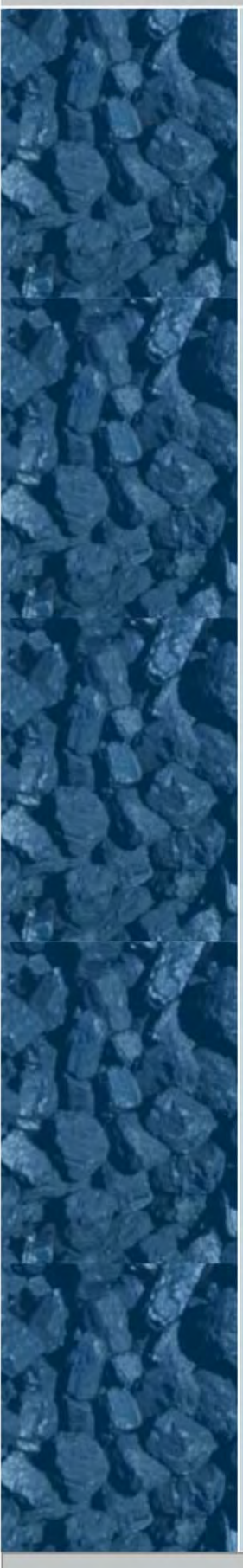
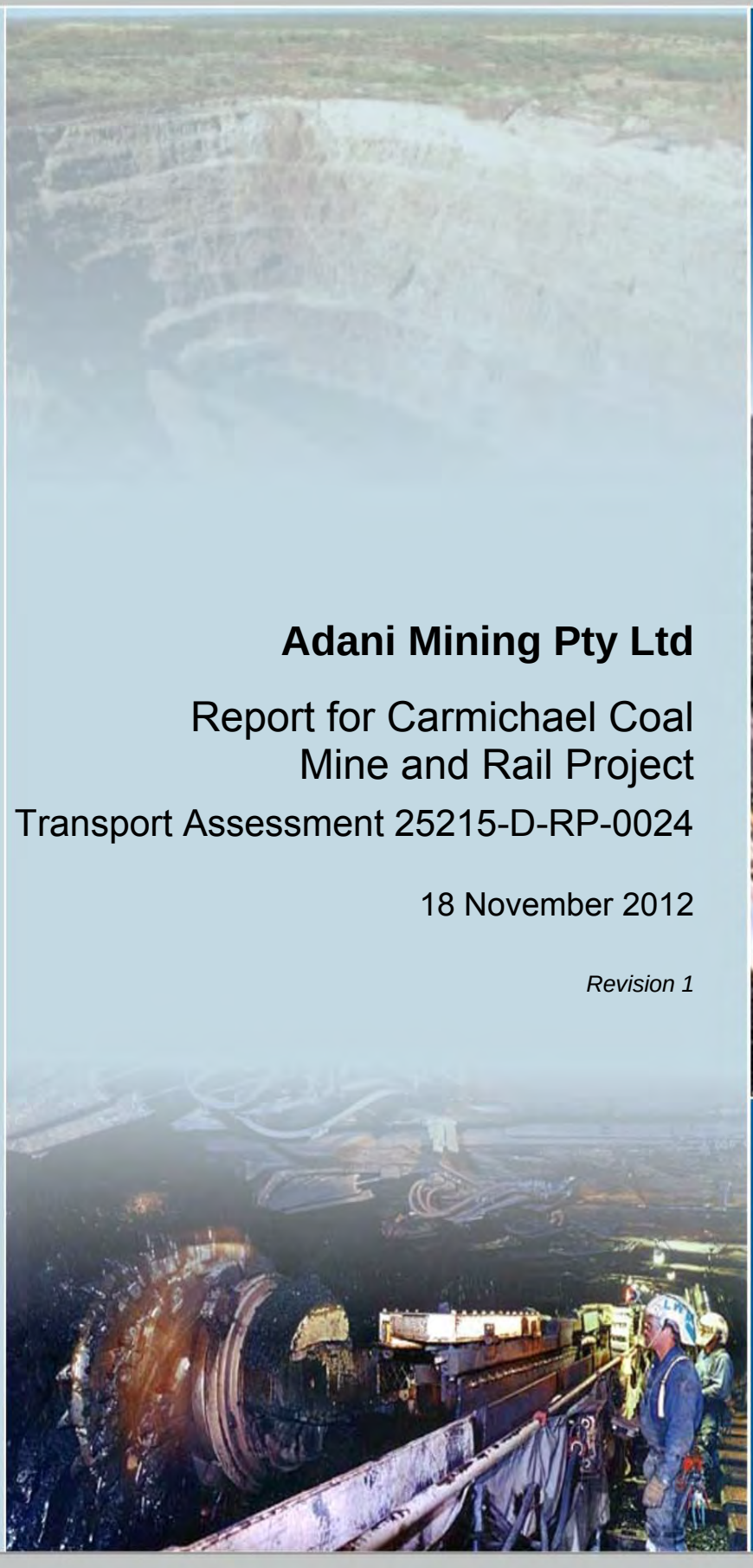
Adani Mining Pty Ltd





