port of Abbot Point and the Port of Hay Point (Dudgeon Point expansion). The Carmichael Coal Mine and Rail Project (the Project) will have an operating life of approximately 90 years.

The Project comprises of two major components:

- ▀ The Project (Mine): a greenfield coal mine over EPC1690 and the eastern portion of EPC1080, which includes both open cut and underground mining, on mine infrastructure and associated mine processing facilities (the Mine) and the Mine (offsite) infrastructure including:

 - A workers accommodation village and associated facilities
 - A permanent airport site
 - Water supply infrastructure
- ▀ The Project (Rail): a greenfield rail line connecting the Mine to the existing Goonyella and Newlands rail systems to provide for the export of coal via the Port of Hay Point (Dudgeon Point expansion) and the Port of Abbot Point, respectively; including:

 - Rail (west): a 120 km dual gauge portion from the Mine site running west to east to Diamond Creek
 - Rail (east): a 69 km narrow gauge portion running east from Diamond Creek connecting to the Goonyella rail system south of Moranbah

The Project (Rail) incorporates terminus facilities within the Mine Infrastructure Area, eight passing loops and a maintenance facility near the Mine site. Temporary construction areas and laydown areas, construction camps, quarries and/or borrow areas will also be established. Construction areas will accommodate flash butt welding plant, concrete batching plant, ballast stockpiles and casting yards for bridge structures.

This report has been prepared for the purposes of providing sufficient information for an informed decision on the potential impacts of the Project (Rail) on land use and tenure within a 95 m wide corridor (the Project Area) to identify appropriate mitigation measures to address such impacts. Requirements listed within Section 3.2.4 of the Terms of Reference for the Project EIS have been provided as part of this report. This report did not consider the Project (Mine).

In order to establish the existing environment of the Project Area this report accounts for key elements such as land use, title and tenure (including rural, mining and petroleum tenures), Native Title claims and determinations, existing and proposed infrastructure (including roads, rail lines, gas and water pipelines and stock routes), proposed and existing infrastructure projects, Good Quality Agricultural Land and strategic cropping land, sensitive receptors and areas of ecological significance.

The potential impacts of the Project (Rail) on these key elements were assessed against relevant legislation and plans, including the Mackay, Isaac and Whitsunday Regional Plan 2011, and with regard to community consultation with land owners and relevant agencies, including Isaac Regional Council, the Department of Natural Resources and Mines and the Department of Transport and Main



Roads. The potential impacts of the Project (Rail) identified through this assessment can be summarised as follows:

- Change from rural/agricultural land use, change in tenure and interference of property access
- Traversal of 12 public roads – 4 local, 1 State controlled road, and 7 minor roads
- Increase in vehicle traffic along key routes (Gregory Developmental Road and Kilcummin Diamond/Eaglefield Road), damage to local roads and disruption to road users
- Interference or alteration of stock route crossings at Kilcummin Diamond/Eaglefield Road, Amaroo Road and Mistake Creek
- Interference with drainage or overland flow (afflux) and impacts to the quantity and/or quality of water storages used for farming and agricultural purposes
- Low potential for sterilisation of petroleum resources on a number of exploration permits for coal or petroleum
- Impacts on the construction and/or operation of proposed developments
- Sterilisation of approximately 1,334 ha of Good Quality Agricultural Land and 115 ha of strategic cropping land

To mitigate the impacts of the proposed Project (Rail) on the existing land use, Adani has consulted landholders to determine the most appropriate alignment based on the following parameters:

- The extent of intrusion of the rail corridor into existing properties
- Existing internal property access tracks and intra property access
- The potential for amalgamation of private tracks with local roads
- The potential for grade separation of private tracks
- The distance of the rail alignment from existing homesteads

Potential impacts identified in this report will be managed through mitigation measures detailed in management plans including the Environmental Management Plan, Social Impact Management Plan, Construction Management Plan, Traffic Management Plan, and Erosion and Sediment Control Plan. These mitigation measures can be summarised as follows:

- Limit overall areas of disturbance during construction
- Limit vehicle movements to defined access tracks during construction
- Modify Project (Rail) design (as far as practicable) to minimise sterilisation of Good Quality Agricultural Land and strategic cropping land
- Maintain surface drainage patterns through design of crossings, culverts and cut/fill areas
- All temporarily disturbed areas will be progressively rehabilitated to a condition as close as possible to pre-construction condition.

Soils surveys will be developed and undertaken to confirm the extent of Good Quality Agricultural Land and strategic cropping land in the Project Area. If necessary, a cropping history assessment will also be undertaken. Ongoing flood modelling will also take place to refine the design of crossings, culverts and cut/fill areas.



1. Introduction

1.1 Project Overview

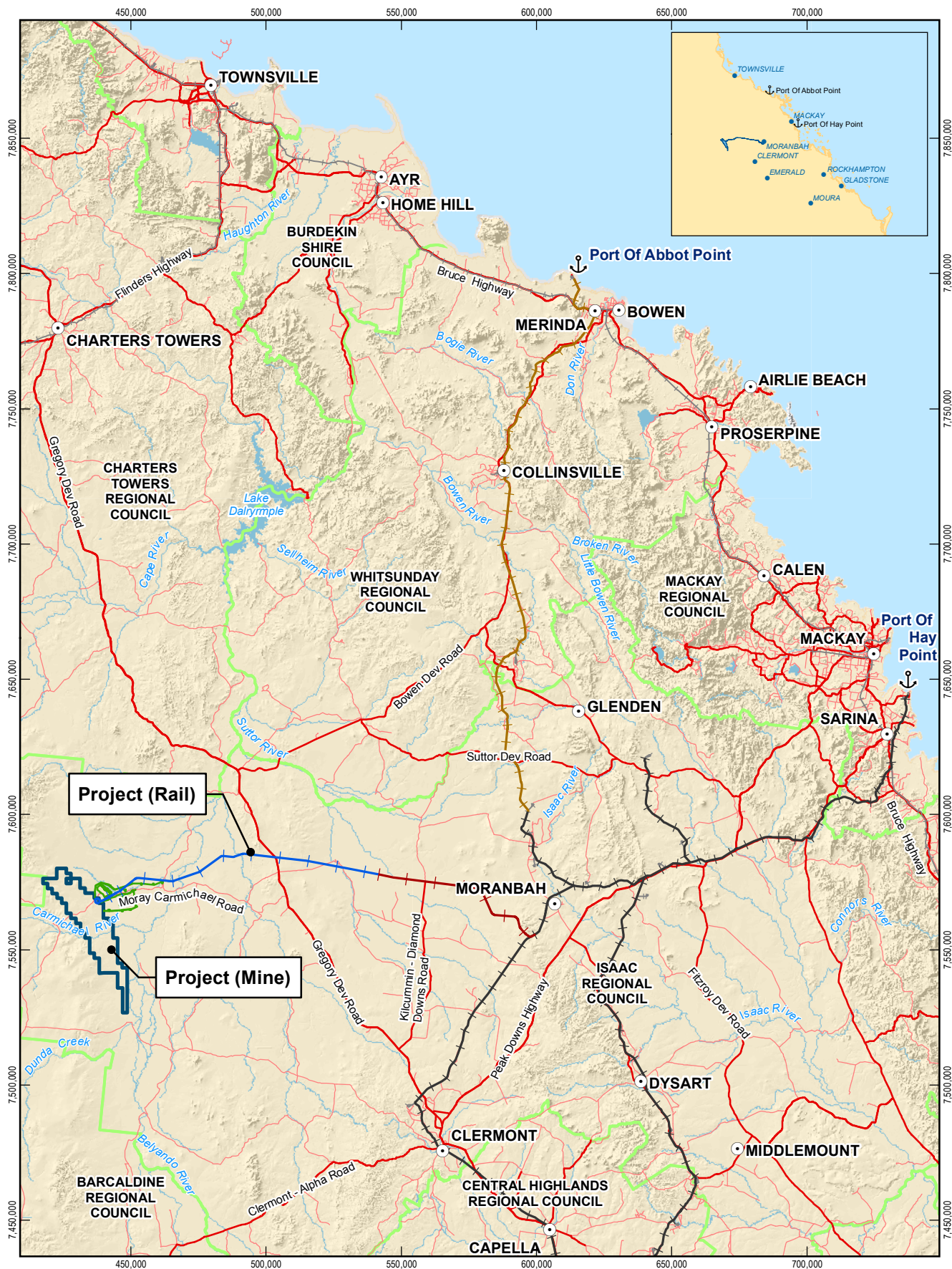
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The Project comprises of two major components:

- ▶ The Project (Mine): a greenfield coal mine over EPC1690 and the eastern portion of EPC1080, which includes both open cut and underground mining, on mine infrastructure and associated mine processing facilities (the Mine) and the Mine (offsite) infrastructure including:
 - A workers accommodation village and associated facilities
 - A permanent airport site
 - Water supply infrastructure
- ▶ The Project (Rail): a greenfield rail line connecting the Mine to the existing Goonyella and Newlands rail systems to provide for the export of coal via the Port of Hay Point (Dudgeon Point expansion) and the Port of Abbot Point, respectively; including:
 - Rail (west): a 120 km dual gauge portion from the Mine site running west to east to Diamond Creek
 - Rail (east): a 69 km narrow gauge portion running east from Diamond Creek connecting to the Goonyella rail system south of Moranbah

The Project has been declared a 'significant project' under the *State Development and Public Works Organisation Act 1971* and as such, an Environmental Impact Statement (EIS) is required for the Project. The Project is also a 'controlled action' and requires assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999*.

The Project EIS has been developed with the objective of avoiding or mitigating all potential adverse impacts to environmental, social and economic values and enhancing positive impacts. Detailed descriptions of the Project are provided in Volume 2 Section 2 Project Description (Mine) and Volume 3 Section 2 Project Description (Rail).



LEGEND

- Town
- ⚓ Major Port
- Other Rail Network
- Goonyella System
- Newlands System
- State Road
- Local Road
- Watercourse
- Local Government Area
- Project (Rail)
- Rail (West)
- Rail (East)
- Project (Mine)
- Mine (Offsite)

Based on or contains data provided by the State of QLD (DERM) [2010]. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for marketing or be used in breach of the privacy laws.

1:2,000,000 (at A4)
0 10 20 30 40 50
Kilometres

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



adani

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project

Project Location

Job Number 41-25215
Revision L
Date 28-08-2012

Figure: 1-1

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Data Sources: © Commonwealth of Australia (Geoscience Australia); Town, Railways, Watercourses (2007); DERM: LGA, (2011), Hillshade (2009); DMR: State Roads (2008); Gassman/Hyder: Mine (Offsite) (2012); DME: EPC1690 (2010), EPC1080 (2011); Adani: Alignment Opt9 Rev3 (2012). Created by: BW, JVC

1.2 Purpose of this Report

The purpose of this report is to provide sufficient information for an informed decision on the potential impacts of the Project (Rail) on land use and tenure within the Project Area and to identify appropriate mitigation measures to address such impacts. The Project Area is defined in Section 1.6 of this report.

This assessment does not consider the Project (Mine) component of the Project. This report addresses the criteria of the Terms of Reference for the Project EIS, relating to the Project (Rail) only (refer to Table 1-1). Refer to Appendix A for a detailed Terms of Reference cross-reference table.

Table 1-1 Terms of Reference Cross-reference Table

Terms of Reference Requirement/Section Number	Section of this Report
Section 3.2.4 Land use and tenure	
Identify, with the aid of maps:	
Land tenure, including reserves and extractive resource areas, tenure of special interest such as protected areas and forest reserves	Sections 2.4, 2.4.3 and 2.5 Figure 2-3, Figure 2-4 and Figure 2-9
Existing and proposed infrastructure (including gas infrastructure, water pipelines, power lines and transport corridors, including local roads, state-controlled roads and rail corridors)	Section 2.8 and Figure 2-8
Zoning and precincts of applicable local government planning schemes, development schemes and regional plans	Volume 4, Appendix D Project Approvals and Planning Assessment.
Existing land uses and facilities surrounding the Project (Rail)	Section 2.4 Figure 2-3, Figure 2-4
Provide land suitability maps of the mapped soil units	Volume 4, Appendix Y Rail Soils Assessment
Agricultural land classes	Section 2.6 and Figure 2-6
Areas covered by applications for native title claims	Section 2.11
Identify affected stock routes	Section 2.9 and Figure 2-8
Distance of the project from residential and recreational areas	Section 2.5
Declared water storage catchments	Section 2.10.3
Location of the project in relation to environmentally sensitive areas.	Not applicable, however refer Section 1



Terms of Reference Requirement/Section Number	Section of this Report
Assess the suitability of the soils mapped in the project area for rain fed, broad acre cropping and beef cattle grazing according to the limitations and land suitability	Volume 4, Appendix Y Rail Soils Assessment
Assess the impact of the Project (Rail) upon the following:	
GQAL or strategic cropping land with particular reference to any residual impacts on the area, class or productivity of such land	Section 2.6 and Section 2.7
Key resource areas with reference to State Planning Policy 2/07: Protection of Extractive Resources	Section 3.4 Volume 4, Appendix D Project Approvals and Planning Assessment
Residential and industrial uses	Section 3.2
Possible effects on town planning objectives and controls, including local government zoning and strategic plans	Volume 4, Appendix D Project Approvals and Planning Assessment
Constraints to potential developments	Section 3.6
Management of the immediate environs of the project including construction buffer zones	Volume 4 Appendix AA Rail Ecology Report
The identification of the potential native title rights and interests likely to be impacted upon by the Project (Rail)	Volume 1, Section 7 Indigenous and Non-indigenous Cultural Heritage
Mitigation strategies for potential impacts of the Project (Rail) on the Stock Route Network	Section 3.7
Proposed land use changes in any areas of high conservation value and information on how easement widths and vegetation clearance in sensitive environmental areas will be minimised	Section 3.8
Potential issues involved in proximity and/or co-location of other current or proposed infrastructure services, including future road upgrades	Sections 2.8 and 3.6
Identification of any land units requiring specific management measures	Volume 4, Appendix Y Rail Soils Assessment
Assess impact upon State's coal mineral and petroleum and gas resources and state significant extractive resources arising from the construction of the project or related infrastructure.	Section 3 of this report



1.3 Objectives

Consistent with Section 3.2.4 of the ToR, the aim of this report is to provide an accurate impact assessment of the Project (Rail) upon the existing environment relating to land use and tenure.

The objectives of this report are to:

- ▶ Identify reserves, extractive resource areas and tenure of special interest
- ▶ Identify existing and proposed infrastructure such as gas pipelines, water pipelines, power lines and transport corridors (including local and state controlled roads and rail corridors)
- ▶ Describe existing land uses and facilities surrounding the Project Area
- ▶ Identify Native Title claims or Native Title determinations
- ▶ Identify stock routes that are likely to be affected by the Project (Rail)
- ▶ Identify declared water storage catchments and location of the Project (Rail) in relation to any environmentally sensitive areas
- ▶ Assess the existence and nature of potential impacts the Project (Rail) may have upon surrounding residential and recreational areas
- ▶ Distance of the Project (Rail) to the nearest residential, recreational and industrial areas
- ▶ Assess the potential impacts the Project (Rail) may have upon the following:
 - Current land use and tenure
 - Good Quality Agricultural Land (GQAL) and strategic cropping land
 - State's coal mineral, petroleum and gas resources that may be presented within or in near proximity the Project Area
 - Stock routes
 - Potential native title rights and interests
 - Potential developments within the Project Area
 - Impact upon any Key Resource Areas that may be located within or in near proximity to the Project Area.

The following requirements of Section 3.2.4 of the Terms of Reference have been assessed in Volume 4 Appendix Y Rail Soils Assessment:

- ▶ Assessment of the suitability of the soils mapped in the Project Area for rainfed cropping and beef cattle grazing in accordance with the Queensland Department of Minerals and Energy 1995, *Technical Guidelines for Environmental Management of Exploration and Mining in Queensland*.
- ▶ More detailed assessment of the Project's impact upon GQAL and/or strategic cropping land

The following requirements of Section 3.2.4 of the Terms of Reference have been addressed in Volume 4 Appendix D Project Approvals and Planning Assessment:

- ▶ Identification of applicable State Planning Policies and an assessment of the Project's compatibility against the outcomes of these policies
- ▶ Identification of applicable local government planning schemes and an assessment of the Project's compatibility with the Desired Environmental Outcomes prescribed by the relevant planning scheme.



- Management of Native Title rights through an Indigenous Land Use Agreement and cultural heritage through a Cultural Heritage Management Plan (CHMP).

1.4 Assumption and Limitations

The project description for the Project (Rail) (refer to Volume 3 Section 2) informed the development of this report and findings of the impact assessment and mitigation measures. Matters outside the Volume 3 Section 2 Project (Rail) Project Description have not been assessed.

The Project (Rail) concept design is based on planning work undertaken by Adani to establish a 95 m wide operating corridor between the Project (Mine) and a planned rail junction with the existing QR National Goonyella Coal Rail System (Goonyella rail system).

The findings of this report will continue to be refined as more field work is undertaken and associated data is refined. Field work and studies completed to date are considered adequately robust to assess the environmental impacts of the construction and operational footprint of the Project (Rail), while allowing for the flexibility to review and validate the design once further data is finalised.

1.5 Methodology

The methodology of this report includes:

- A review of the concept design (Aarvee Associates, 2011), to ensure an understanding of the location, scale, timing and process of the construction and operation of the Project (Rail).
- Determination of the Project Area to clearly define the area of assessment relating to land use and tenure
- A review of primary data and information to assist in a clear understanding of the existing environment regarding land use and tenure. This included drawing on existing data sets, and undertaking GIS analysis to accurately determine how the Project (Rail) transects with key features. This also assisted in understanding if the concept design could be feasibly modified to mitigate potential impacts identified as a part of this process. The data reviewed included:
 - Aerial photography (Vekta Aerial Imagery)
 - Topographic (10 m) and cadastral data
 - Title details and tenure information of traversed properties, such as ownership and rural and mining leases, and licences
 - Native Title claim areas and determinations
 - Location of existing infrastructure, such as roads, rail lines, gas and water pipelines, stock routes, sensitive receptors and areas of ecological significance, as applicable.
- Documentation and mapping of the above features that are potentially impacted by the Project (Rail)
- A review of legislative requirements and guidelines relevant to the scope and location of the Project (Rail) including:
 - *Sustainable Planning Act 2009* and Sustainable Planning Regulation 2009
 - *Transport Infrastructure Act 1994*
 - *Land Act 1994*



- *Mineral Resources Act 1989*
- *Nature Conservation Act 1992*
- *Vegetation Management Act 1999* and *Vegetation Management Regulation 2000*
- *Stock Route Network Management Bill 2011*
- *Land Protection (Pest and Stock Route Management) Act 2002*
- *Transport Planning and Coordination Act 1994*
- DEHP Nature Refuge Program information available online
- DERM 2010 Guide to Tenure under the *Land Act 1994*,
- Relevant Regional Plan:
 - Statutory Mackay, Isaac and Whitsunday Regional Plan 2011 (MIWRP)
- Discussion with relevant agencies and local government including:
 - Department of Natural Resources and Mines (DNRM) and Isaac Regional Council (IRC) in relation to the stock route network
 - Department of Transport and Main Roads (DTMR) in regard to treatments for State-controlled road crossings
 - IRC in regard to stock route treatments, planning provisions, proposed new developments and local plans and policies
- Review of Project specific specialist reports to supplement an understanding of the Project (Rail) and the existing environment
- Review of land owner consultation to gain their feedback on the potential impacts and issues associated with the Project (Rail)
- Assessment of the Project (Rail) concept design against relevant regulatory provisions
- Feedback on the findings of this report into the concept design to ensure relevant provisions are addressed in the design of the Project (Rail) where possible

1.6 The Project Area

1.6.1 Overview

The Project (Rail) alignment is located within a 95 metre (m) wide corridor that runs from the load out facilities within the boundary of the Mine Site approximately 189 km eastwards to connect with the Blair Athol Branch Line of the existing Goonyella rail system, south of Moranbah. From the Goonyella system the coal product will be railed through to the Port of Hay Point (Dudgeon point expansion) and the Port of Abbot Point. These areas fall outside of the scope of the Project EIS.

The dual gauge Project (Rail) rail line will have a running width of approximately 16.5 m within the wider 95 m corridor. The corridor will cater for earthworks (i.e. cut and fill batters) and temporary infrastructure for the construction of the Project (Rail), and permanent project components and infrastructure for the on-going operation of the Project (Rail).

The Project (Rail) is located within the IRC local government area (LGA). The Project Area is illustrated in Figure 1-1.



1.6.2 Project (Rail) Components

A detailed Project Description is provided in Volume 3, Section 2 Project Description. A summary of the key Project (Rail) components is detailed as follows.

Temporary Infrastructure

Temporary infrastructure is required to facilitate the construction of the Project (Rail). Temporary construction workers camps are proposed to be developed along the Project (Rail) in the locations outlined in Table 1-2, and graphically presented in Figure 1-2.

Each camp has a footprint in the order of 10 ha and can accommodate 400 persons.

Table 1-2 Project (Rail) Temporary Construction Camps

No.	Location (east-west)	Capacity	Lot on Plan
1	35.0 km	400	Lot 7 on SP233102
2	94.9 km	400	Lot 4 on SP116046
3	151.9 km	400	Lot 662 on PH1491 (Moray Downs)
4	-	400	Lot 662 on PH1491 (co-located with the Project (Mine) workers accommodation village on Moray Downs)

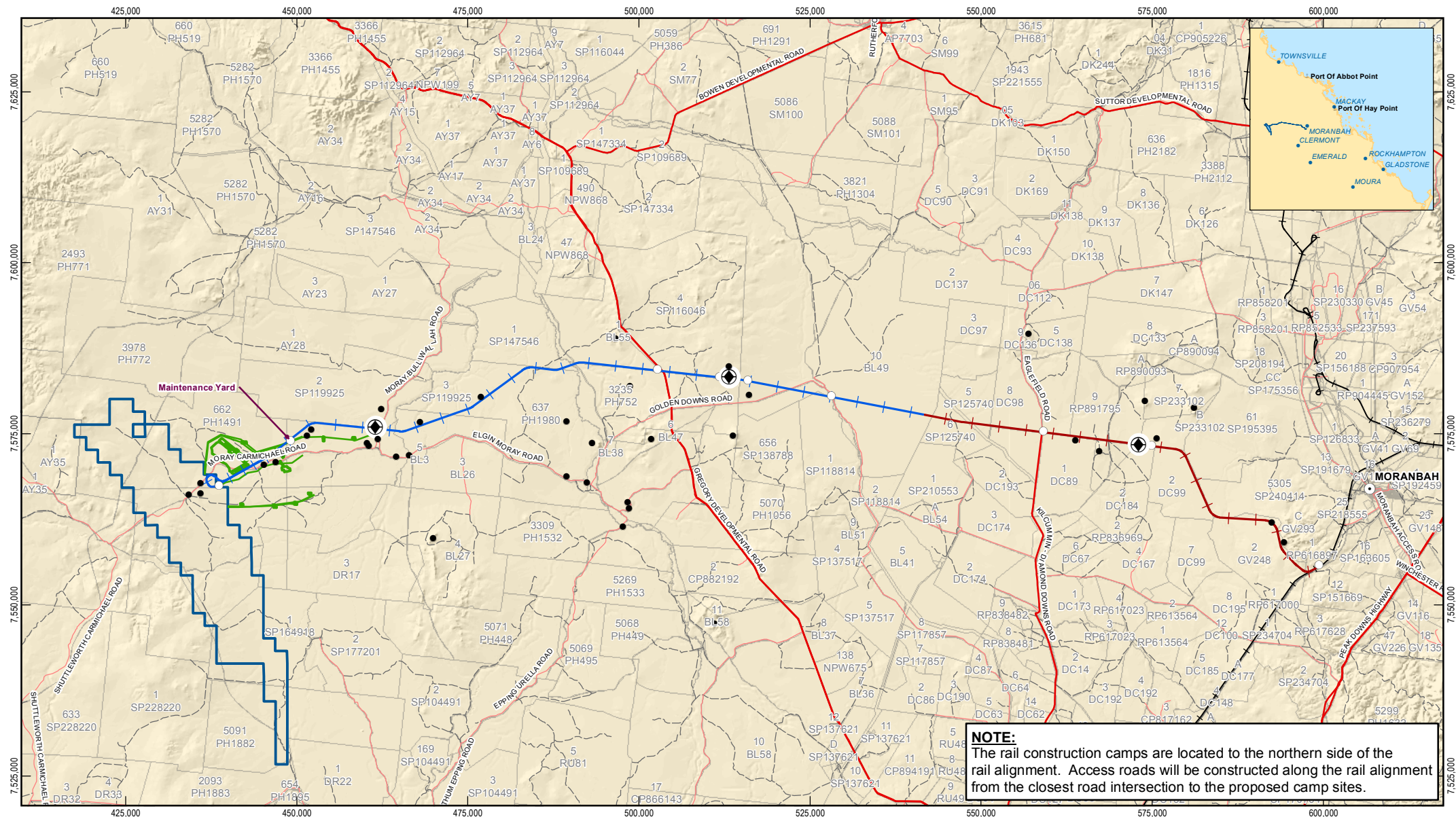
Temporary construction areas and laydowns will be located along the Project (Rail). These will accommodate flash butt welding plant, concrete batching plant, ballast stockpiles and casting yards for bridge structures. Indicative areas have been identified as shown in Figure 1-2. Subject to further detailed site investigations (inclusive of environmental, social, cultural and technical considerations) and negotiations with landholders, these locations will be confirmed during detailed design.

Quarry and Borrow Locations

To facilitate the provision of resource material to the Project, a number of potential quarries and/or borrow areas are being investigated within the landscape as shown in Figure 1-2.

Adani is currently undertaking investigations to prove the resources at each site and determine suitability for use. Resources targeted include ballast, capping material, sub-base material and select fill (refer Volume 3, Section 2 Project Description). Geotechnical investigations are underway to better determine the nature of the potential resource and the quantity of resource available.

Quarry and borrow areas are where possible within Project areas, however depending on the resource, areas further afield from the Project (Rail) have been identified as potential sources.



NOTE:
The rail construction camps are located to the northern side of the rail alignment. Access roads will be constructed along the rail alignment from the closest road intersection to the proposed camp sites.

1:750,000 (at A4)
0 5 10 15 20 25
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55



LEGEND

- Town
- Existing Railway
- State Road
- Local Road
- Track
- Construction Camp
- Investigation Areas
- Rail (Infrastructure)
- Rail (West)
- Rail (East)
- Project (Mine)
- Mine (Offsite)
- Cadastral Parcel



Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project

Job Number 41-25215
Revision B
Date 14-09-2012

Project (Rail) Components

Figure: 1-2

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Data source: DERM: DEM (2008), DCDB (2012), Physical Road Network (2011); DME: EPC1690 (2010), EPC1080 (2011); © Commonwealth of Australia (Geoscience Australia); Localities, Railways (2007);

Adani: Alignment Opt9 Rev3, Investigation Areas (2012), Construction Camp, Rail Infrastructure (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: BW, jvc

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Permanent Infrastructure

The Project (Rail) permanent infrastructure includes the following components:

- ▶ Terminus facilities located within the Mine Infrastructure Area of the Mine Site
- ▶ In the order of 247 km of narrow and standard gauge track within a rail corridor approximately 189 km in length between the Mine Site and the connection with the Goonyella system
- ▶ Eight passing loops, with bad order sidings at every second or third passing loop
- ▶ A maintenance facility (located between 167.5 km and 175.4 km (on the western extent near the Mine Site) developed to test, service, repair, provision and overhaul consists/trains

Signalling and communications: signalling and power supply rooms housing signalling equipment will be developed at appropriate locations on the passing loops.

2. Existing Environment

2.1 Regional Context

The Project (Rail) traverses the IRC LGA and sits within the Mackay, Isaac and Whitsunday (MIW) region. For the purpose of this assessment, the regional context is defined as the areas subject to the Regional Plan affecting the Project Area, namely the *Mackay Isaac and Whitsunday Regional Plan 2011* (MIWRP) (Department of Local Government and Planning (DLGP), 2011a). A review of the MIWRP and its applicability to the Project (Rail) is undertaken in Section 2.1.1 of this report with an assessment of the Project (Rail) against the applicable Desired Regional Outcomes of the MIWRP contained within Volume 4 Appendix D Project Approvals and Planning Assessment.

The MIW region has been identified as the fastest growing region in Queensland due to rapid growth in the mining, agriculture and tourism industries. The planning regions surrounding MIW region are the Central West Region, Central Queensland and the Northern Region. The MIWRP identifies the Galilee Basin as being entirely located within the adjoining Central West Region. The Galilee Basin is adjacent to the Bowen Basin and will depend on infrastructure within, or extending from the Bowen Basin. As such, development of future mining industries within the Galilee Basin is expected to impact the MIW region (DLGP, 2011).

2.1.1 Review of Regional Plans

Mackay, Isaac and Whitsunday Regional Plan 2011

The purpose of the MIWRP is to manage the growth and change within the MIW region in the most sustainable way to protect and enhance quality of life in the region (DLGP, 2011). The MIWRP is a key tool of Qplan – Queensland's planning, development and building system. It sets the framework for the region to achieve a sustainable planning foundation, and provides policies and programs to manage growth and change from a regional level through to street level.

The MIWRP has been prepared in accordance with the *Sustainable Planning Act 2009* and covers the LGAs of Isaac region, Mackay region and Whitsunday region. This statutory plan provides a policy framework to guide decision making for managing the region's growth and management until 2031 (DLGP, 2011a).

Accordingly, the MIWRP:

- ▀ Identifies sufficient developable land for future growth
- ▀ Promotes timely infrastructure delivery to support community and economic development that provides greater certainty to the private sector
- ▀ Outlines policies and strategies to address key economic, environmental and social issue
- ▀ Outlines policies and strategies for a full range of key social services and facilities to meet the needs of the community and to maintain the quality of life and wellbeing of residents
- ▀ Provides a framework that supports the region's unique biodiversity
- ▀ Promotes sustainability outcomes in the consideration of climate change mitigation and adaptation



- Supports effective and efficient transport systems to connect the region's communities with goods, services, employment and other communities (DLGP, 2011a)

The MIWRP identifies regional land use patterns which provide a spatial description of the Desired Regional Outcome (DLGP, 2011a). These land use patterns include:

- Regionally significant environmental features
- Regional land use categories
- Land that can accommodate urban development up to and beyond 2031
- Land that is protected from further urban development
- Regionally significant economic areas and infrastructure corridors

Three land use categories (refer Figure 2-1) have been identified in the MIWRP as detailed in Table 2-1 and described below:

- Regional landscape and rural production area:** this area identifies land with regional landscape, rural production or values such as cultural and landscape heritage values, GQAL, strategic cropping land and others. This area includes land with extractive resources of economic significance, including mining. This area protects land from urban or rural residential development or other development that may be inappropriate.
- Urban footprint:** this footprint identifies land that has capacity to meet the region's forecasted urban development needs until 2031. This footprint concentrates urban growth in locations that have access to infrastructure, provide transportation choices and employment options.
- Rural living area:** This area of land constitutes locations that are designated for rural residential development in accordance with applicable local government planning schemes.

Table 2-1 Land Use Categories in the Mackay, Isaac and Whitsunday Region (DLGP, 2011a)

Land use category	LGA	Area (ha)	Per cent of LGA	Per cent of Region
Urban Footprint	Mackay	12, 397	1.63	52.4
	Isaac	6 468	0.11	27.4
	Whitsunday	4 775	0.20	20.2
	Total	23 640		0.26
Rural Living Area	Mackay	2 439	0.32	57.2
	Isaac	251	<0.01	5.9
	Whitsunday	1570	0.07	36.9
	Total	4 260		0.05
Regional Landscape and Rural Production Area	Mackay	746 373	98.05	8.3
	Isaac	5 849 937	99.89	65.2
	Whitsunday	2 372 119	99.73	26.5
	Total	8 968 429		99.7



LEGEND

- Town
- ⚓ Major Port
- Other Rail Network
- Goonyella System
- Newlands System
- State Road
- Local Road
- Watercourse
- MIW Region
- Local Government Area

Regional Landuse Category (Draft)

- Urban Footprint
- Rural Living Area
- Regional Landscape and Rural Production Area

- Mine (Onsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)

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1:2,000,000 (at A4)
0 10 20 30 40 50
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55



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Carmichael Coal Mine and Rail Project

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Regional Land Use Categories

Figure: 2-1



It is evident that the MIW region largely consists of regional landscape and rural production land area (98 per cent of the MIW region), with only 0.26 per cent of land being designated as part of the urban footprint and some 0.05 per cent as rural living area. The IRC in particular consists of primarily regional landscape and rural production area, which is accounted for by the dominant presence of the extractive resource uses within the Bowen Basin coal reserve (DLGP, 2011a).

2.1.2 Regional Cities and Towns

Within the MIW region, the regional centres hierarchy includes Airlie Beach, Cannonvale, Proserpine, Bowen and the Whitsunday islands. Moranbah is the major regional centre of the IRC; while Clermont, Dysart, Middelmount, Glenden and Nebo are the district rural activity centres (DLGP, 2011a). These towns have been established primarily to support the mining industry, with Moranbah known as the main mining town. Dysart, Middelmount and Glenden are now also servicing the rural population and industries such as cattle grazing, grain crop production and sunflower fields. The MIWRP reports a low diversity of private land ownership in these towns, particularly Glenden and Middelmount as most houses are owned by mining companies.

Key cities and towns within the MIW region relevant to the development and operation of the Project (Rail) include the following:

Mackay

Having a population of 121,400 people and an annual growth rate of 3.3 per cent, Mackay is the primary centre of the Mackay Regional Council LGA and the primary urban centre for the MIW region (DLGP, 2011a). Mackay provides a broad range of high level services and functions for the MIW region including a university campus, base hospital and the region's main air and sea ports (DLGP, 2011a).

Moranbah

Moranbah is located 150 km south-west of Mackay and has a resident population of approximately 7,133 people (Centre for the Government of Queensland, 2011). Moranbah was originally established as a purpose built mining town in the early 1970s, and is the major regional activity and service centre for the mining and gas industries in the IRC LGA (DLGP, 2011a). The MIWRP states that Moranbah's role as the primary service centre will be maintained and further enhanced in the future.

Clermont

Clermont is located 320 km west of Rockhampton and 100 km north of Emerald. Clermont has a strong history as a cattle grazing and grain producing community and has since diversified into servicing the mining industry (DLGP, 2011a). Clermont is the closest community to the Project Area (160 km south east) and serves as a secondary (after Moranbah) commercial and service centre for the Isaac Region (DLGP, 2011a).

2.2 Queensland Coal Plan 2030

The coal industry is a major contributor to Queensland's economy and with steady growth in international demand for coal; the coal industry in Queensland is experiencing unprecedented growth in the number of greenfield mine developments, expansion of existing mines, increased exploration activity and new infrastructure to service the mining industry (Department of Infrastructure and



Planning (DIP), 2010). To provide strategic direction and guide the expansion path of the State's coal industry, the Queensland Government developed the Coal Plan 2030.

The objectives of the Coal Plan 2030 are to:

- ▶ Anticipate growth, ensure timely and effective planning and provide whole of government coal production forecasts to assist in the planning of infrastructure for coal chain systems as well as the planning of key infrastructure projects. This will provide the State with a timely roadmap for the development of Queensland's coal industry.
- ▶ Provide a document to strengthen the coordination and delivery of infrastructure to support industry growth
- ▶ Feature infrastructure needs of emerging regions (DIP, 2010)

Queensland's ability to expand coal exports to meet global demand depends on the capacity of its coal systems to handle additional output from mines (DIP, 2010).