Adani Mining Pty Ltd

Report for Carmichael Coal Mine and Rail Project

Transport Assessment 25215-D-RP-0024

18 November 2012

Revision 1

This Carmichael Coal Mine and Rail Project: Mine Transport Assessment ("the Report") has been prepared by GHD Pty Ltd ("GHD") on behalf of and for Adani Mining Pty Ltd ("Adani") in accordance with an agreement between GHD and Adani.

The Report may only be used and relied on by Adani for the purpose of informing environmental assessments and planning approvals for the proposed Carmichael Coal Mine and Rail Project (Purpose) and may not be used by, or relied on by any person other than Adani.

The services undertaken by GHD in connection with preparing the Report were limited to those specifically detailed in Section 2 of the Report.

The Report is based on conditions encountered and information reviewed, including assumptions made by GHD, at the time of preparing the Report. Assumptions made by GHD are listed within Section 2.5 of the Report and contained through the Report.

To the maximum extent permitted by law GHD expressly disclaims responsibility for or liability arising from:

- *any error in, or omission in connection with assumptions, or*
- *reliance on the Report by a third party, or use of this Report other than for the Purpose.*

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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**
AADT	Annual Average Daily Traffic
Adani	Adani Mining Pty Ltd
CMP	Construction Management Plan
DEEDI	Former Department of Employment, Economic Development and Innovation
DIP	Department of Infrastructure and Planning (former)
DIW	Directory of Important Wetlands
DR	District Road
DLGP	Department of Local Government and Planning
DTMR	Department of Transport and Main Roads
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
EPC	Exploration Permit for Coal
EPP	Exploration Permit for Petroleum
GARID	*Guidelines for Assessment of Road Impacts of Development (GARID – April 2006).*
Goonyella system	QR National Goonyella Coal Rail System
GQAL	Good Quality Agricultural Land
IRC	Isaac Regional Council
LGA	Local government area
LOS	Level of Service

MDL	Mineral Development Licence
NH	National Highway
SRN	Stock Route Network
SSR	State Strategic Road
SCR	State Controlled Road
SDPWO Act	*State Development and Public Works Organisation Act 1971*
RR	Regional Road
TI Act	*Transport Infrastructure Act 1994*
TIA	Traffic Impact Assessment
ToR	Terms of reference
TPC Act	*Transport Planning and Coordination Act 1994*
TMP	Transport Management Plan

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 (km) 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 part 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 greenfield rail component connects the Mine to the existing Goonyella and Newlands Rail systems and comprises the following:
  - Rail (west) – a 120 km dual gauge portion from the Mine site running west to east to Diamond Creek ; and
  - Rail (east) – a 69 km narrow gauge portion running east from Diamond Creek connecting to the Goonyella rail system south of Moranbah.

The proposed connection to the existing Goonyella rail system will facilitate the export of coal via the Port of Abbot Point and/or the Port of Hay Point (Dudgeon Point expansion).

The Project has been declared a 'significant project' under the *State Development and Public Works Organisation Act 1971* (SDPWO Act) 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* (EPBC Act).

The Carmichael Coal Mine and Rail Project Environmental Impact Statement (the Project EIS) has been developed with the objective to ensure that all potential environmental, social and economic impacts from the Project are identified, assessed and managed.