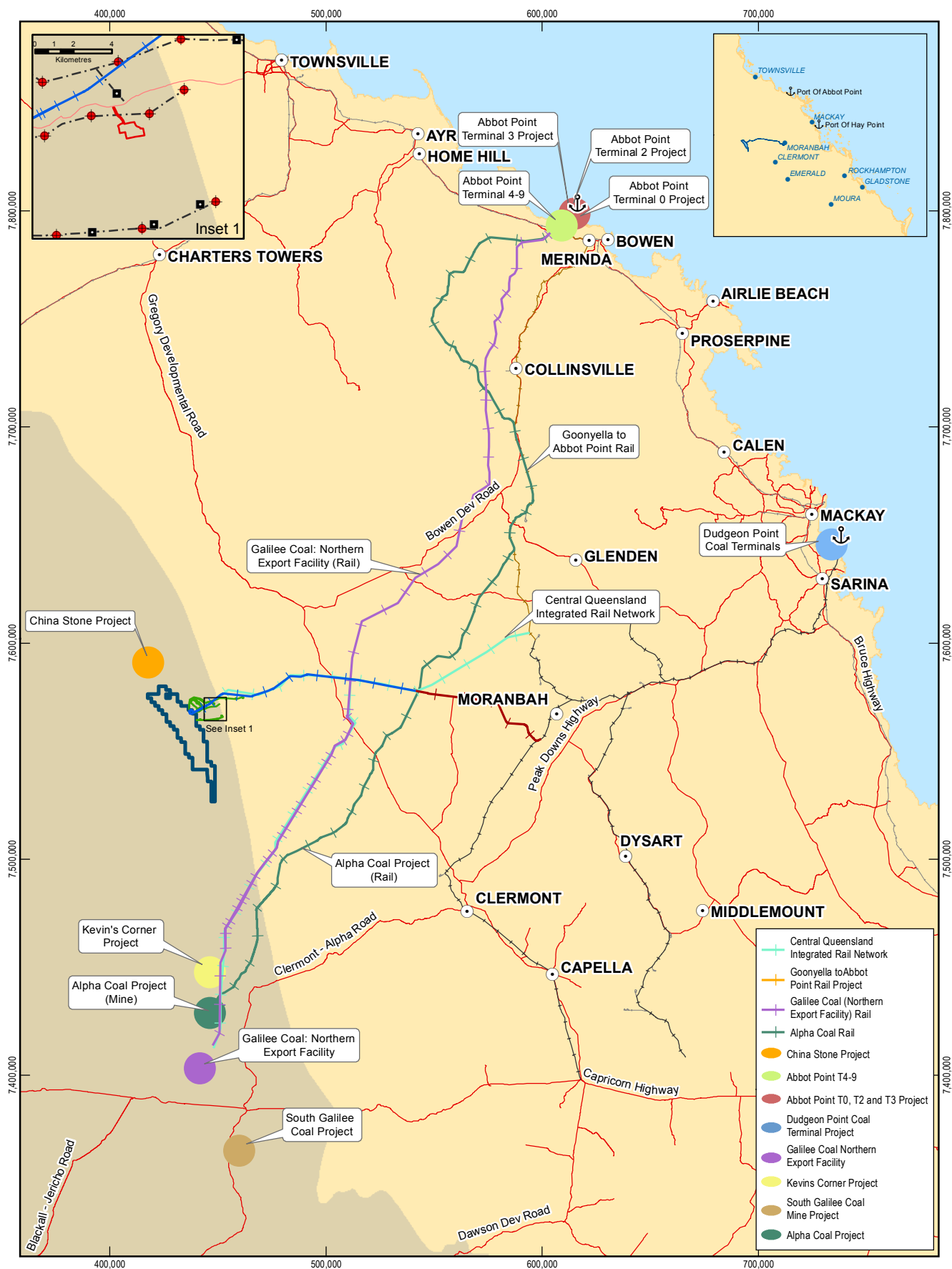
A coal system comprises:

- ▶ Mines and associated coal preparation plants, coal stockpiles and rail load-out facilities
- ▶ Regional road, power and water infrastructure
- ▶ A rail network and rail-haul providers that deliver product coal to domestic users and export ports
- ▶ One or more export coal terminals
- ▶ A deep water export coal port, supporting infrastructure and services
- ▶ Bulk carriers to transport the coal overseas

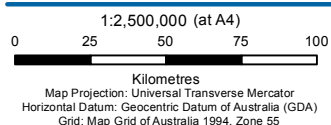
According to the Coal Plan 2030, there are currently four coal systems operating in Queensland. These include: Newlands System; Goonyella System; Blackwater-Moura System; and Western System.

The Project (Rail) will connect into the Goonyella system which services more than 30 coal mines in the northern and central areas of the Bowen Basin (DIP, 2010). The Project will also utilise the Newlands system to access the Port of Abbot Point.

The Coal Plan 2030 reports that significant planning work is currently being undertaken for the purposes of establishing infrastructure capable of exporting coal from the Galilee Basin. Due to lack of essential infrastructure such as water, power and rail infrastructure, the Galilee Basin was precluded from large scale mining projects. However, with the coal prices rising in 2008, new interest in coal and gas industries within the Galilee Basin was stimulated (DIP, 2010). Figure 2-2 provides an overview of infrastructure projects proposed within the Galilee Basin (refer Volume 1 Section 3 Introduction for further discussion).



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Cumulative Impact Assessment Projects Figure: 2-2

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Data Source: DERM: LGA (2011); DMR: State Roads (2008); DME: EPC1690 (2010), EPC1080 (2011); Adani: Alignment Op19 Rev3 (2012); Gassman/Hyder: Mine (Offsite) (2012); Other Projects (2012). Created by: NR, MS



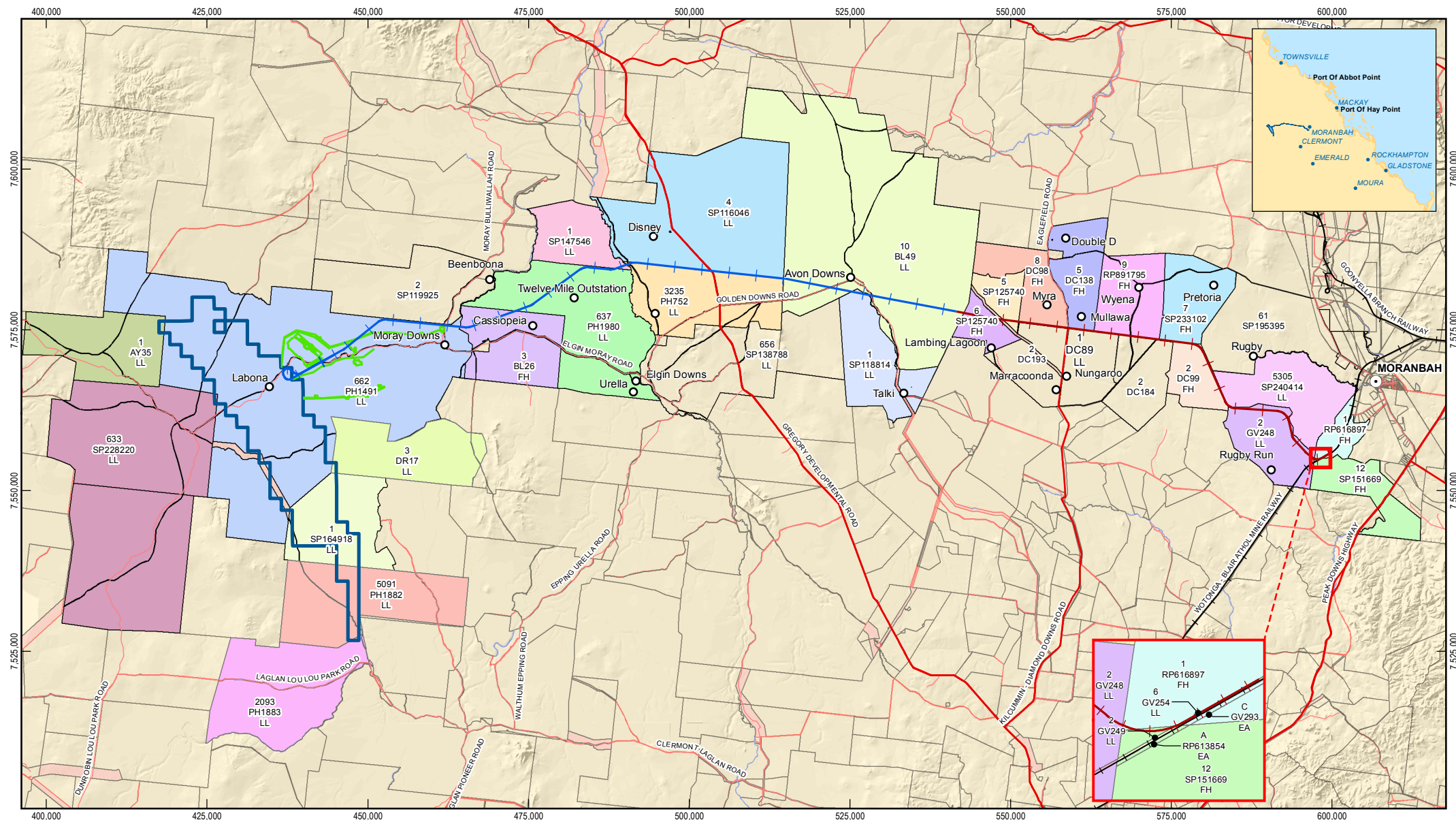
Proposed infrastructure projects include, amongst others:

- ▀ Hancock Prospecting Pty Ltd - Alpha Coal Project (Mine and Rail) and Kevin's Corner Coal Project. These projects entail establishment of two mines and a 459 km long railway to the Port of Abbot Point.
- ▀ Waratah Coal's Galilee Coal: Northern Export Facility– Establishment of a coal mine, coal fired power station and a standard gauge rail network to the Port of Abbot Point
- ▀ AMCI Limited in partnership with Bandana Pty Ltd: South Galilee Coal Project – establishment of a mine and export of coal through third party access to the proposed rail network. The coal is to be exported through the Port of Abbot Point.
- ▀ The BHP Billiton Goonyella to Abbot Point Rail Project - the construction and operation of a dedicated greenfield rail line and associated infrastructure from the Goonyella Riverside Mine Complex within the Bowen Basin, to the Port of Abbot Point
- ▀ QR National proposed Central Queensland Integrated Rail Project will service the growing needs of the Central and South Galilee Basin providing the Basin's mines with access to the ports of Central Queensland (Abbot Point, Dalrymple Bay, Hay Point and Gladstone). The project will also provide enhanced access to Abbot Point for the expanding and new mines of the Bowen Basin (QR National, 2011).
- ▀ Macmines' China Stone Project: limited information is available as the project has not been declared a significant project or referred under the Environment Protection and Biodiversity Conservation Act.

2.3 Local Context

For the purposes of this assessment, the local context is defined by the Project (Rail) corridor and immediately adjacent parcels of land, infrastructure, communities and land use. As depicted in Figure 2-3, the local context is defined by the following:

- ▀ Project (Rail) area which comprises of 11 leasehold lots and 10 freehold lots as described in Section 2.4.1
- ▀ Existing infrastructure as defined in Section 6.5
- ▀ The nearby communities of Moranbah and Clermont, as described in Section 2
- ▀ The extent of the land through which the Project (Rail) traverses which is classified as production from relatively natural environments, as detailed in Section 2.1.1.



1:800,000 (at A4)
0 5 10 15 20 25
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55



LEGEND

- Town
- Homestead
- State Road
- Local Road
- Other Rail Network
- Cadastral Parcel
- Road Reserve
- Watercourse Reserve
- Rail (West)
- Rail (East)
- Mine (Onsite)
- Mine (Offsite)



Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project
Project (Rail)
Local Context and Tenure

Job Number 41-25215
Revision D
Date 04-09-2012

Figure: 2-3

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Data source: DERM: DEM (2008); DCDB (2010); DME: EPC1690 (2010); EPC1080 (2011); © Commonwealth of Australia (Geoscience Australia); Homesteads, Localities, Railways, Roads (2007);

Adani: Alignment Opt9 Rev3 (SP182) (2012); RP Data: Property Owners (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: AF,MS

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2.4 Tenure and Land Use Patterns

Tenure typically refers to a lease or freehold which conveys possession of land to a person (DERM, 2010). Leasehold land is administered under the *Land Act 1994*, by the Minister for Natural Resources and Mines. The object of the *Land Act 1994* requires land to be managed for the benefit of the people of Queensland by having regard to seven principles. These principles are sustainability, evaluation, development, community purpose, protection, consultation and administration (DERM, 2010). Rural leasehold land is land leased for agricultural, grazing or pastoral uses, and excludes leases over land within a reserve, state forest, timber reserve, national park or other *Nature Conservation Act 1992* tenures (DERM, 2010). Land use refers to the primary use of the land, as permitted by the State and local government authorities.

2.4.1 Project Area Tenure

The Project (Rail) traverses 11 leasehold lots and 10 freehold lots as presented in Table 2-2 and Figure 2-3. Also included in Table 2-2 and Figure 2-3 are leasehold lots, freehold lots and easements adjacent to but not traversed by the Project (Rail).

Table 2-2 Project (Rail) Tenure

Lot on Plan	Area of lot within Project (Rail) corridor (ha)	Current Tenure
Project (Rail) West		
Lot 662 PH1491	333	Leasehold
Lot 3 BL26	86	Freehold
Lot 637 PH1980	168	Leasehold
Lot 1 SP147546	17	Leasehold
Lot 3235 PH752	22	Leasehold
Lot 4 SP116046	206	Leasehold
Lot 10 BL49	234	Leasehold
Lot 1 SP118814	24	Leasehold
Project (Rail) East		
Lot 6 SP125740	52	Freehold
Lot 5 SP125740	23	Freehold
Lot 8 DC98	73	Freehold
Lot 5 DC138	37	Freehold
Lot 9 RP891795	97	Freehold
Lot 7 on SP233102	38	Freehold
Lot 2 DC99	117	Freehold



Lot on Plan	Area of lot within Project (Rail) corridor (ha)	Current Tenure
Lot 5305 SP240414	9	Leasehold
Lot 2 GV248	162	Leasehold
Lot 1 RP616897	10	Freehold
Lot 12 SP151669	6	Freehold
Lot 2 GV249	0.4	Leasehold
Lot 6 GV254	2	Leasehold

Lot 662 on Plan PH1491 comprises the Moray Downs property, within which the Project (Mine) and associated onsite and offsite infrastructure is located. Adani has purchased the lease for Moray Downs (refer Volume 2, Section 2 Mine Project Description).

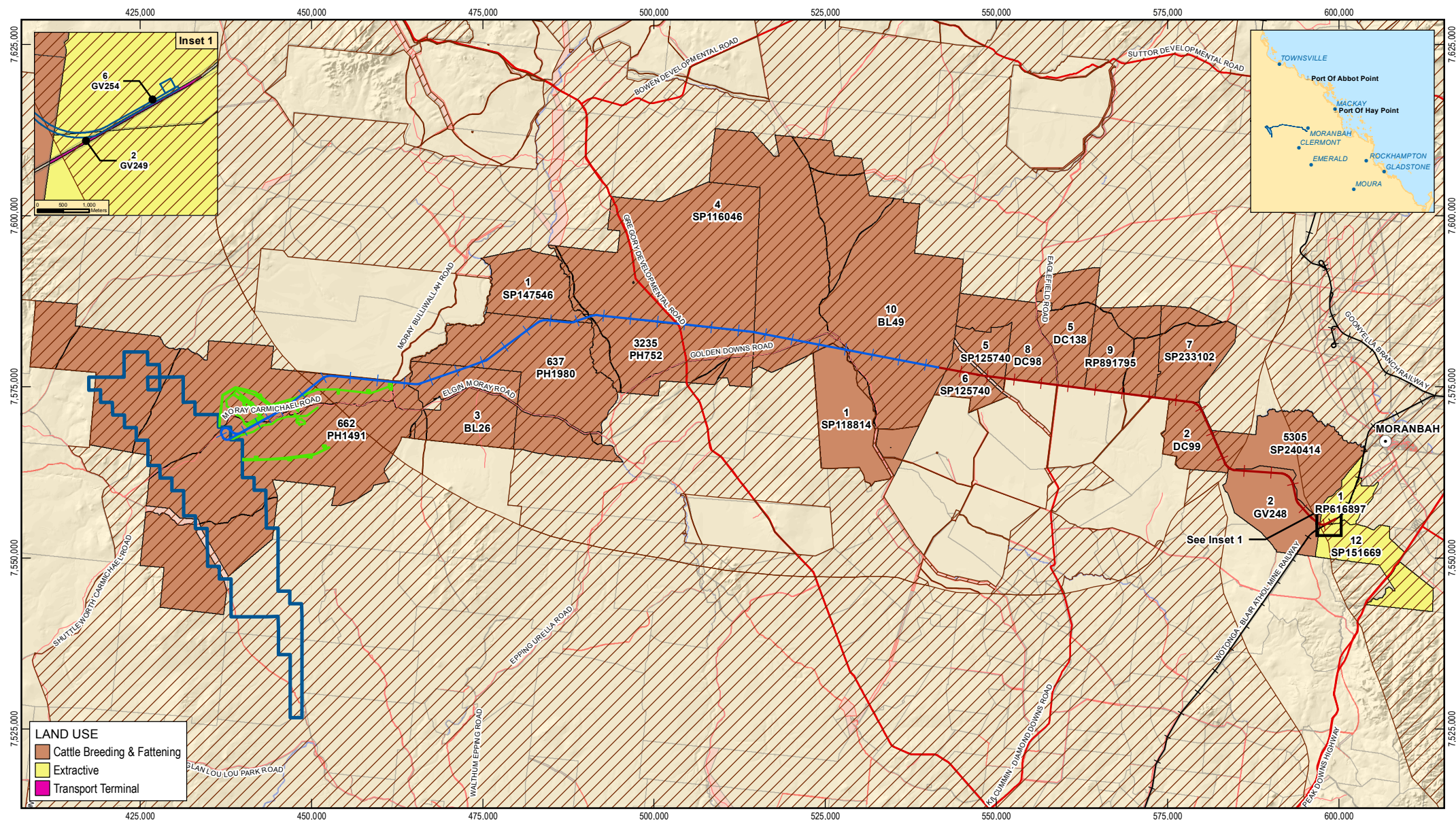
The temporary construction camp located on the eastern extent of the Project (Rail) is proposed to be established on freehold tenure land. The remaining three camps are proposed to be developed on leasehold tenure land (refer Volume 4, Appendix D Project Approvals and Planning Assessment).

2.4.2 Project Area Land Use

The Project Area is located within the regional landscape and rural production area land use category as defined in the MIWRP. The regional landscape and rural production area includes land with significant biodiversity values, GQAL, cultural and landscape heritage values, extractive resources of economic significance (e.g. mining), water catchments, native forests, coastal wetlands, land unsuitable for urban/rural residential purposes and rural towns and associated activities (DLGP, 2011a).

The Project (Rail) alignment route selection process considered environmental constraints and aimed to follow cadastral boundaries where possible.

Land use as shown in Figure 2-4 in the Project Area is predominantly for the purposes of cattle breeding and fattening. Limited areas are defined as being for the purposes of cattle fattening and grains and cattle fattening only. Some extractive use is defined at the eastern extent of the Project (Rail) near the junction with the Goonyella rail system. The Project Area traverses a number of waterways and water bodies (refer Volume 4 Appendix AB Rail Hydrology Report), notably the Belyando River, Mistake Creek, Diamond Creek, Logan Creek and Grosvenor Creek. State controlled roads traversed include the Gregory Developmental Road and the Kilcummin Diamond Downs Road. A number of local roads and access tracks are intersected by the Project (Rail) (refer Volume 4 Appendix AG Rail Transport Report).



LAND USE

- Cattle Breeding & Fattening
- Extractive
- Transport Terminal

0 5 10 15 20 25
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55



LEGEND

- Town
- State Road
- Local Road
- Other Rail Network
- Native Title Register
- Cadastral Parcel
- Road Reserve
- Watercourse Reserve
- Rail (West)
- Rail (East)
- Mine (Onsite)
- Mine (Offsite)



Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project

Job Number 41-25215
Revision E
Date 20-09-2012

Project (Rail) Land Use

Figure: 2-4

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2.4.3 Mining and Petroleum Tenure

Under Section 8 of the *Mineral Resources Act 1989* (MR Act), the State owns gold, coal and all minerals on or below the surface of the land in Queensland. The MR Act provides the legislative framework for exploration, development and mining tenure. A permit, claim, license or lease may, among other things, authorise prospecting, exploration, mining, processing or transport of materials (including coal) under the provisions of the MR Act.

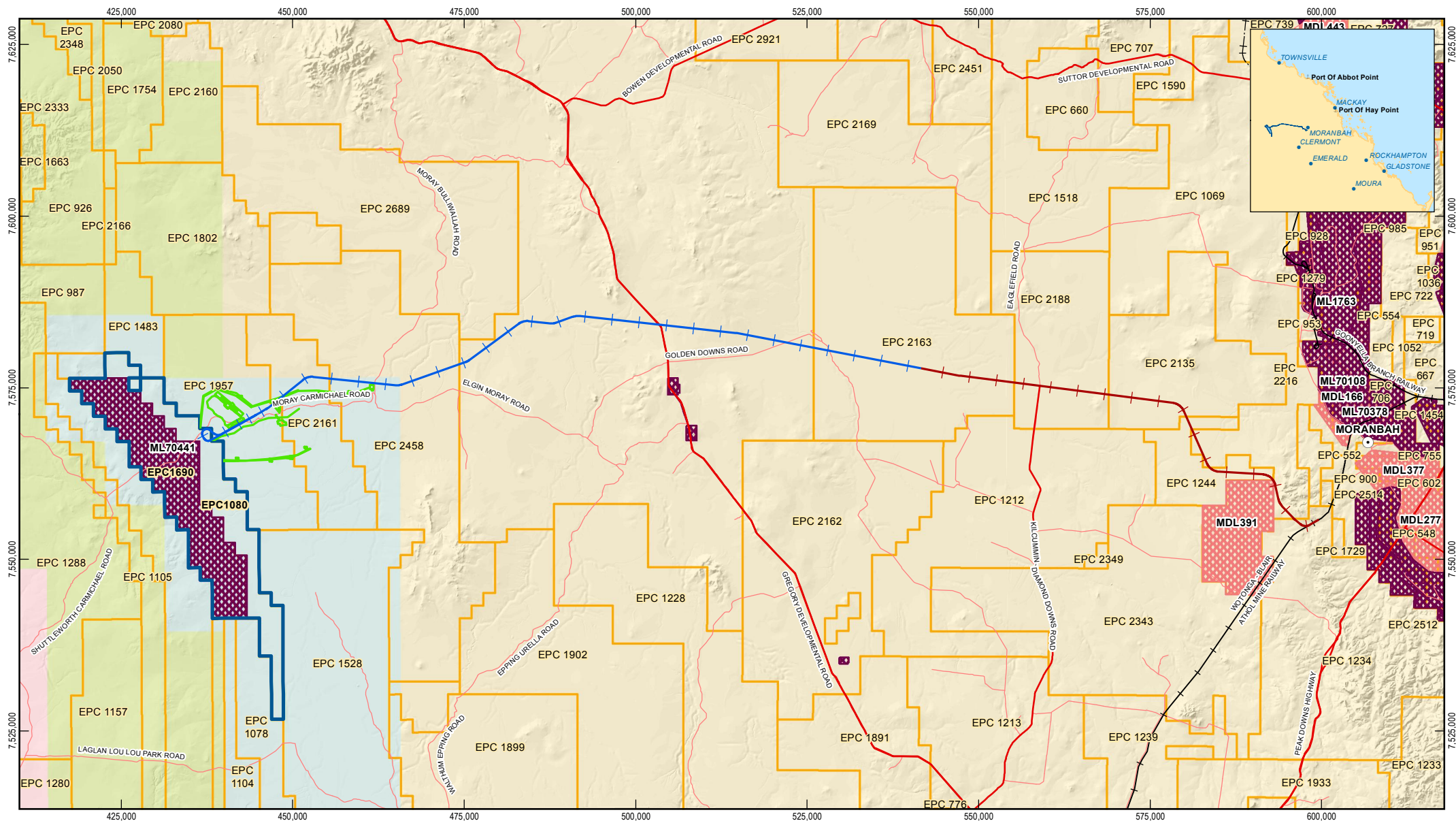
Several different mining tenements are granted and administered under the MR Act, as follows:

- ▶ **Prospecting permit:** this permit entitles the holder to prospect for and/or hand-mine for minerals and/or peg a mining lease or mining claim on the available land (excludes coal). There are two types of prospecting permits, namely a parcel prospecting permit and a district prospecting permit.
- ▶ **Exploration permit:** this permit is issued for the purposes of exploration, allowing the permit holder to determine the existence, quality and quantity of minerals on, in or under land by methods such as prospecting, geophysical surveys and other methods. This permit may eventually lead onto an application for a mineral development licence.
- ▶ **Mineral Development Licence:** this licence allows the holder to undertake geoscientific programs, mining feasibility studies, environmental, engineering and design studies so as to evaluate the potential for development of the defined resource.
- ▶ **Mining Claim:** a mining claim is granted to holders of prospecting permits to carry out small scale operations, which can be up to one hectare in area and can be granted for minerals other than coal.
- ▶ **Mining Lease:** lease granted for mining operations that entitle the holder to machine-mine specified minerals and carry out activities associated with mining or promoting the activity of mining.

A review of the Queensland Government, Department of Mines and Energy 2011 data illustrates that the Project (Rail) traverses and is surrounded by a number of coal and petroleum exploration tenures. The Project (Rail) does not traverse any land subject to a Mining Lease or Mineral Development Licence.

A study was commissioned to review historical exploration results within the rail corridor in order to assess the likelihood that any significant deposits exist in the area (refer Volume 4, Appendix Z1 Xenith Rail Easement Study). The report concludes that the potential for substantial economic coal and/or petroleum deposits within the vicinity of the Project Area is low.

The locations of the tenures are illustrated in Figure 2-5 and described in detailed in Table 2-3.



0 5 10 15 20 25
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55



LEGEND

- Town
- State Road
- Local Road
- Other Rail Network
- Mining Lease
- Mineral Development License
- EPC Boundary
- EPP 744
- EPP 1015
- EPP 1044
- Rail (West)
- Rail (East)
- Mine (Onsite)
- Mine (Offsite)



Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project
Project (Rail)
Mining and Petroleum Tenure

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Revision D
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Figure: 2-5

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Data source: DERM: DEM (2008), DCDB (2010); DME: EPC1690 (2010), EPC1080 (2011), Mining Leases, Mineral Development Licences, EPC, EPP (2012);

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Table 2-3 Mining and Petroleum Tenures

Tenure*	Holder	Status
Tenure held by Adani		
ML70441	Adani Mining Pty Ltd	Application
EPC1690	Adani Mining Pty Ltd	Granted
EPC1080	Adani Mining Pty Ltd	Granted
Exploration Permits for Coal		
EPC2163	Queensland Coal Investments Pty Ltd	Granted
EPC2135	Carabella Resources Limited	Application
EPC2458	Civil and Mining Resources Pty Ltd	Application
EPC2161	Rem Resources Pty Ltd	Application
EPC1957	Mining Investments One Pty Ltd	Application
EPC1069	Carabella Resources Limited	Granted
EPC2188	Carabella Resources Limited	Granted
EPC1080	Waratah Coal Pty Ltd	Granted
EPC1690	Adani Mining Pty Ltd	Granted
EPC1244	Energy Minerals Pty Ltd	Granted
EPC1234	Queensland Coking Coal Pty Ltd	Granted
Exploration Permits for Petroleum		
EPP1044	Queensland Energy Resources Limited	Granted
EPP793	Diamond Creek Coal Pty Ltd	Granted
EPP814	Eureka Petroleum Pty Ltd	Granted

2.5 Surrounding Residential and Recreational Areas

The main residential areas surrounding the Project (Rail) are located at Clermont, Moranbah and Belyando. None of these residential areas are in close proximity to the Project Area.

The Project (Rail) alignment has been designed with the intent to have minimal adverse effect on the properties through which the alignment passes. Specifically, the alignment seeks to avoid fragmentation of properties into non-productive portions. Furthermore, the alignment has been developed to avoid homesteads and associated improvements such as sheds, as far as is practicable.

Table 2-4 lists the nearest homesteads identified within approximately 5 km of the rail corridor. These homesteads have been identified on the basis of the published mapping. Table 2-4 indicates the land in the vicinity of the proposed Project (Rail) is sparsely populated with very few identified homesteads. The nearest homestead in relation to the proposed rail alignment is Lambing Lagoon which is approximately 1.6 km away. Homestead locations are shown on Figure 2-3.

The potential impacts of the Project (Rail) on homesteads, and proposed mitigation measures are detailed in Section 3.

Table 2-4 Homesteads Surrounding the Project Area

Homestead	Easting	Northing	Approximate Distance from Project Area (km)	Description/Comment
Moray Downs	462027	7572602	3.3	Homestead
Cassiopeia	475674	7575617	3.0	Homestead
Twelve Mile Outstation	482139	7579957	3.0	Homestead
Disney	494429	7589482	4.2	Homestead
Avon Downs	525174	7583086	2.2	Homestead
Lambing Lagoon	546218	7578704	1.6	Homestead
Myra	555680	7578811	3.0	Homestead
Mullawa	561038	7577015	1.9	Homestead

The Project (Rail) alignment does not traverse any public recreation reserves. However, there are a number of sites surrounding the Project Area that are used for recreational purposes by the community and tourists. These areas include:

- ▶ Camping reserve located on Elgin Moray Road, approximately 4.5 km south of the Project (Rail)
- ▶ Camping reserve located on Elgin Road, approximately 11 km south of the Project (Rail)
- ▶ Mazeppa National Park located on the Gregory Developmental Road approximately 30 km south of the Project (Rail).



2.6 Agricultural Land

Land mapped as suitable for cropping (Class A) is limited within the Project (Rail) area. Land considered marginal for cropping (Class B) is more widespread along the Project (Rail) albeit still limited in extent. Class C1 agricultural land, that is land considered suitable only for sown pastures with moderate limitations, dominates the landscape in the vicinity of the Project (Rail). The Project (Rail) also traverses pockets of non-agricultural land along the rail corridor, particularly at the intersections of roads, creeks and at the Goonyella rail system connection.

For the most part, land mapped as GQAL is not within the areas potentially suitable for the provision of quarry and/or borrow material.

Figure 2-6 provides an overview of GQAL as mapped within the vicinity of the Project (Rail) and in the wider landscape.

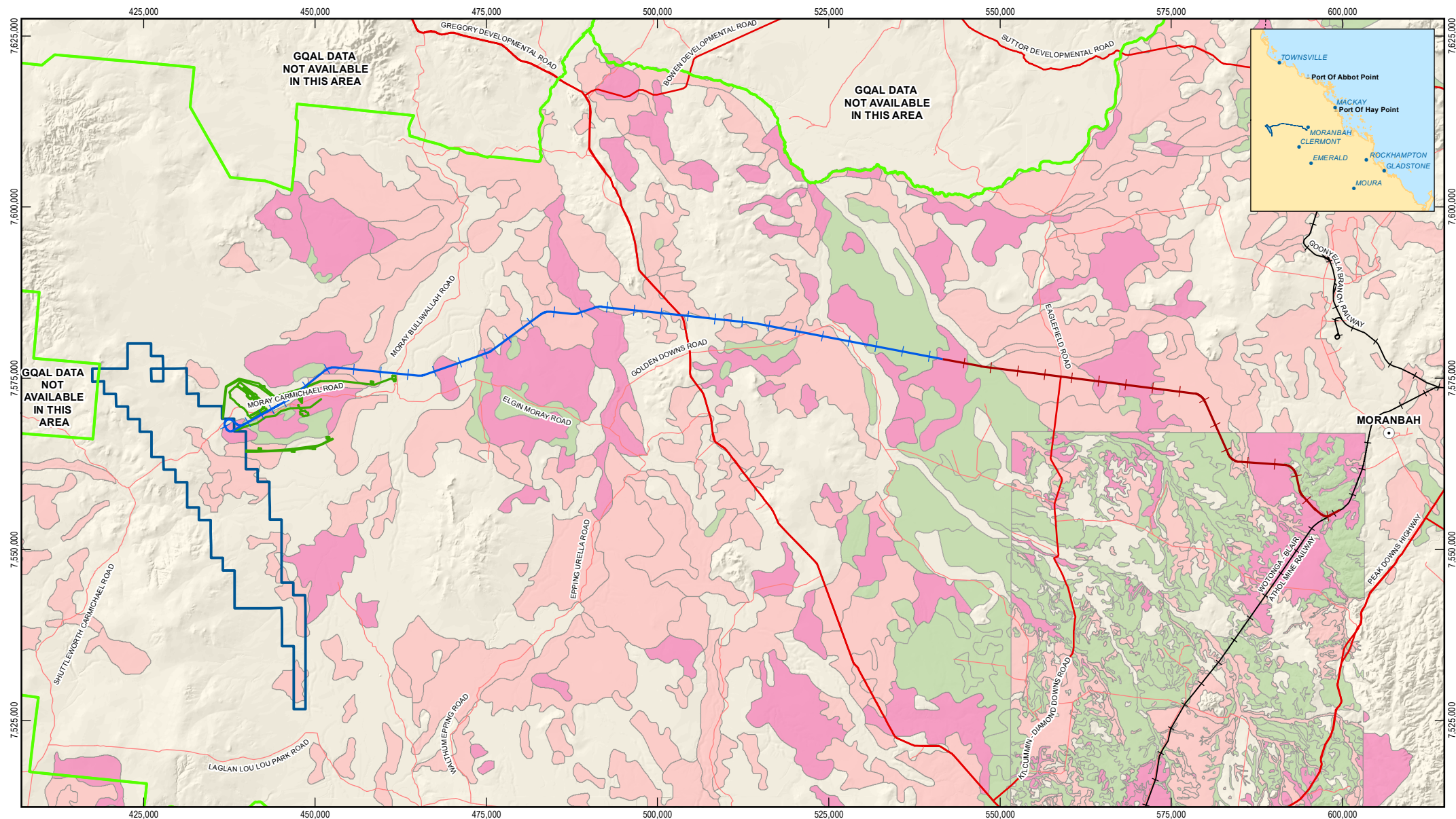
Refer to Section 3.3.2 for assessment of potential impacts and mitigation measures and Volume 4 Appendix Y Rail Soils Assessment for further detail.

2.7 Strategic Cropping Land

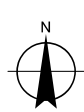
The Queensland Government considers that the best cropping land, namely strategic cropping land, is a finite resource that must be conserved and managed for the longer term.

On 6 December 2011, the *Strategic Cropping Land Act 2011* was given assent by the Governor in Council and commenced on 30 January 2012. The *Strategic Cropping Land Act 2011* is supported by the Strategic Cropping Land Regulation 2011 and State Planning Policy 1/12: Protection of Queensland's Strategic Cropping Land. SPP1/12 is designed to ensure that planning and development assessment includes appropriate consideration of strategic cropping land. SPP 1/12 will operate in tandem with SPP 1/92 Development and Conservation of Agricultural Land, which applies to a broader range of agricultural lands.

Approximately 120 km of the Project (Rail) corridor traverses the western extent of the strategic cropping land Management Area in the western cropping zone. There are no strategic cropping land Protection Areas within the Project (Rail) vicinity. Strategic cropping land is limited in extent within the Project (Rail) area and occurs in fragmented parcels. Strategic cropping land is not mapped within the potential quarry and borrow area locations. An assessment of the potential impacts of the proposed Project (Rail) alignment on strategic cropping land is provided in Section 3.3.1 of this report.



1:750,000 (at A4)
0 5 10 15 20 25
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55



LEGEND

- Town
- State Road
- Local Road
- Other Rail Network
- GQAL
 - A
 - B
 - C1
- Rail (West)
- Rail (East)
- Mine (Onsite)
- Mine (Offsite)
- Local Government Area Boundary



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Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project
Project (Rail)
Good Quality Agricultural Land

Job Number 41-25215
Revision C
Date 04-09-2012

Figure: 2-6

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Data source: DERM: DEM (2008), DCDB (2010), LGA Boundary (2012); DME: GQAL, EPC1690 (2010), EPC1080 (2011); © Commonwealth of Australia (Geoscience Australia); Localities, Railways, Roads (2007);
Adani: Alignment Opt9 Rev3 (SP1&2) (2012); Gassman/Hyder: Mine (Offsite) (2012). Created by: B.W.MS

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2.8 Existing and Proposed Infrastructure

2.8.1 Overview

The newly gazetted *Queensland Infrastructure Plan 2011* sets the strategic platform to guide the planning, prioritisation and sequencing of infrastructure within Queensland. It identifies the infrastructure needed to support and further encourage growth across Queensland's major regional economic zones of minerals, coal and energy, gas, agriculture, tropical expertise and tourism (DLGP, 2011c). The QI Plan identifies the MIW region as one of the fastest growing economies in Queensland due to its strong mining, manufacturing, agriculture and tourism sectors that have developed on the basis of an abundance of natural resources from the Bowen and Galilee Basins. As a result of the economic growth of these sectors, several infrastructure projects are being planned for the region to support these sectors. The following sections provide an overview of the existing and proposed infrastructure within the MIW region, specifically in the context of the Project Area.

2.8.2 Road Infrastructure

An efficient road network is critical to the construction of the Project (Rail). Road infrastructure is governed by the *Transport Infrastructure Act 1994* which is administered by both State and local government. Categories of roads include state-controlled roads, local roads, and minor unsealed roads. Road infrastructure in the vicinity of the Project (Rail) is shown on Figure 2-2.

Consultation with the DTMR and IRC identified a number of public roads crossing the rail alignment, with one road being a state-controlled road. A review of the DERM GIS data also revealed a number of 'minor' roads crossing the rail alignment which were not included in Council records. Overall, a total of seven public road crossings have been identified in the Project (Rail) study area. Notable named roads and stock routes (refer Section 2.9) include:

- Kilcummin-Diamond Downs Road (state-controlled road)
- Eaglefield Road (IRC local road) (stock route (M399BELY03))
- Amaroo Road (adjacent Logan Creek and stock crossing (stock route (U402BELY03))
- Avon Road (IRC local road)
- Gregory Developmental Road (state-controlled road)
- Mistake Creek (stock route Y401BELY02)
- Moray – Bulliwallah Road (IRC local road)
- Moray Carmichael Road (IRC local road).

Based on the review of the *Queensland Infrastructure Plan 2011*, there are no planned road upgrades in close proximity to the Project Area. Road upgrades are anticipated to the Bruce Highway at Mackay, Sarina and Proserpine as well as Peak Downs Highway (Nebo to Mackay) Walkerston bypass pre-project works.