Construction of the Project (Mine) is expected to occur over a period of approximately ten years. The volume and intensity of truck movements will vary over the construction period. The highest traffic volume during construction period was identified to occur during the first year of construction and generate 25,000 trips or 68 daily trips on the external road network.

Operation of the Project (Mine) is expected to commence approximately 15 to 18 months after commencement of construction. The volume and intensity of the operation vehicle movements would increases over the operation period, peaking three years after the target output production of the Mine is reached (60 Mtpa). In 2025 the operation of the Mine is expected to generate approximately 52,000 trips on the external road network, which is equal to 142 daily trips.

The peak traffic generation occurs in 2025, which consists of traffic associated with the Mine operations only. The analysis of the road network during this period indicates that the expected

increase in traffic associated with the both the construction and operation of the Mine can be adequately accommodated and does not impact the operating performance of the road network.

However, worst-case estimates predict that traffic generated by the Mine operations will exceed the threshold of a five per cent increase in Annual Average Daily Traffic (AADT) along Flinders Highway and Gregory Developmental Road. Therefore, the assessment shows that the predicted increase in traffic does not meet the *Guidelines for Assessment of Road Impacts of Development* (GARID) criteria and that Adani should have discussions with Department of Transport and Main Roads (DTMR) to establish how this should be managed. However, it should be noted that the assessment is based on the worst case scenario and would not impact on midblock level of service (LOS) Performance of either road, which are expected to operate with LOS A.

The delivery of materials and equipment will be managed in order to minimise impact on the local community. Traffic management issues will be addressed through the preparation and implementation of construction and operation Traffic Management Plans (TMPs), which will be developed during the detailed design phase. The TMPs will be developed in consultation with the relevant DTMR Regional offices, Queensland Police Service (QPS) and local authorities.

The TMPs will address key safety and logistical issues that may arise from the construction and operation of the Mine and will focus on:

- 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 in the TMPs to address each of the above issues. If necessary, separate site-specific (local) TMPs will be prepared.

An important mitigation measure relating to traffic impacts is the implementation of a community information and awareness program. This program will need to be initiated prior to construction commencing and continue throughout the entire construction period and operational period to ensure that local residents are fully aware of the activities. The awareness program will identify communication protocols for community feedback on issues relating to vehicle driver behaviour and construction-related matters.

Other initiatives to be undertaken as part of the TMPs include:

- Consult with the DTMR to identify mitigation measures to address increases in traffic levels of over five per cent on Gregory Developmental Road and Flinders Highway during the Mine construction and operational periods
- Consult with DTMR to ensure that general signposting of access roads are appropriate and provide adequate warning of heavy vehicle and construction activity
- Review signposted and non-signposted speed restrictions along the road network and where necessary, provide additional signposting of speed limitations
- Distribute construction activity warning notices to advise local road users of scheduled construction activities
- Provide advance notice of road/lane closures and advice on alternative routes

- Install appropriate traffic control and warning signs for areas identified to have existing potential safety risks
- Manage the transportation of materials to maximise vehicle loads and minimise vehicle movements
- Whenever practical, promote the use internal and haulage access roads rather than public roads by construction vehicles
- Project induction training for truck and vehicle operators as a requirement in the TMPs.
- Key offsite traffic issues mainly relate to:
  - Use of identified road segments on the road network for access by heavy vehicles for the delivery of plant and material
  - Disruption to traffic due to road/lane closures brought about by construction activities
  - Increase in travel time to existing road users due to road works and increase in heavy vehicle movement.

1. Introduction

1.1 Project Overview

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 (km) 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, 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 has been declared a 'significant project' under the *State Development and Public Works Organisation Act 1971* (SDPWO Act) 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* (EPBC Act).

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).

Figure 1-1 shows the Project location.

1.2 Study Area

The Study Area includes the Mine site and existing road and rail networks expected to be utilised and impacted by the construction and operation of the Project (Mine). The assessment includes roads that are potentially impacted by traffic movements generated by the construction and operation of the Project (Mine). Figure 1-1 shows the location of Carmichael Coal Mine in relation to the urban centres, road network, the existing rail network and ports at Abbot Point and Hay Point.