2.8.3 Rail Infrastructure

Rail infrastructure is governed by the *Transport Infrastructure Act 1994* which provides a framework to allow rail transport infrastructure to be constructed, maintained, operated and managed effectively and efficiently.

QR National currently holds the largest rail service within the Bowen Basin servicing multiple mines to the Abbot Point Coal Terminal (QR National, 2011). The nearest existing railway to the location of the Project (Rail) is the Blair Athol Branch Line of the Goonyella system which runs south from Wotonga to Blair Athol.

The Goonyella system primarily services more than 30 coal mines in the northern and central areas of the Bowen Basin and transports coal to the two export terminals at the Port of Hay Point, the Dalrymple Bay Coal Terminal and the Hay Point Services Coal Terminal (DIP, 2010).

The Project (Rail) will be developed to enable the transportation of coal product from the Project (Mine) to the Port of Abbot Point and the Port of Hay Point (Dudgeon Point expansion).

In addition to the Project (Rail), the following railway lines are proposed to be developed in the vicinity of the Project Area and will cross the Project (Rail) (refer Volume 1 Section 3 Introduction):

- ▶ Hancock Prospecting Pty Ltd's proposed Alpha Coal and Rail Project, with the rail component running north-east from the Alpha Mine to the Port of Abbot Point
- ▶ Waratah Coal Pty Ltd's Galilee Coal (Northern Export Facility) Project with the rail component travelling north-east from a new coal mine near Alpha in the Galilee Basin to the Port of Abbot Point and cross the Project (Rail).

The rail line proposed by Alpha Coal has received approval and, if constructed, is likely to impact on or be impacted by the Project (Rail). Waratah Coal's proposal is still being assessed. If progressed, it may impact on or be impacted by the Project (Rail).

The proposed Project (Rail) is likely to have an impact on these proposed rail lines (refer Volume 4, Appendix AG Rail Transport Assessment). Existing and proposed rail infrastructure in the vicinity of the Project (Rail) is shown on Figure 2-2.

2.8.4 Airports and Landing Strips

Public passenger transport airports are declared under the *Transport Planning and Coordination Act 1994* and are administered by the DTMR.

There is one international airport (Townsville), two domestic airports (Mackay and Proserpine), one regional airport (Emerald) and numerous additional local airstrips (Moranbah, Clermont, Bowen and Collinsville) in the vicinity of the Project. Those within the vicinity of the Mine are Mackay, Proserpine, Emerald, Clermont and Moranbah.

Mackay Airport has two asphalt surfaced runways and operates flights to Brisbane, Sydney, Melbourne, Gladstone, Rockhampton, Townsville and Cairns. Airlines operating from Mackay Airport include Jetstar, Pel-Air (cargo), Qantas, Tiger Airways and Virgin Australia.

Proserpine Airport is located approximately 10 km south of Proserpine and has two runways. Jetstar Airways and Virgin Australia currently operate daily flights between Proserpine and Brisbane.



Emerald Airport is located approximately 6 km from the town of Emerald and has two runways. Australian Air Express, Qantaslink - Sunstate Airlines and Virgin Australia currently operate flights between Emerald and Brisbane.

Clermont Airport has two runways, one 1,068 m long (gravel) and the other 1,311 m long (asphalt). Moranbah Airport is located off Goonyella Road, approximately 6 km south of Moranbah. The airport has one runway which is 1,524 m long. Qantaslink - Sunstate Airlines and Skytrans operate between Moranbah and Brisbane, Cairns, Townsville and Sunshine Coast.

There are a number of commercial landing strips/airfields in the IRC LGA. Most are privately owned and only service the local requirements of Dysart, Middlemount and Clermont (DLGP, 2011c). Key ones surrounding the Project Area are Laglan, Beresford and Albro properties located to the south of the Project Area. The Project (Rail) will potentially impact the capacity of existing airports to service the Project's fly-in/fly-out construction and operation workforce. The Project proposes to construct a new airport in close proximity to Project (Rail) adjacent to the Mine Site (refer Volume 2 Sections 2 Project Description and Volume 4 Appendix M Mine Land Use Report).

The Project (Mine) airstrip will service a fly in and fly out workforce. The airstrip will be up to 3.0 km long and located approximately 12.5 km east of the Project Area on Lot 662 on PH1491. No other airports are proposed to be constructed in close proximity to the Project Area.

Figure 2-7 shows ports and airports within the Project Area.

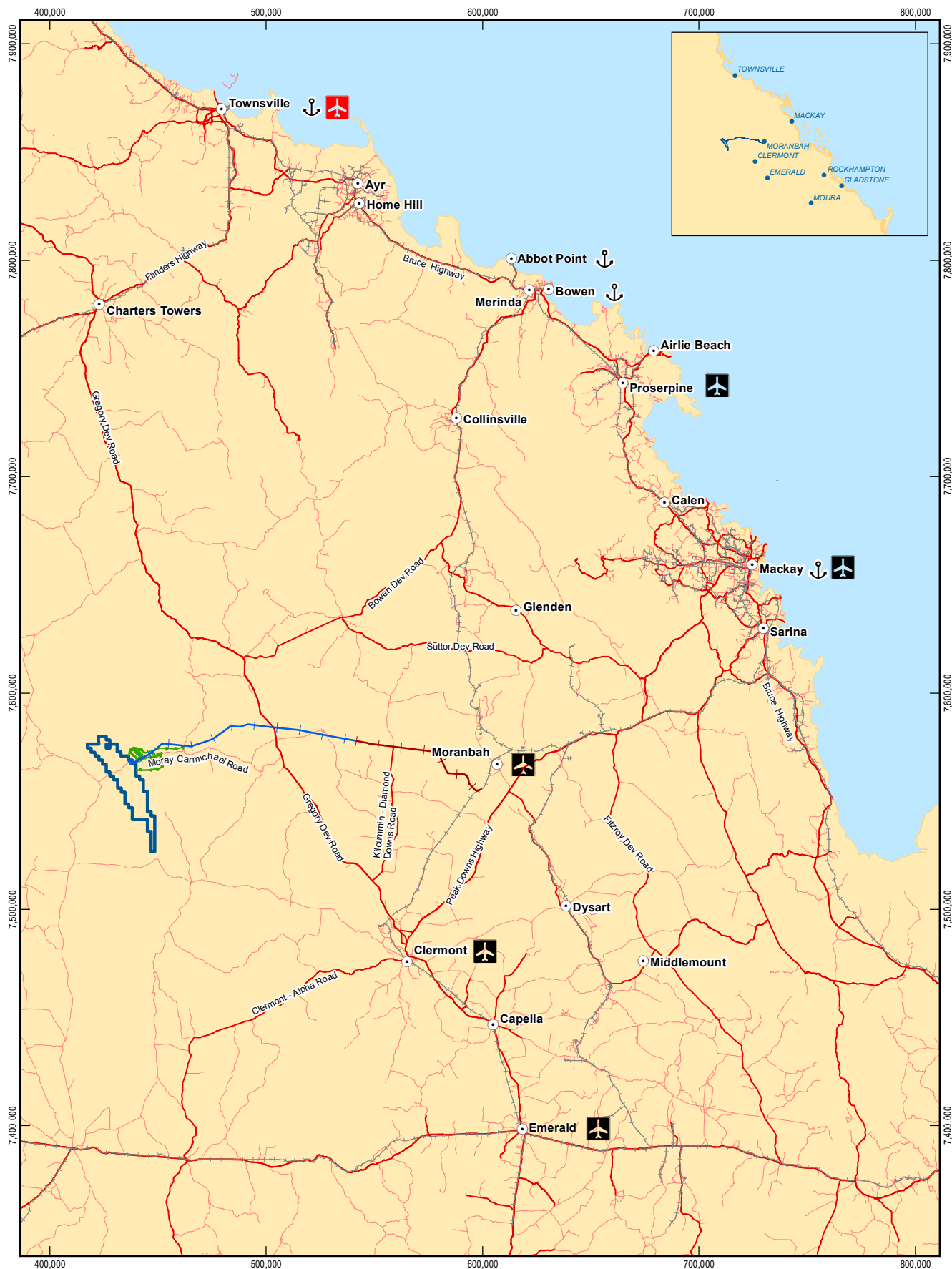
2.8.5 Port Infrastructure

It is anticipated that the following ports could be utilised for both the transfer of supplies and equipment and the export of coal in the Project's operational phase (refer to Figure 2-7):

- ▀ Townsville – major port with nine working berths currently accommodates international shipping and supporting warehousing facilities
- ▀ Mackay – port with four working berths currently accommodates international shipping and supporting warehousing facilities
- ▀ Hay Point – dedicated coal export facility. Environmental and engineering studies for the development of the Dudgeon Point expansion at the port are currently underway. The expansion comprises two new terminals providing an expected 150 to 180 Mtpa additional capacity to the port. Adani and Dudgeon Point Project Management Pty Ltd were selected as preferred developers of the Dudgeon Point project in 2010. Dudgeon Point is expected to commence operations in 2015/2016
- ▀ Abbot Point – dedicated coal export facility with planned general cargo handling facility. The Port of Abbot Point is operated by North Queensland Bulk Ports Corporation Limited. The port is located approximately 25 km north of Bowen and is Australia's most northerly coal port. The port comprises a single coal export terminal, Abbot Point Coal Terminal 1 which is operated (under long-term 99 year lease) by Adani Abbot Point Terminal Pty Ltd, a subsidiary of the Adani Group. Abbot Point Coal Terminal 1 comprises a rail in-loading facility, coal handling and stockpile areas, and a dual trestle jetty and conveyors connected to two berths and ship-loaders, located 2.75 km offshore, with a capacity of 50 Mtpa. Coal is supplied to the port via the Newlands rail system
- ▀ Bowen – limited facilities and not currently used as an active cargo port mainly; functions as a domestic facility and a base for tug boats that service the Abbot Point coal terminal



Figure 2-7 shows ports and airports within the Project Area (refer Volume 4, Appendix AG Rail Transport Assessment for further detail).



LEGEND

- Town
- ⚓ Major Port
- ✈ Airport International
- ✈ Airport Regional
- State Road
- Local Road
- Existing Rail Network
- Project (Mine)
- Mine (Offsite)
- Rail (West)
- Rail (East)

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1:2,500,000 (at A4)
0 20 40 60 80 100
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55



adani

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project

Job Number 41-25215
Revision E
Date 04-09-2012

Project Area Ports and Airports

Figure: 2-7

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Data Source: GA: Gazetted Names (2008) - Airports/Ports; DMR: State Roads (2008); DME:EPC1690 (2010), EPC1080 (2011); Adani: Alignment Opt9 Rev3 (2012); Gassman/Hyder: Mine (Offsite) (2012). Created by: BW,JVC.



2.8.6 Gas and Water Pipelines

Coal mining activity in the Galilee Basin on the scale being planned requires access to significant quantities of water (DIP, 2010). It is envisaged that mines will access water from various sources including local bores, mine dewatering and a new pipeline to existing or new storages (DIP, 2010). The *Queensland Infrastructure Plan 2011* identifies the following proposed water pipelines within the MIW region:

- ▶ Burdekin to Moranbah pipeline augmentation
- ▶ Arrow to Bowen Gas Pipeline

A search of the Queensland Groundwater Database revealed a total of 43 registered bores within the Project (Rail) Study Area 10 km buffer (as defined in Volume 4, Appendix AC Rail Hydrogeology). Abandoned bores total 19, of which 15 are no longer useable (and reported as abandoned and destroyed). The remaining 24 bores are assumed to still be in use. The reported facility roles include unknown, water supply, stratigraphic investigation, mineral or coal exploration, sub-artesian monitoring and groundwater investigation and sub-artesian monitoring. Seven of the existing bores are defined as 'water supply' bores; however it is possible that some or all of the 11 existing bores with an 'unknown' facility role may also abstract groundwater for water supply. An assessment of the potential impacts of the Project (Rail) on existing and proposed water infrastructure is provided in Sections 3.5 and 3.6.

2.8.7 Energy and Telecommunication Easements

Ergon Energy is responsible for electricity supply to the Mackay area (under its Distribution Authority) and has identified emerging limitations in the electricity network supplying Moranbah and the surrounding area (Ergon Energy, 2011a).

The existing power supply in Moranbah comprises of Powerlink Queensland's T34 Moranbah substation which has three 132/66/11kV transformers supplying Moranbah town and the coal mine customers in the surrounding Bowen Basin coalfields (Ergon Energy, 2011a). Ergon Energy owns and operates the 66kV switchyard in T34 Moranbah substation which connects four privately-owned and two Ergon Energy-owned 66kV feeders which supply the coal mines in the area (Ergon Energy, 2011a).

The nearest electricity line to the proposed Project (Rail) is an existing high voltage electricity line that runs in a north south direction, parallel to the existing Wotonga – Blair Athol Mine Railway line. No electricity or telecommunication easements traverse the proposed Project (Rail) line.

With continued development of the mining industry in the Bowen Basin, there is increased demand on Ergon Energy's electricity supply network in the Moranbah area. A number of new coal mines have requested connection to Ergon's 66kV network, and many existing coal mine customers have requested increases in their Agreed Demands (Ergon Energy, 2011b). No projects are currently proposed by Ergon to connect and supply future mining projects. However, Ergon Energy expect that augmentation of the network will be required if reliable supply is to be maintained (Ergon Energy, 2011b). Ergon Energy has proposed to implement demand-side measures throughout 2012 and 2013 and defer establishment of a new 66/11kV substation beside Powerlink Queensland's T34 Moranbah substation until November 2014 (Ergon Energy 2011c).



Galilee Power, a subsidiary of Waratah Coal, has proposed a 900 MW coal-fired power station 30 km north-west of Alpha to be completed by 2017 to provide energy support for industrial development in the northern economic triangle (Galilee Power 2009). Powerlink Queensland has proposed a substation (Surbiton Hill) 50 km north of Alpha and associated easements for a 275 kV transmission line between the proposed substation and the existing substation near Emerald (Lilyvale), and two 132 kV transmission lines between the proposed substation and the existing Alpha and Kevin's Corner mining leases.

Adani is currently investigating power supply options via a number of alternative sources including:

- ▶ Powerlink via the new Surbiton 275 kV Substation fed from Lilyvale in the south
- ▶ Powerlink via the Moorevale 132 kV Substation (yet to be developed near Moranbah) fed from the existing Nebo 275 kV Substation to the north
- ▶ Powerlink via the Strathmore 275 kV Substation (near Collinsville)
- ▶ Copper String Project via the Pentland 330 kV Substation (Project is yet to be committed and developed)

Telecommunication services in the MIW region are currently provided by Telstra with towers located at the following locations:

- ▶ Within Lot 2 on SP119925, approximately 6 km north of the Project (Rail)
- ▶ Within Lot 4 on SP116046, approximately 5.5 km north of the Project (Rail)
- ▶ Within Lot 1 on SP210553, approximately 12 km south of the Project (Rail)

2.9 Stock Routes

The stock route network is the network of stock routes and reserves for travelling stock in the State. The term 'stock route' describes a particular use of part of the State's road network (DERM, 2010). In Queensland, a stock route is not a separate parcel of land but a term used to describe a road or route that is declared under a regulation to be a stock route and ordinarily used for moving stock on foot (DERM, 2010).

Furthermore, a road that is a stock route may also be used for other purposes. Apart from being a stock route, a road may also be used as a transport corridor for vehicles or a communication and utility infrastructure corridor for phone, power and gas lines. It may also be an area of land with rich biodiversity (DERM, 2010). Stock routes are pathways for travelling stock on roads, reserves, unallocated state land and pastoral leases, and are divided into four classifications for operational and management purposes (DERM, 2010). Each stock route is classified depending on the average usage of the route over a five year period.

Management of the stock route network is shared between the State government and local government, with local government being responsible for its day to day management and DNRM as the custodian of the land, providing support, guidance and strategic directions for management (DERM, 2010).

According to the *Queensland Stock Route Strategy 2009- 2014*, a number of values are associated with the land that makes up the stock route network. These values include:



- ▶ Economic values associated with the high pastoral productivity of the land to meet the needs of travelling stock, as well as economic benefits to rural communities through having corridors of land to transport goods and services to and from these communities
- ▶ Environmental values associated with rich biodiversity, riparian areas and aesthetics, as well as value as a corridor linking areas of natural vegetation, which allows for wildlife movement across the landscape Cultural values associated with Indigenous trade routes and sites of archaeological and cultural significance
- ▶ Social values associated with use of the land for purposes other than stock route activities such as horse riding or recreational fishing, providing access corridors linking isolated areas of the State, and benefiting rural communities (DERM, 2009a).

On the basis of DERM (2010) data, it has been identified that the Project (Rail) alignments traverses three stock routes as shown on in Figure 2-8 and listed as:

- ▶ Kilcummin-Diamond Downs Road / Eaglefield Road (M399BELY03)
- ▶ Amaroo Road (U402BELY03)
- ▶ Mistake Creek Crossing (Y401BELY02)

The potential impacts of the Project (Rail) on the stock routes, and the potential impacts on the values of the land within the stock route network are identified in Section 3.7.1.