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)

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

N

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

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

Project Location

Figure: 1-1

G:\41\25215\GIS\Maps\MXD\100_Planning\41-25215_117_rev_l.mxd

Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data Source: © 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

1.3 Proposed Mine Access Arrangements

Transport corridors have been identified for the construction and operation of the mine. The primary routes (state controlled roads) to be utilised during the construction phase for access and support logistics are:

- Flinders Highway
- Peak Downs Highway
- Kilcummin Diamond Downs Road
- Gregory Developmental Road

During operation, the main access roads will be the Peak Downs Highway (from Mackay) and Gregory Developmental Road (via Flinders Highway from Townsville), along with the local road network.

Road access to the mine site will be via approximately 90 km of currently unsealed local roads off the Gregory Developmental Road. Adani has entered into agreements with IRC regarding the long term maintenance and development of the entire length of the Moray Carmichael Road which runs from the intersection of the Gregory Developmental Road westerly through the mine to intersect with the Shuttleworth Carmichael Road. The Moray Carmichael Road will be progressively upgraded to a Class 1 sealed arterial in accordance with the agreement deed with Council.

The current road runs through the mine site and will continue to do so, Adani has committed to maintaining public access to the road through the mine site at all times. The alignment of the road may move from time to time to accommodate mining activity, however it will continue to be open to the public and meet the required engineering standard.

Adani will also work with landholders along the route to realign the road in places to provide a better alignment to accommodate mining traffic. Adani has also entered into an agreement with the Department of Transport and Main Roads (TMR) in the treatment of the intersection of the Moray Carmichael Road and the Gregory Developmental Road which will be upgraded. The opportunity for localised widening in sections on the Gregory Developmental Road is also being discussed with DTMR to both provide rest areas for heavy vehicles transporting materials from Townsville, and to provide pull-off areas for other traffic. Additional and improved signage around intersections and road/rail crossings will also be developed and installed to comply with DTMR requirements.

1.4 Legislative Framework

This traffic and transportation assessment has been undertaken with reference to the DTMRs *'Guidelines for Assessment of Road Impacts of Development'* (GARID) (DTMR 2006), which states that:

"DTMR will not approve development unless any road impacts of the development can be managed to maintain a safe and efficient road system for all road users, as required by in the Transport Infrastructure Act 1994. This approach is supported by the legislative powers of both the Integrated Planning Act 1997 and the State Development and Public Works Organisation Act 1971 which enable DTMR to impose conditions to mitigate the road impacts of proposed developments as part of the development planning process".

1.5 Report Scope

The report provides an assessment of traffic impact during the construction and operational stages of the Project (Mine) and identifies mitigation measures to address identified impacts. It focuses on the traffic implications from haulage of material required by the Project (Mine) along the road network, the transporting of plant equipment and vehicular traffic generated by employees. This report addresses Section 3.9 of the Project ToR, specifically in regard to the Project (Mine) as shown in Table 1-1. A fully detailed cross reference in included in Appendix A.

Table 1-1 Cross Reference with Terms of Reference

Terms of Reference Requirement/Section Number	Section of this report
Section 3.9.1 Provide background to the Project	Section 1.1
Transport assessment report for each project affected mode (Road, rail, air and sea), include baseline data and description of current conditions of the affected network	Section 3.1 to 3.6
A map of the State controlled road network	Figure 1-1
Section 3.9.2 For all phases of project described:	
◗ Expected volumes of project inputs and outputs	Section 4, 5
◗ How project inputs and outputs will be moved	Section 4.2, 5.2.3
◗ Traffic to be generated by workforce	Section 4.2.5, 5.2.4
◗ Likely heavy and oversize loads	Section 6.3, 7.3
Section 3.9.3 Potential Impacts	
◗ Details on adopted methodology	Section 6, 7
◗ Description of input data and assumptions	Section 2.4
◗ Summary of consultation	Section 2.3
◗ Impact on transport operations	Section 2.2
◗ Any other rail projects in the vicinity of subject proposal	Volume 3
◗ Impact of construction on existing road network	Section 3.1.9
◗ Road safety/efficiency and location of rail crossings	Volume 3
◗ Impact on public transport	Section 7.3.4,
Section 3.9.4 Detail infrastructure alterations	
◗ Proposed alterations or new transport-related infrastructure and services	Section 4
◗ Construction of project-related plant and utilities impacting upon the jurisdiction of any transport authority	Section 4
◗ Requirements to upgrade and existing level crossings	Section 4.3.1, 5.2.2
Section 3.9.5 Management and mitigation	
◗ Discuss recommended mitigation and management strategies for identified impacts	Section 6.4.3, 7.3.3

Terms of Reference Requirement/Section Number	Section of this report
◗ Develop transport management plan	Section 6.4.3, 7.3.3

2. Scope and Methodology

2.1 Overview

This section outlines the methodology and evaluation criteria used in the assessment of the Project (Mine).

2.2 Consultation

This study has included and taken into consideration consultation with the following road authorities:

- DTMR
- Isaac Regional Council (IRC)

2.3 Data Sources

The investigation of impacts was undertaken as part of a desktop assessment. The desktop assessment included the collection and review of the following data sets:

- A review of aerial photography and other mapping information
- Existing traffic count data for SCR obtained from DTMR
- Traffic data for local roads in the Study Area provided by IRC
- DTMR crash data for state and local authority controlled roads in the Study Area

2.4 Methodology

This report addresses the project ToR requirements detailed in Table 1-1 using GARID and other network relevant evaluating criteria.

The traffic impact assessment (TIA) has been undertaken with reference to DTMR's *Guidelines for Assessment of Road Impacts of Development* (GARID – April 2006). While not mandatory, the guideline suggests a process and methodology to undertake the TIA. The traffic operation assessment process outlined in the guidelines stipulates that the operating characteristics need to be compared with an agreed performance criteria. The main performance criteria adopted as part of GARID for the assessment of projects of this type are detailed in Table 2-1.

Access routes within the Study Area generally have flat terrain and are two-lane two-way rural roads (one lane per direction), with the exception of the road sections on the state highways that lead into the major urban centres. The AUSTROADS *Guide to Traffic Engineering Practice - Part 2: Roadway Capacity* defines level of service (LOS) as a qualitative measure describing operational conditions within a traffic stream. The term LOS and its characteristics for rural roads are defined in Table 2-2.

Table 2-1 Performance Criteria (GARID) – Assessment

Performance Measure	Criteria Adopted
Level of Service	LoS C can be considered the minimum standard in a rural context, although LoS D may be considered satisfactory where weekend peaks are the defining event and occur on recreational occasions. LoS E should be considered the limit of acceptable rural area operation and remedial works would be needed if LoS F would otherwise result.
Per cent Increase in Daily Traffic on the SCR network	An increase within 5% is generally considered acceptable
Per cent Increase in Pavements Loadings (equivalent standard axles (ESA's))	An increase within 5% is generally considered acceptable

Table 2-2 Level of Service for Rural Roads

LOS	Description	Description
A	Free, unrestricted flow	Satisfactory
B	Mostly free flow, few disruptions	
C	Stable flow	
D	Mostly stable flow, some delays	Consideration of safety implications required
E	Congested flow, delays common	Unsatisfactory
F	Forced flow	

Source: *AUSTROADS Guide to Traffic Engineering Practice Part 2: Roadway Capacity*

The volume and composition of traffic on a given road determines the level of interaction between vehicles and is a performance measure known as a LOS. For a particular roadway capacity the LOS deteriorates with increasing traffic volumes. GARID states that LOS A, LOS B and LOS C in a rural context are all satisfactory. LOS D may also be considered satisfactory where weekend peaks are the defining event and occur on recreational routes.

In cases where traffic, terrain or geometric data may not be precisely known, the AUSTROADS Guide provides planning guidance on maximum AADT values that two-lane, two-way rural roads can accommodate under various terrain conditions.

Table 2-3 shows the performance range values for a two lane two way rural road with level terrain under varying peak hour volume to AADT ratios. For a LOS C, the maximum AADT values range from 5,300 to 7,900 depending on the peak hour design hour volume to AADT ratio. The above

performance value ranges will be used to evaluate network performance deficiencies associated with construction vehicle access to the investigation corridor.