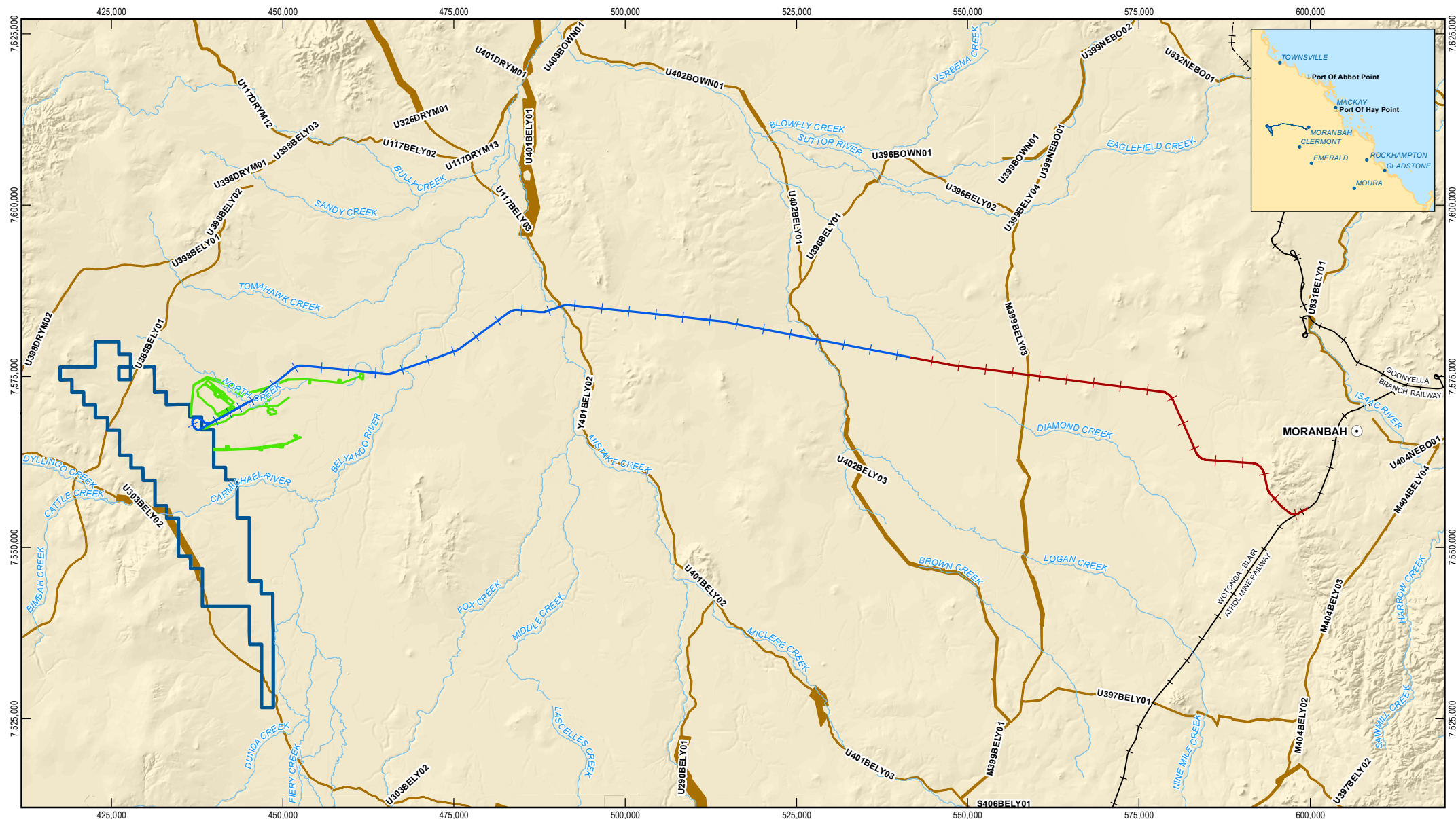
2.10 Conservation Areas

2.10.1 Nature Refuge

A nature refuge is a class of a protected area under Section 14 of the *Nature Conservation Act 1992*. It is defined as ‘a *voluntary agreement between a landowner and the Queensland Government that acknowledges a commitment to manage and preserve land that contains significant conservation values while allowing compatible and sustainable land uses to continue*’ (DERM, 2011a).

Nature refuges that are located within close proximity to the Project Area and trigger consideration are as follows (see Figure 2-9):

- ▶ Doongmabulla Mound Springs Nature Refuge located approximately 14 km west of the Project (Rail)
- ▶ Bygana Nature Refuge located 23 km south of the Project (Rail)
- ▶ Bygana West Nature Refuge located on the south-east portion of the Project (Mine) site, 17 km south of the Project (Rail)
- ▶ Nibbereena Creek Nature Refuge located 20 km north of the Project Area
- ▶ Eaglefield Creek Nature Refuge located 25 km north of the Project Area
- ▶ East Top Nature Refuge located approximately 35 km south of the Project (Rail)



0 5 10 15 20 25
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55



LEGEND

- Town
- Stock Route
- Rail (West)
- Rail (East)
- Mine (Onsite)
- Mine (Offsite)
- Other Rail Network
- Watercourse



Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project
**Project (Rail)
Stock Routes**

Job Number 41-25215
Revision E
Date 31-07-2011

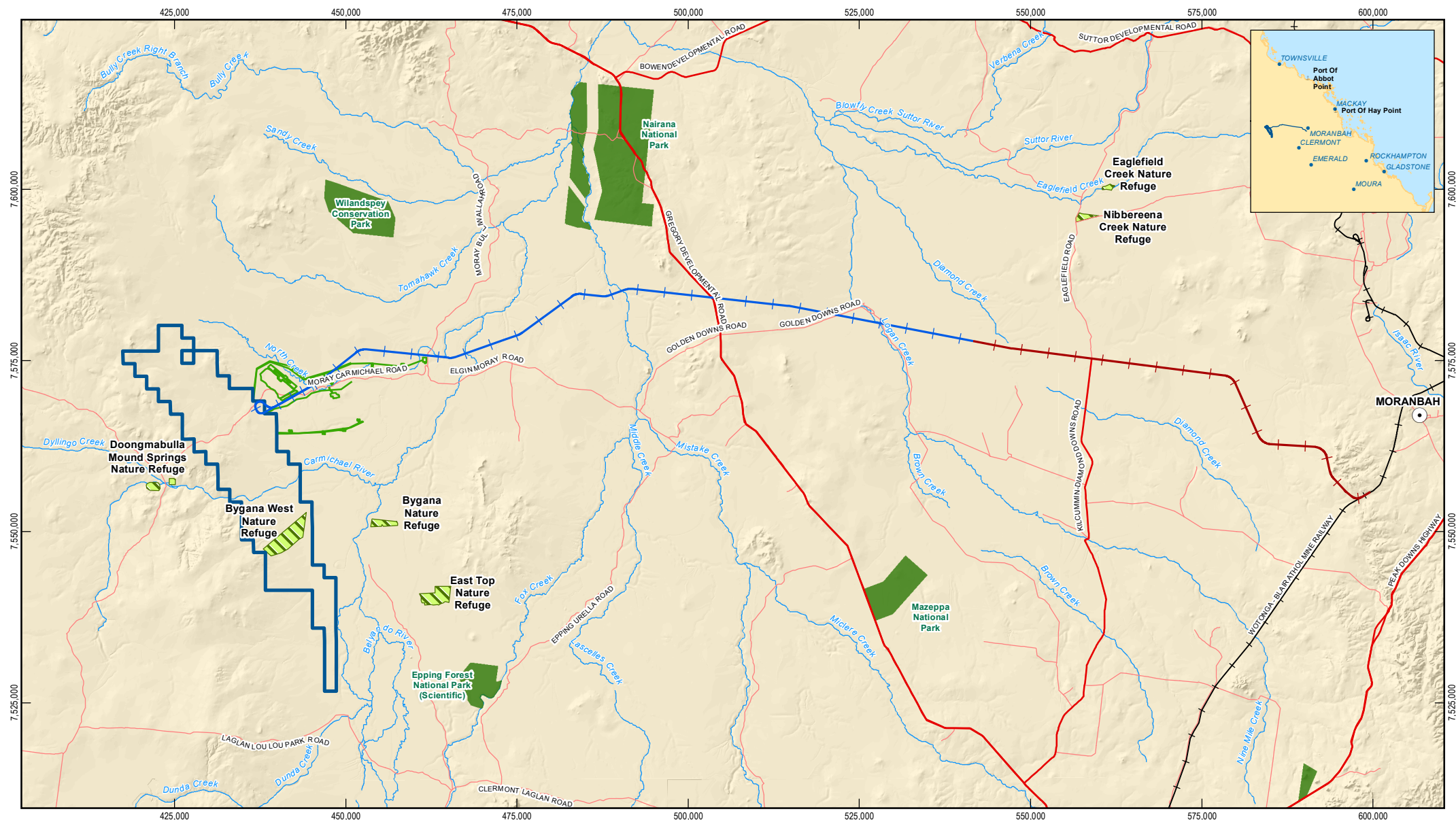
Figure: 2-8

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Data Source: ©Commonwealth of Australia (Geoscience Australia); Localities, Roads, Railway (2007); DME: EPC1690 (2010), EPC1080 (2011); DERM: Cadastre, Stock Route (2010); Adani: Alignment Opt9 Rev3 (2012); Gassman/Hyder: Mine (Offsite) (2012). Created by: BW, JVC.

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0 5 10 15 20 25
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55



LEGEND

- Town
- Other Rail Network
- Rail (West)
- Rail (East)
- Mine (Onsite)
- Mine (Offsite)
- Nature Refuge
- National Park
- Watercourse
- State Road
- Local Road



Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project
**Nature Refuges in the Vicinity of
Project (Rail)**

Job Number 41-25215
Revision A
Date 05-09-2012

Figure 2-9

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Data source: DERM: DEM (2008), Nature Refuge (2011); DME: EPC1690 (2010), EPC1080 (2011); © Commonwealth of Australia (Geoscience Australia); Localities, Railways, Roads (2007); Adani: Alignment Opt9 Rev3 (2012); Gassman/Hyder: Mine (Offsite) (2012); GHD: Northern Missing Link (2011). Created by: NR, CA

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2.10.2 Wetlands of National Significance

According to the Directory of Important Wetlands in Australia (Environment Australia, 2001), a wetland may be considered nationally important if it meets at least one of the following criteria:

- It is a good example of a wetland type occurring within a biogeographic region in Australia
- It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex
- It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevails

The wetland supports 1 per cent or more of the national populations of any native plant or animal taxa

- The wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level
- The wetland is of outstanding historical or cultural significance

The Directory of Important Wetlands lists all wetlands of national significance within Australia. The Directory of Important Wetlands has been created through the Convention on Wetlands (the Ramsar Convention). There are no Ramsar wetlands within the Project (Rail) footprint.

DERM Wetland Information (2011d) identified the Doongmabulla Springs as wetlands of national significance within some proximity to the Project (Rail), located approximately 14 km west of the Project (Rail). The springs are located on a 400 ha site. These springs are a good example of an active artesian spring which is a rare community type. The site is currently and has historically been used for watering domestic stock and existing key threats are identified as trampling and grazing by stock and feral animals, as well as aquifer draw down (DSEWPaC, 2010). The site supports an unusual habitat type which is distinct from the surrounding arid region (DERM, 2011d). Refer to Volume 2, Section 5 Nature Conservation for further details on potential impacts and mitigation measures.

2.10.3 Declared Water Storage Catchments

The Project Area is located predominantly within the Burdekin River catchment, with a small portion located within the Fitzroy River Catchment (from the junction with the Goonyella system to approximately 30 km). The key features of the Burdekin River catchment are the Burdekin River Gorge and falls, and the Burdekin Falls Dam. The main basins of the catchment include the Upper Burdekin basin, Cape Campaspe basin, Belyando basin, Suttor River basin, Bowen Broken Bogie Basin and Low Burdekin basin (Dight, 2009).

The Project (Rail) alignment traverses three basins:

- Belyando River Basin (Burdekin River Catchment)
- Suttor River Basin (Burdekin River Catchment)
- Isaac River Basin (Fitzroy River Catchment)

The Belyando River Basin and the Suttor River Basin are dominated by grazing and natural pastures, and widespread clearing has resulted in a decline in riparian habitat condition and occurrence over



the past 30 years. The Belyando River and Suttor River basins are characterised by generally low relief floodplains drained by braided channels and surrounded by wide alluvial plains (Dight, 2009).

The Isaac River Basin is dominated by beef-cattle grazing, dryland cropping and coal mining land uses and according to SKM (2009) the catchment retains much of its natural values. However, diminished availability of groundwater resource in recent years has been an impediment to any irrigation expansion (SKM, 2009).

The main riverine feature within the Project (Rail) Area is the Belyando River at the western extent of the Project Area. The Belyando River converges with the Suttor River and the waterway eventually drains into the Burdekin River.

The Teviot Dam is located approximately 30 km northeast of the Project Area. A number of smaller dams used primarily for farm and stock watering are located in close proximity to the Project area.

2.11 Cultural Heritage and Native Title

2.11.1 Aboriginal Cultural Heritage Act 2003

The main purpose of the *Aboriginal Cultural Heritage Act 2003* is to provide effective recognition, protection and conservation of Aboriginal cultural heritage. A person who carries out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal cultural heritage (the 'cultural heritage duty of care') (Section 23 (1)).

The Project affects four native title/Aboriginal party areas:

- ▶ The Project (Mine) and first 17 km of the Project (Rail) are located within the external boundaries of the Wangan and Jagalingou People registered native title claim (QUD85/04, QC04/6)
- ▶ Approximately 145 km of the Project (Rail) is located within the external boundaries of the Jangga People registered native title claim (QUD6230/98, QC98/10)
- ▶ Approximately 17 km of the Project (Rail) is located within the external boundaries of the Barada Barna Kabalbara & Yetimarla People #4 (BBKY #4) former registered native title claim (QUD6023/01, QC01/25)
- ▶ Approximately 3 km of the Project (Rail) is located within the external boundaries of the Barada Barna People registered native title claim (QUD380/08, QC08/11).

During the course of 2011 and 2012, Adani engaged with each of the above groups. During the consultation process, Adani established the following agreements with each party:

- ▶ Wangan and Jagalingou People
 - A Terms of Reference was established in July 2011 for a cultural heritage work program undertaken from July to November 2011
 - A CHMP for the life of the Project was established and approved by the Chief Executive of DERM in November 2011
- ▶ Jangga People:
 - An Early Works Agreement was established in July 2011 for cultural heritage clearances undertaken from July to November 2011



- A CHMP for the life of the Project was established and approved by the Chief Executive of DERM in November 2011
- BBKY #4 People:
 - An Early Works Agreement was established in July 2011 for cultural heritage clearances undertaken from July to November 2011
 - A CHMP for the life of the Project is due to be submitted for approval by the Chief Executive of the Department Aboriginal and Torres Strait Islander and Multicultural Affairs in September 2012
- Barada Barna People:
 - An Early Works Agreement was established in November 2011
 - A CHMP for the life of the Project was executed in November 2011 and is due to be submitted for approval by the Chief Executive of Department Aboriginal and Torres Strait Islander and Multicultural Affairs of in September 2012

Details of CHMPs are confidential to the signatories and are not provided here.

Refer to Volume 1, Section 5 Indigenous and Non-indigenous Cultural Heritage for further information regarding cultural heritage.

2.11.2 Native Title Act 1993

In accordance with Section 3 of the Commonwealth *Native Title Act 1993* the main objects of the Act are:

- To provide for the recognition and protection of native title
- To establish ways in which future dealings affecting native title may proceed and to set standards for those dealings
- To establish a mechanism for determining claims to native title
- To provide for, or permit, the validation of past acts, and intermediate period acts, invalidated because of the existence of native title

According to National Native Title Tribunal (2011), native title is the recognition by Australian law that some Indigenous people have rights and interests in their land that come from their traditional laws and customs. In essence, native title rights give rights to indigenous people to:

- Live on the area
- Access the area for traditional purposes, like camping or to do ceremonies
- Visit and protect important places and sites
- Hunt, fish and gather food or traditional resources like water, wood and ochre
- Teach law and custom on country (National Native Title Tribunal, 2011)

Adani is currently undertaking negotiations with the Native Title claimants. Indigenous Land Use Agreements are currently being negotiated. Native title extinguishment is also being assessed.



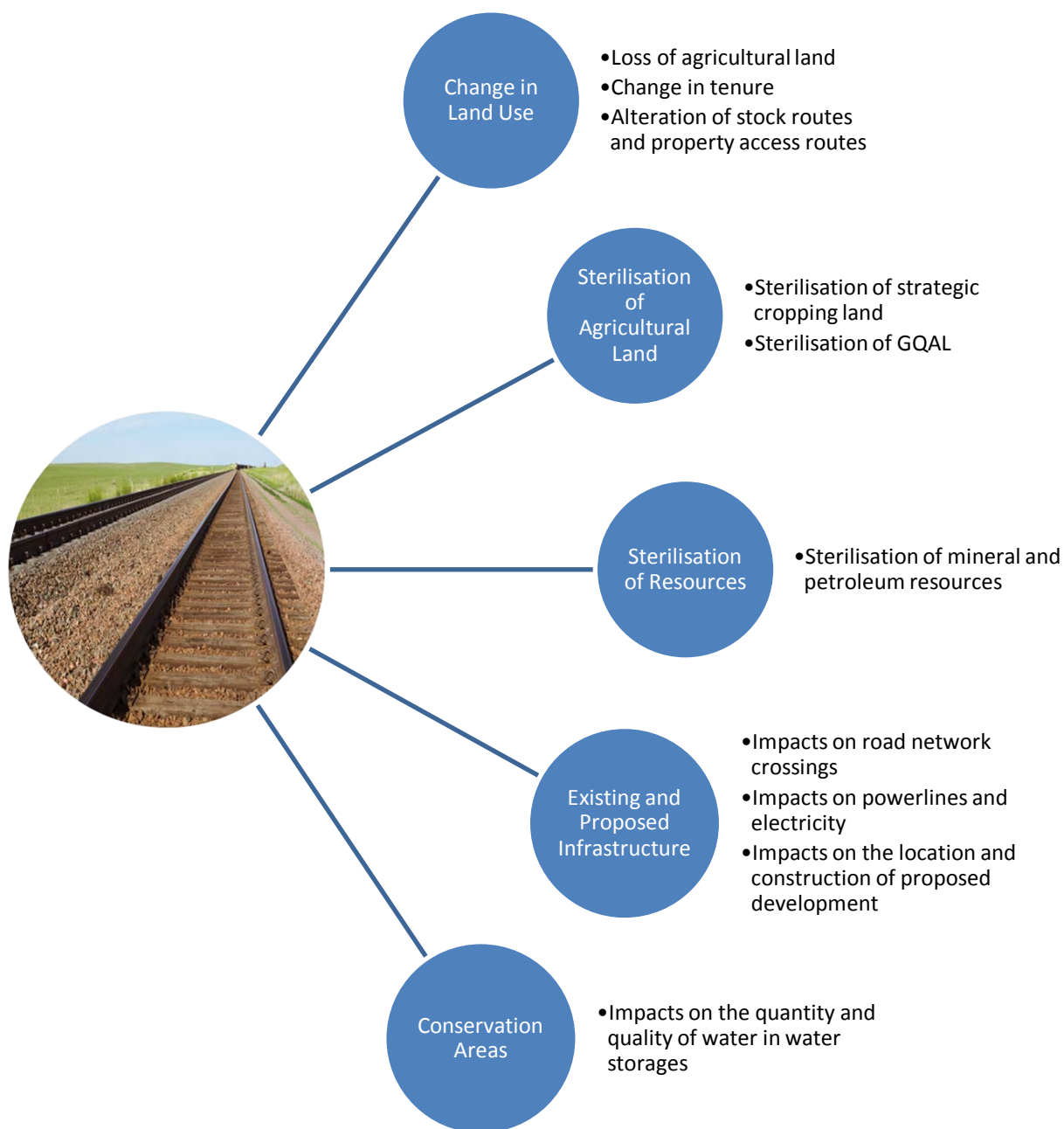
3. Potential Impacts and Mitigation Measures – Construction and Operation Phases

3.1 Introduction

The construction and operation of the Project (Rail) has potential to result in direct permanent changes to the land use and tenure of the Project Area. While other environmental impact studies classify the potential impacts on the basis of the construction and operational phases of the Project (Rail), land use and tenure impacts are generally consistent across both stages. As such this section considers the potential impacts of the Project (Rail) throughout both phases of the Project (Rail).

The potential impacts have been identified based on desktop analysis, Project specific specialist studies, review against regulatory framework, strategies and plans, and consultation with stakeholders as shown in the conceptual overview in Figure 3-1.

Figure 3-1 Conceptual Overview of Potential Environmental Impacts





3.2 Land Use and Tenure

As described in Section 2.4, the Project Area is located within the regional landscape and rural production area land use category under the MIWRP, with the extent of the land through which the Project (Rail) traverses classified as production from relatively natural environment.

The key impacts identified during the land owner consultation process were:

- ▶ A shift from rural/agricultural land use
- ▶ Interference with property access or internal stock movement
- ▶ Interference with drainage and overland flow

3.2.1 Potential Impact – Shift from Rural / Agricultural Land Use

The key potential impact of the Project (Rail) may be a cumulative shift from a rural/agricultural land use to a mining and associated infrastructure related land use. This shift in land use will potentially impact the current operations of properties in terms of paddocks and stock movements.

3.2.2 Potential Impact – Property Access

A number of impacts have been raised during consultation with landholders including severance of access, separation of land tenure, maintenance of private tracks and insufficient separation of homesteads from the impacts of the proposed Project (Rail).

As identified in Table 3-1, there are a number of access tracks both within and between properties which are used to transfer stock to various grazing paddocks and holding yards. The Project (Rail) will cross a number of access routes potentially impacting stock movement on these properties.

Table 3-1 Primary Impacts on Properties within and adjacent to the Project (Rail)

Lot on Plan (east to west)	Property Impacts	Access Impacts
Lot C on GV293	Corridor not on this lot.	Access to this easement is unlikely to be altered.
Lot 6 GV254	This lot comprises the Wotonga to Blair Athol Mine Railway where the Project (Rail) will join this rail line which is part of the Goonyella system.	The additional trains associated with the Mine's production can be accommodated on the existing rail network or on other rail line proposed for development within the Galilee Basin. Any impact will be managed through the scheduling of trains which will be undertaken in consultation with QR National and third party operators.
Lot A RP613854	Corridor not on this lot.	Access to this easement is unlikely to be altered.
Lot 2 GV249	This lot comprises the Wotonga to Blair Athol Mine Railway where the Project (Rail) will join this rail line which is part of the Goonyella system.	The additional trains associated with the Mine's production can be accommodated on the existing rail network or on other rail line proposed for development within the Galilee Basin. Any impact will be managed



Lot on Plan (east to west)	Property Impacts	Access Impacts
		through the scheduling of trains which will be undertaken in consultation with QR National and third party operators.
Lot 12 SP151669	Rail corridor. Small section adjacent to site boundary.	Current access maintained.
Lot 1 RP616897	Rail corridor. Small triangular section in south-west corner severed.	Access to severed section available from adjoining lot to south in similar ownership.
Lot 2 GV248	Rail corridor in close proximity to eastern and northern lot boundary. Elongated section of lot severed.	Nin access tracks affected with all but on proposed to be closed. An at grade passive crossing to be provided. Access to adjoining property to east is closed except for via the one crossing proposed to be retained.
Lot 5305 SP240414	Rail corridor cuts through the southwest corner of the lot (approximately 250 m from corner)	There are no access points to the adjoining lots to the south or west of Lot 5305 SP240414 where the rail line traverses
Lot 61 SP195395	Corridor not on this lot.	Existing access to adjoining lot (Lot 2 DC99) to the west is closed with the exception of two crossings that are to be retained.
Lot 2 DC99	Rail corridor adjoining north eastern and northern boundaries. Small triangular section of lot in the north western corner may be severed. Possibly included into corridor.	There are four access tracks affected with two being retained. The two retained permit access to adjoining properties to the east. There is also a new crossing that will permit access to the adjoining property to the west.
Lot 7 SP233102	Rail corridor adjoining lot's southern boundary.	There were no identifiable crossings to from the lots in the south to Lot 7 SP233102. Access from all other directions will be preserved.
Lot 2 DC184	Corridor not on this lot.	There were no identifiable crossings to the adjoining land to the north (Lot 7 RP890093 and Lot 9 RP891795). A gazetted road reserve crossed from this lot to Lot 9 RP891795. It is intended to retain this via an at grade passive crossing.
Lot 9 RP891795	Rail corridor adjoining lot's southern boundary. Part of a passing loop is also proposed here.	Three access tracks and a gazetted local road reserve present. It is intended to provide access via the gazetted road reserve and the local road only.
Lot 1 DC89	Corridor not on this lot.	No identifiable crossings to the



Lot on Plan (east to west)	Property Impacts	Access Impacts
		adjoining land north. Access to the adjoining Lot 5 DC138 to the north is available via Kilcummin Diamond Downs Road/Eaglefield Road.
Lot 5 DC138	Rail corridor adjoining lot's southern boundary. Passing loop located here. Possible concrete batching plant on this lot.	No access points currently.
Lot 2 DC193	Corridor not within lot.	The corridor runs along the northern boundary of this lot. There are no identifiable crossings to the north. Access is available via the Kilcummin Diamond Downs Road/Eaglefield Road to the adjoining lot to the north.
Lot 8 DC98	Rail corridor adjoining lot's southern boundary.	The trail running adjacent to the southern boundary will be preserved. Access is available via the Kilcummin Diamond Downs Road/Eaglefield Road to the adjoining lot to the south (Lot 6 SP125740)
Lot 5 SP125740	Rail corridor cuts through lot's southern part to cause severance of land.	Existing access between the balance parcels of land is retained. Also, the adjoining gazetted road reserve on the western boundary will be preserved. Location of access track to homestead is unknown.
Lot 6 SP125740	Project (Rail) severs the lot in two.	An access track that links both parts will be retained and further access is available via gazetted local road reserve and DERM track. Access from the property is also available via the Kilcummin Diamond Downs Road that forms the eastern boundary.
Lot 1 SP118814	Rail corridor adjoins the far northern section of the lot.	One crossing is affected by the rail corridor and will be preserved.
Lot 656 SP138788	Corridor not within lot.	Access to the north will be available on the Gregory Developmental Road.
Lot 10 BL49	Project (Rail) cuts through southern portion of the lot causing severance. Two passing loops and construction camp proposed.	Seven access tracks and two roads (Avon Road and Amaroo Road) that provide access to the severed parts of the property. It is proposed to retain three crossings. All severed sections will be connected internally as well as via Amaroo and Avon Roads.
Lot 4 SP116046	Rail corridor adjoining the lot's southern boundary. Possible concrete batching plant located here. Contains a passing loop.	Four access tracks are affected. In addition there is the Gregory Developmental Road and a DERM listed road. It is proposed to retain



Lot on Plan (east to west)	Property Impacts	Access Impacts
		track crossing to the west of the Gregory Developmental Road and the DERM road to the east.
Lot 3235 PH752	Corridor not on this lot with the exception of a small intrusion in the north west corner of the lot in proximity to Mistake Creek and its adjoining stock route.	There may be access points to the adjoining lot to the north (Lot 4 SP116046) that will be closed by the corridor. However, access is available via the Gregory Developmental Road and a DERM listed road. It is intended to retain both formal roadways. Off road access between properties is also retained on the western side of the Gregory Developmental Road by the retention of a crossing. The stock crossing will be retained.
Lot 1 SP147546	This lot is predominantly unaffected with the exception of a small incursion in the far south eastern section of the site adjacent to Mistake Creek and the stock route.	There are no access points to the adjoining lot to the south (Lot 637 PH1980) but the proposed alignment does still offer several opportunities for this access albeit further to the west.
Lot 637 PH1980	Rail corridor cuts through lot's north western third to cause a severance of the land into two parts.	There are 11 inter property access points including those that may also provide access to the lot to the north (Lot 1 SP147546). It is proposed to close all but two crossings. In addition, the gazetted road reserve will be retained as an at-grade crossing.
Lot 3 BL26	Rail corridor cuts through lot's north western third to cause a severance of the land into two parts. Land contains a passing loop.	There are six intra property access tracks and it is proposed to retain one at the far western end of the corridor in close proximity to the Belyando River. A further access point on the boundary that adjoins the northern lot (Lot 637 PH1980) will be closed but access is available at other locations from the severed portion.
Lot 2 SP119925	Corridor not within lot.	Five access tracks affected. All access tracks will be closed. The Moray Bulliwallah Road also provides access to adjoining properties.
Lot 662 PH1491	This lot comprises Moray Downs. Adani has purchased the lease for this property to accommodate the Project (Mine), associated Mine (Offsite) facilities and infrastructure (including a workers accommodation village and airport) and the Project (Rail).	The Moray Carmichael Road is an IRC local road traversing the property. The road will be realigned but access and use of the road through the Mine Site as a public road will be maintained.



3.2.3 Potential Impact – Drainage

The Project (Rail) is likely to impact overland flow paths on properties and as a result, landholders have raised concerns with regard to water ponding and afflux which may impact grazing pastures and constrain access and movement across the property (refer Volume 4, Appendix AB Rail Hydrology).

Graziers currently lose the use of grazing land for the duration of flooding. An increased afflux has the potential to lead to greater areas of lost grazing land being inundated during floods. Inundation may also be present for longer. According to DEEDI (2010), five days full of inundation is sufficient to kill the exotic buffel grass. Buffel grass is a common species of grazing land pasture in the Dry Tropics. The estimated average flood duration only exceeds five days for the Belyando River so incremental loss of buffel grass is unlikely to be of concern.

Infrastructure assets in the floodplain, such as roads and farm tracks, will be adversely affected by the increased depth of flooding. A catalogue of all instances where the railway will cross roads and stock routes is listed in Volume 3, Section 2 Project Description. It is logical to assume that these roads and stock routes could be adversely impacted by higher flood levels, i.e. deeper flooding depths during a flood.

It is considered that afflux resulting from the Project (Rail) will potentially impact the floodplain. Further studies are underway to better determine the potential impacts of the Project (Rail) upon the floodplain, refer to Volume 4 Appendix AB Rail Hydrology for further information.

3.2.4 Mitigation Measures

The management hierarchy to mitigate the potential impacts to land use is:

- ▶ Continue landowner consultation
- ▶ Limit the extent of intrusion of the Project (Rail) into the property, including designing the location of the corridor adjacent to property boundaries
- ▶ Preserve the existing internal property access tracks and intra property access where possible
- ▶ Amalgamate private tracks with local roads
- ▶ Grade separate private tracks where technically and practically feasible
- ▶ Maximise the distance of the rail alignment from homesteads
- ▶ Build occupational crossings to provide access either under or over the Project (Rail) alignment

With regard to potential flood (afflux) impacts the following are proposed:

- ▶ Continued and iterative flood modelling through detailed design will refine afflux values in association with refinement in bridge and culvert crossing design
- ▶ Continue work to catalogue the impacts of afflux on the floodplain, properties, assets and infrastructure
- ▶ Negotiate and agree acceptable levels with affected landowners and asset owners
- ▶ Consideration of compensation to flood affected land and asset owners in relation to excessive afflux.



3.2.5 Summary

The Project (Rail) has the potential to sever portions of properties and restrict access between properties. Placement of the Project (Rail) along cadastral boundaries as far as is possible and the provision of suitable access points along the Project (Rail) will reduce this impact. The Project (Rail) has the potential to impact on surface water flows (hydrology) (increased flood duration and extent). Iterative modelling through detailed design and adoption of appropriate waterway crossing design will reduce this impact.

3.3 Agricultural Land

3.3.1 Potential Impact – Sterilisation of Strategic Cropping Land

The Queensland Government considers that the best cropping land, defined as strategic cropping land, is a finite resource that must be conserved and managed for the longer term. As identified in Section 2.6, the Project (Rail) traverses strategic cropping land within the management area in the western cropping zone. A total of six (6) individual polygons of strategic cropping land will be traversed by the Project (Rail). Approximately 115 ha of strategic cropping land within the western cropping zone will potentially be impacted on by the rail.

3.3.2 Potential Impact – Sterilisation of Good Quality Agricultural Land

GQAL has also been identified as mapped in the Project Area, as described in Section 2.6 of this report. The Project (Rail) will potentially sterilise GQAL within the footprint of the corridor, and fragment land parcels leading to a reduction and loss of access to agricultural land. Available GQAL mapping indicates that in the order of 1,334 ha of mapped GQAL will be sterilised as a result of the Project (Rail).

Class C1 land, or pasture land classed as being suitable only for improved or native pastures due to limitations which preclude continuous cultivation for crop production, comprises 54 per cent of the impacted area.

3.3.3 Mitigation Measures

Potential sterilisation of strategic cropping land

Potential impacts on strategic cropping land have been avoided and minimised through route selection. Where mapped strategic cropping land is unable to be avoided, the route selection process has considered (amongst other environmental, social, cultural, economic and technical constraints), placement of the Project (Rail) such that it traverses around or as close as possible to, the edges of polygons to minimise fragmentation.

As discussed in Volume 4 Appendix Y Rail Soils Assessment, measures to further avoid or minimize potential impacts will include:

- ▶ Develop and undertake soil surveys to determine the actual presence of strategic cropping land prior to construction. This survey will evaluate soils within the western cropping zone and in particular those mapped as strategic cropping land
- ▶ If areas are confirmed as strategic cropping land, undertake a cropping history assessment



- ▶ Limit overall areas of disturbance during construction
- ▶ Reinstatement all temporarily disturbed areas progressively during and after construction. Reinstatement will be as close as possible to pre-construction conditions. Where soils may have been damaged, reinstatement will include appropriate amelioration measures such as fertilizer to restore soils to pre-construction productivity.
- ▶ Rip soils in areas where compaction may have occurred
- ▶ Following soil survey if land is determined to be declared strategic cropping land, mitigation will be required for infrastructure and activities considered to be permanent (ie rail and service road infrastructure). Mitigation may comprise financial contributions to a strategic cropping land mitigation fund or other proposals aimed at benefitting cropping productivity. A Deed of Agreement will be established between Adani and Department of Agricultural, Fisheries and Forestry to facilitate mitigation.

Potential sterilisation of Good Quality Agricultural Land

The objective is to minimise the impact on GQAL. Potential impacts on mapped GQAL have been avoided and minimised through route selection whereby GQAL constraints (amongst others) were considered. The Project (Rail) alignment largely avoids land mapped as being Class A GQAL and attempts to traverse the outer extremes of Class B mapped areas to avoid and minimise fragmentation.

Mitigation and management measures to further avoid or minimize potential impacts on agricultural productivity of soils will include:

- ▶ Continued consultation with directly affected landowners in relation to the limiting effects of fragmentation, for example by providing stock crossings and other crossings as necessary and the provision of compensation
- ▶ Maintain surface drainage patterns through design of culverts and cut/fill areas. Where changes in flows cannot be avoided, consider stabilization of soils to prevent salinisation or other forms of soil degradation.
- ▶ Limit overall areas of disturbance during construction
- ▶ Limit vehicle movements to defined access tracks during construction
- ▶ Strip topsoil from all disturbed areas and set aside for use in reinstatement. Manage topsoil stockpiles to maintain soil fertility and other soil properties
- ▶ Develop and implement an Erosion and Sediment Control Plan (refer Volume 3 Section 13 Environmental Management Plan). Erosion control structures will remain in place until reinstatement is complete.
- ▶ Reinstatement all temporarily disturbed areas progressively during and after construction. Reinstatement will be as close as possible to pre-construction conditions. Where soils may have been damaged, reinstatement will include appropriate amelioration measures such as fertilizer to restore soils to pre-construction productivity.
- ▶ Rip soils in areas where compaction may have occurred
- ▶ Develop and undertake soil surveys to better define the presence and nature of GQAL within the Project (Rail) and develop additional management measures as appropriate.



3.3.4 Summary

It is recognised that the Project (Rail) will potentially sterilise agricultural land within the Project Area. The extent of potential impacts is yet to be determined through a detailed soil survey and strategic cropping land assessment. However, potential impacts will be managed appropriately through Erosion and Sediment Control Plans, an Environmental Management Plan (EMP) and compensation where necessary.

3.4 Key Resources

3.4.1 Potential Impact – Resource Sterilisation

A number of mining tenements have been identified in the vicinity of the Project Area, in particular exploration permits for coal and petroleum. It is considered that linear infrastructure such as the proposed Project (Rail) has the potential to sterilise mineral resources as it restricts the potential of the resource to be mined.

As identified in Section 2.4.3, the Project (Rail) does not traverse any areas holding mining leases or mineral development licences. However, the Project (Rail) does traverse a number of exploration permits for coal and exploration permits for petroleum. A study was commissioned to review historical exploration results within the rail corridor in order to assess the likelihood that any significant deposits exist in the area (refer Volume 4, Appendix Z1 Xenith Rail Easement Study). The report concludes that the potential for substantial economic coal and/or petroleum deposits within the vicinity of the Project (Rail) is low.

3.4.2 Mitigation Measures

The location and extent of mining tenements have been considered when determining the location of the Project (Rail) alignment to reduce the potential of resource sterilisation, this has included:

- ▶ Desktop review of the Queensland Government, Department of Mines and Energy (2011) database
- ▶ Identification of mining tenures including mineral development licenses, EPCs and EPPs that transect the Project (Rail) corridor

Adani will undertake consultation with holders of granted permits to gain their feedback on the proposed Project (Rail) alignment.

Where it is not feasible to realign the Project (Rail) alignment to avoid mining tenures due to environmental, engineering or other constraints, negotiations will be undertaken with key tenure holders to negotiate satisfactory outcomes.

3.4.3 Summary

The location and extent of mining tenements have been considered when determining the location of the Project (Rail) alignment to reduce the potential of resource sterilisation. A management hierarchy has been implemented to undertake consultation with key tenure holders to gain their feedback on the alignment of the rail corridor. Where it is not feasible to realign the Project (Rail), negotiations will be undertaken with key tenure holders to reach mutually satisfactory outcomes.



3.5 Existing Infrastructure

3.5.1 Potential Impact – Road Crossings

As identified in Section 2.8, the key existing infrastructure in the vicinity of the Project (Area) comprises of roads, rail, water and power.

The proposed Project (Rail) will traverse seven public roads, four of which are local roads managed by IRC and one of which (Gregory Developmental Road) is a state-controlled road managed by DTMR (as detailed in Section 2.8.2). The remainder comprise minor roads. It is considered that the activities associated with the construction of the Project (Rail) will generate an increase in vehicle traffic along the key routes, specifically the Gregory Developmental Road and the Kilcummin Diamond Road/Eaglefield Road with the transport of equipment and supplies from both the north (Townsville) and the south (Moranbah, Clermont, Mackay) (refer Volume 4 Appendix AG Rail Transport Report).

An increase of heavy vehicle traffic on local roads will also increase the risk of damage to the existing road infrastructure, as most roads are currently not designed for heavy and wide traffic. Disruption to traffic can be expected during construction as equipment and materials are transported to site, especially along the Gregory Development Road.

There will be a higher number of personnel movements by road during construction as people are transported via bus or four wheel drive vehicle to and from construction camps and construction locations along the proposed Project (Rail) alignment.

3.5.2 Potential Impact – Power Lines and Water Pipelines

As identified in Section 2.8, the nearest electricity line to the proposed Project (Rail) is an existing high voltage electricity line which runs in a north south direction, parallel to the existing Wotonga – Blair Athol Mine Railway line. No electricity or telecommunication easements traverse the proposed Project (Rail) rail line. It is considered that the Project (Rail) will not have any significant impacts on existing power lines or electricity infrastructure. However, to allow for the transport of large loads via roads and to undertake construction activities safely, power lines may need to be raised and/or realigned temporarily.

In regard to existing water infrastructure, the Project (Rail) will have minimal impact. However, construction activities such as bulk earthworks may cause potential to damage underground water infrastructure.

3.5.3 Mitigation Measures

The management hierarchy to mitigate the potential impacts to existing infrastructure is:

- ▶ Provision of suitable crossings
- ▶ Provision of alternate access
- ▶ Compensation

Three different types of treatment options will be applied to road crossing depending upon the traffic volume, available sight distance, train frequency and speed, and crossing vertical geometry. Potential



treatment options have been determined based on DTMR's Manual of Uniform Traffic Control Devices and include:

- ▶ Not preserved
- ▶ At grade passive control
- ▶ At grade active control
- ▶ Grade separation (overpass or underpass)

Preliminary discussions with DTMR and IRC have confirmed the treatments as presented in Table 3-2.

Table 3-2 Roads and Stock Routes that Intersect with the Project (Rail)

ID	Road/Crossing Name	Chainage	Proposed Treatment Type*	Description
1	Unnamed Road	Ch. 41.4	At grade (passive crossing)	Registered road
2	Eaglefield Road / Kilcummin Diamond Downs Road	Ch. 51.2	<ul style="list-style-type: none"> ▶ At grade active crossing ▶ Stock crossing separately by culvert 	IRC local controlled road State Controlled Road (south of the Project (Rail)) Stock route (M399BELY03)
3	Unnamed Road	Ch. 61.3	At grade (passive crossing)	Registered road (adjacent to Diamond Creek)
4	Amaroo Road	Ch. 82.1	<ul style="list-style-type: none"> ▶ Grade separated (rail over road) ▶ Stock route along road 	IRC local controlled road Stock route (U402BELY03)
5	Avon Road	Ch. 88.7	Grade separated (rail over road)	IRC local controlled road
6	Gregory Developmental Road	Ch. 107.4	Grade separated (rail under road)	State controlled road
7	Mistake Creek Crossing	Ch. 120.4	Provide sufficient clearance for stock under the waterway bridge over creek	Stock route (Y401BELY02)
8	Moray Bulliwallah Road	Ch. 151.6	At grade active crossing	IRC local controlled road
9	Moray Carmichael Road	Ch. 173.1	Realigned to run parallel on the southern side of the Project (Rail). No crossing treatment required.	IRC local controlled road

* Subject to negotiations with IRC, DNRM and landholders.



Traffic management issues shall be addressed through the preparation and implementation of a Traffic Management Plan (TMP), to be developed during the detailed design phase. This TMP shall be developed in consultation with the relevant DTMR Regional offices, police and authorities of impacted councils.

The TMP will address key safety and logistical issues that may arise due to:

- ▶ Vehicle crossings at major and minor road intersections
- ▶ Safety risks brought about by increased heavy vehicle traffic
- ▶ Lane closures and the use of single-lane local access roads

Mitigation measures will be identified to address each of these issues. If necessary, a separate site-specific local TMP will be prepared (refer Volume 4 Appendix AG Rail Transport Report).

- ▶ Power lines

Potential impacts of existing power lines in the vicinity of the Project (Area) will be managed through a Construction Management Plan (CMP) (refer Volume 3 Section 13 Draft Environmental Management Plan).

3.5.4 Summary

The Project (Rail) will potentially impact existing infrastructure predominantly through the construction phase of the Project (Rail). However, potential impacts will be managed appropriately through the implementation of a TMP and CMP.

Any potential long term impacts on existing infrastructure such as roads will be managed through maintenance and funding partnerships with local and state government authorities.

3.6 Proposed Infrastructure

3.6.1 Potential Impacts

Additional regional infrastructure is required to support the continued growth of the mining industry in the MIW region. As a result, a number of infrastructure projects are proposed to be developed in the study area such as water pipelines, electricity infrastructure and rail lines. The *Queensland Infrastructure Plan 2011* identifies a number of water pipelines proposed to be constructed in the MIW Region. Of the water pipeline projects identified, only Sunwater's Moranbah to Alpha pipeline was potentially impacted by the proposed Project (Rail).

In July 2012, SunWater announced that it would not proceed with the Connors River Dam and Pipelines Project.

3.6.2 Mitigation Measures

Potential impacts on proposed infrastructure will be managed and mitigated through ongoing discussions with the relevant Proponents of the infrastructure. The design, construction and operation of the Project (Rail) will consider the construction timeframes and operation of the proposed infrastructure to minimise impacts.



A CMP and EMP have been developed for the Project (Rail) to manage impacts and issues that may arise during the construction phase (refer Volume 3 Section 13 Draft Environmental Management Plan).

3.6.3 Summary

Potential impacts on proposed infrastructure are considered to be minimal. However, potential impacts particularly during the construction phase will need to be managed to facilitate that construction and operation of proposed infrastructure is not compromised by the Project (Rail) and vice versa. Potential impacts will be mitigated through coordinated implementation of a CMP, EMP and continued communication with relevant Proponents of infrastructure.

3.7 Stock Route Network

3.7.1 Potential Impact – Stock route crossings

Queensland's stock route network is valued by the community as an important use of public lands, in recognition of its positive contribution to the State's pastoral industry and economy (DERM, 2009a). As identified in Section 2.9, the Project (Rail) will traverse three stock crossings which form part of the State's stock route network: Kilcummin Diamond Downs Road/Eaglefield Road, Amaroo Road, and Mistake Creek.

The Project (Rail) will potentially constrain the movement of stock between pastures which can result in economic and social impacts. Wait times for stock on foot or on trucks due to traffic on the road for the construction or operation of the Project (Rail) could potentially distress the animals and incur delays for landholders trying to transport stock for sale in particular. This can lead to economic impacts including reduced pastoral productivity, higher costs of transportation of stock and potential loss of stock due to drought and access to adequate pastures for feeding. Potential social impacts may include constraints to recreational activities such as horse riding and restricted access to recreation areas such as camping grounds (refer Volume 4 Appendix F Social Impact Assessment Report).

3.7.2 Mitigation Measures

In order to mitigate the potential impacts of the Project (Rail) on stock routes Adani is negotiating appropriate treatment options for stock crossings with IRC, DNRm and landowners.

Preliminary discussions with IRC and DNRm have indicated potential treatment options which may be considered appropriate based on previous cases and similar project impacts.

Stock Route Crossings

The management hierarchy to mitigate the potential impacts on stock routes is prescribed as follows (refer Table 3-2):

- ▶ Kilcummin Diamond Downs Road is a stock crossing (Stock route M399BELY03) and it is proposed that the crossing treatment will comprise a large culvert.
- ▶ Amaroo Road (stock route U402BELY03) is proposed to be grade separated with stock passing under the proposed rail bridge structure (ie rail over road) (to be confirmed through detailed design).



- ▶ Mistake Creek is also a stock crossing (stock route (Y401BELY02). Mistake Creek crossing is proposed to be grade separated with stock passing under the proposed rail bridge structure necessary for crossing the watercourse.

During preliminary discussions, DERM representatives noted that the potential exists for currently disused stock crossings to be reactivated sometime in the future, and within the working life of the rail line. As a result, negotiations may be required to address this issue should the situation present itself in the future (Aarvee, 2011). IRC and DNRM also advised that holding yards would be required on either side of at-grade stock crossings of the railway. These requirements will need to be formalised as part of the detailed design process, and will also need to be agreed as a part of the final respective landowner negotiations.

3.7.3 Summary

The proposed mitigation measures will allow for continued use of stock routes for the transfer of stock. Furthermore, the economic, environmental, cultural and social values of the stock routes will be maintained.

3.8 Conservation Areas

3.8.1 Potential Impact – Nature Refuges

Nature refuges fall within regional ecosystems and provide passages for wildlife seeking to access the river and riparian habitats as part of normal seasonal movements. The Project (Rail) does not transect any nature refuges. The change in land use of the Project (Rail) will not adversely impact the values and existing landscape character of the nature refuges.

3.8.2 Potential Impact – Water Quantity and Water Quality of Water Storages

Permanent water sources, such as farm dams adjacent to the Project (Rail) corridor and watercourses with a more permanent source of water, such as the Belyando River are likely to be sensitive to indirect impacts affecting water quantity and quality due to the change in land use.

With respect to water quantity, the potential impacts to stock watering and farm use, arising from the construction phase, are considered minimal based on the premise that water supply is being investigated from a range of sources including:

- ▶ Creeks and rivers that are located at various points along the alignment
- ▶ Construction of bores
- ▶ Existing storages such as dams that can be deepened to increase capacity and rainfall harvesting
- ▶ The construction of new dams along the corridor
- ▶ Recycled, potable and/or raw water may be available from proximate townships and would be tankered to site
- ▶ Recycled water from construction camps and/or the workers accommodation village at the Mine

With respect to water quality, there are potential impacts to stock watering and farm use associated with the potential for contamination and additional total suspended solids. Good water quality is



essential for successful stock production. Poor quality water is less palatable to animals leading to poor health and impaired fertility which results in loss of livelihood for farmers.

3.8.3 Mitigation Measures

Nature refuges

The Project (Rail) will not directly impact nature refuges.

Water quantity and water quality of water storages

Mitigation measures to address the potential deterioration in water quality including a comprehensive suite of erosion and sediment control measures will be incorporated into the construction phase works through implementation of erosion and sediment control plans and CMPs. Consultation with landowners on the use of farm dams and water storages will be undertaken to determine the use of the storages for stock and irrigation. Where dams are required to be removed to allow for the development of the rail, negotiations will be undertaken with landowners to relocate the storage or provide compensation to minimise impacts on the use of the land for agricultural purposes.

Further details of mitigation measures are provided in Volume 4 Appendix AB Rail Hydrology Report.

3.8.4 Summary

No impacts on nature refuges will arise from the Project (Rail). The potential impacts on water storages will be mitigated where possible and appropriately managed through the CMP and EMP.



4. Conclusion

This report has been prepared to gain an understanding of the existing environment of the Project Area and to determine the potential impacts of the Project (Rail) on the land use and tenure.

The extent of the land through which the Project (Rail) traverses is classified as production from relatively natural environments and is used predominantly for cattle grazing and fattening. The existing infrastructure that services the rural holdings in the vicinity of the Project Area will require upgrading to service future development.

It has been identified through this assessment that the construction and operation of the Project (Rail) has potential to result in direct permanent changes to the land use and tenure. The key impact of the Project (Rail) on the existing land use and tenure will be the cumulative shift of the existing rural/agricultural land within the Project Area to a mining and associated infrastructure related land use. This change in land use is also likely to trigger the following potential impacts:

- ▀ Loss of agricultural land
- ▀ Change in tenure of the land within the Project Area
- ▀ Alteration to stock routes and property access
- ▀ Sterilisation of strategic cropping land and GQAL
- ▀ Impacts on existing road network crossings
- ▀ Impacts on the construction and/or operation of proposed developments such as water pipelines and rail lines
- ▀ Impacts on the quantity and/or quality of water storages used for farming and agricultural purposes

To mitigate the impacts of the proposed Project (Rail) on the existing land use, Adani has undertaken consultation with landholders and other stakeholders (IRC, DNRM and DTMR, amongst others) to determine the most appropriate alignment based on the following parameters:

- ▀ The extent of intrusion of the rail corridor into the property, including the location of the corridor adjacent to property boundaries
- ▀ Preservation of existing internal property access tracks and intra property access where possible
- ▀ Amalgamation of private tracks with local roads
- ▀ Grade separation of private tracks where possible
- ▀ Maximising the distance of the rail alignment from homesteads where possible

The Project (Rail) alignment has been subject to multiple reiterations based on feedback from landholders to run parallel to property boundaries where possible in order to minimise severance of holdings and minimise impacts on property operations. Impacts to individual property holdings will be managed directly with landholders and negotiations will be undertaken to determine mitigation of impacts.

Other potential impacts identified in this report will be mitigated and/or managed through management plans including (but not limited to) the EMP and the Social Impact Management Plan.



Overall, the development of the Project (Rail) is in the public interest as it is strategically important to the region and the State. On this basis, Adani will continue to work with landowners and State and local governments to minimise the potential impacts of the Project (Rail) on the land use and tenure of the existing environment.

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Appendix A

Terms of Reference Cross-reference



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Terms of Reference Requirement/Section Number	Section of this Report
Section 3.2.4 Land use and tenure	
Identify, with the aid of maps:	
<ul style="list-style-type: none"> Land tenure, including reserves and extractive resource areas, tenure of special interest such as protected areas and forest reserves, identification of existing and proposed gas infrastructure, water pipelines, power lines and transport corridors, including local roads, state-controlled roads and rail corridors 	Section 2.4, Figure 2-4, Section 2.8 of this report
<ul style="list-style-type: none"> Zoning and precincts of applicable local government planning schemes, development schemes and regional plans 	Volume 4 Appendix D and Section 2.1 of this report
<ul style="list-style-type: none"> Existing land uses and facilities surrounding the project 	Figure 2-1 and Figure 2-4 of this report
<ul style="list-style-type: none"> Provide land suitability maps of the mapped soil units and an agricultural land class map according to the <i>Planning Guideline: The Identification of Good Quality Agricultural Land</i>¹. Comment on and assess any variation with the GQAL mapping shown in the planning scheme for the former Belyando Shire as required under <i>State Planning Policy 1/92: Development and the Conservation of Agricultural Land</i>². Identify any land shown as strategic cropping land on current trigger maps 	Volume 4 Appendix D, Volume 4 Appendix Y, Section 2.6, Section 2.7 of this report
<ul style="list-style-type: none"> Areas covered by applications for native title claims or native title determinations, providing boundary descriptions of native title representative body/ies. The proponent should also identify whether there are any necessary notifications required to the representative body/ies or evidence that native title does not exist 	Section 2.11 and Figure 2-4 of this report.
<ul style="list-style-type: none"> Include the identification of affected stock routes in consultation with Stock Route Management Unit staff of the Department of Environment and Resource Management (DERM). Consider the impacts of this project on the management and operation of the Stock Route Network. Include potential impacts that are identified during the EIS process as the footprint of the development is finalised. 	Section 2.9 of this report
<ul style="list-style-type: none"> Distance of the project from residential and recreational areas 	Section 2.5 and Figure 2-3 of this report
<ul style="list-style-type: none"> Details should be provided on the location of proposed water pipelines, power lines and transport corridors, including local roads, state-controlled roads and rail corridors within and servicing the mining development that may impact on the Stock Route Network 	Section 2.8, Section 2.9 of this report
<ul style="list-style-type: none"> Declared water storage catchments 	Section 2.10.3 of this report

¹ Department of Primary Industries and Department of Housing, Local Government and Planning, *Planning guidelines: The identification of good quality agricultural land*, 1993.

² Available from: www.dip.qld.gov.au/docs/ipa/spp1_92.pdf

Terms of Reference Requirement/Section Number	Section of this Report
Section 3.2.4 Land use and tenure	
<ul style="list-style-type: none"> Location of the project in relation to environmentally sensitive areas. 	Not applicable to Project (Rail), however refer to Volume 4 Appendix AA
<ul style="list-style-type: none"> Assess the suitability of the soils mapped in the project area for rain fed, broad acre cropping and beef cattle grazing according to the limitations and land suitability classification system in Attachment 2 of the Land Suitability Assessment Techniques in the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland. 	Volume 4 Appendix Y
Assess the impact of the Project (Mine) upon the following:	
<ul style="list-style-type: none"> Detail the potential for the construction and operation of the project to change existing and potential land uses of the project site and adjacent areas. 	Section 3.2 of this report
<ul style="list-style-type: none"> Describe the impacts on surrounding land uses and human activities and strategies for minimisation. 	Section 3.2 of this report
<ul style="list-style-type: none"> GQAL or strategic cropping land with particular reference to any residual impacts on the area, class or productivity of such land 	Section 3.3 of this report
<ul style="list-style-type: none"> Key resource areas (refer to State Planning Policy 2/07: Protection of Extractive Resources and its associated guideline) 	Section 3.4 of this report and Volume 4 Appendix D
<ul style="list-style-type: none"> Residential and industrial uses 	Section 2.5
<ul style="list-style-type: none"> Possible effect on town planning objectives and controls, including local government zoning and strategic plans 	Volume 4 Appendix D
<ul style="list-style-type: none"> Constraints to potential developments 	Section 2.8 of this report
<ul style="list-style-type: none"> Management of the immediate environs of the project including construction buffer zones 	Volume 4 Appendix AA
<ul style="list-style-type: none"> The identification of the potential native title rights and interests likely to be impacted upon by the project and the potential for managing those impacts by an Indigenous land use agreement or other native title compliance outcomes 	Section 2.11 of this report.
<ul style="list-style-type: none"> Mitigation strategies for potential adverse impacts of the project on the state's stock route network in consultation with DERM's Stock Route Management Unit 	Section 3.7 of this report
<ul style="list-style-type: none"> Proposed land use changes in any areas of high conservation value and information on how easement widths and vegetation clearance in sensitive environmental areas will be minimised 	Section 3.8 of this report
<ul style="list-style-type: none"> Potential issues involved in proximity and/or co-location of other current or proposed infrastructure services 	Section 3.5 and Section 3.6
<ul style="list-style-type: none"> Potential impacts on future road upgrades 	Section 3.6 of this report



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Terms of Reference Requirement/Section Number	Section of this Report
Section 3.2.4 Land use and tenure	
► Identification of any land units requiring specific management measures.	Section 3.3 of this report
► Avoid sterilisation of, or impact on, any of the State's coal mineral and petroleum and gas (including coal seam gas) resources and state significant extractive resources arising from the construction of the project or related infrastructure. If impact on or sterilisation of these resources is argues as unavoidable, justification should be provided.	Section 3.4 of this report



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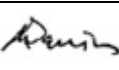

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0	G Vidovic	J Keane	On file	J Scott	On file	20/02/2012
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