Table 2-3 Performance Criteria for Rural Roads with Level Terrain

Design Hour Volume to AADT Ratio	Level of Service (LoS) and Daily Traffic Flows				
	A	B	C	D	E
0.10	2,400	4,800	7,900	13,500	22,900
0.11	2,200	4,400	7,200	12,200	20,800
0.12	2,000	4,000	6,600	11,200	19,000
0.13	1,900	3,700	6,100	10,400	17,600
0.14	1,700	3,400	5,700	9,600	16,300
0.15	1,600	3,200	5,300	9,000	15,200

Source: *AUSTROADS Guide to Traffic Engineering Practice, Part 2: Roadway Capacity*, Table 3.9, from TRB Highway Capacity Manual (1985) Table 8.10.

2.5 Assumptions and Limitations

The traffic impact assessment for this report has been limited by the following:

- The availability of traffic flow data for roads surrounding the Mine, as traffic data is not available for all local roads within the Study Area. Advice from IRC indicates that the traffic volumes of these roads is minimal and that due to the condition of the roads undertaking traffic surveys is generally not possible.
- The availability of crash data for roads surrounding the Mine, as crash data is not available for all local roads within the Study Area.

3. Description of Existing Situation

3.1 Existing Road Network

The road network surrounding the Mine serves several different functions and these are reviewed in the following subsections.

3.1.1 Existing Road Classification

The classification of roads along the existing road network can be used as an indication of the functional role each road plays with respect to the volume of traffic they should appropriately carry and its ability to accommodate project related traffic. DTMR has jurisdiction over roads of State or regional significance and has four administrative classifications in its hierarchy of roads. These are:

- National Highway (NH)
- State Strategic Road (SSR)
- Regional Road (RR)
- District Road (DR)

For the purposes of this study, all of the above will be referred to as SCRs and will be referred against the evaluation criteria shown in Table 2-3.

The project area encompasses several transport corridors of national, state, regional, district and local significance. These types of roads are either under the management and control of either DTMR (the State road authority) or in the case of local roads, IRC. Table 3-1 provides the classification of each road within the Study Area and identifies the road authority that manages each road.

Table 3-1 State Controlled Roads in the Study Area

Road Name	Road Authority	Classification	HV Designation
Flinders Highway (Charters Towers to Townsville)	DTMR	State Strategic Road	Road Train
Gregory Developmental Road (Charters Towers to Clermont)	DTMR	State Strategic Road	Road Train
Bowen Developmental Road (Bowen-Collinsville)	DTMR	District	Road Train
Bowen Developmental Road (Collinsville – Belyando Crossing)	DTMR	District	Road Train
Suttor Developmental Road (Nebo-Mount Coolon)	DTMR	Regional Road	Road Train
Peak Downs Highway (Clermont – Nebo)	DTMR	State Strategic Road	Road Train
Peak Downs Highway (Nebo – Walkerston)	DTMR	State Strategic Road	Road Train

Road Name	Road Authority	Classification	HV Designation
Peak Downs Highway (Walkerston – Bruce Highway)	DTMR	State Strategic Road	Road Train
Kilcummin Diamond Downs Road	DTMR	District	Road Train
Oxford Downs – Sarina Road	DTMR	District	Road Train
Marlborough – Sarina Road	DTMR	District	
Moray Carmichael Road	IRC	Local Road	
Moray Bulliwallah Road	IRC	Local Road	
Elgin Moray Road	IRC	Local Road	
Golden Downs Avon Road	IRC	Local Road	

Source: Heavy vehicle designation is referenced from *http://www.tmr.qld.gov.au/Business-industry/Heavy-vehicles/Multi-combination-vehicles/Maps/Map-of-south-Queensland/Section-10-maps.aspx*

3.1.2 Description of Existing Road Conditions

Flinders Highway

Flinders Highway road runs in an approximate east-west direction and is approximately 760 km in length. The road connects Townsville to east with Cloncurry in the west. Flinders Highway intersects with Gregory Developmental Road at a priority controlled T-intersection immediately south of the township of Charters Towers.

Flinders Highway has the following general characteristics:

- Sealed pavement in good condition
- Heavy vehicle traffic and functioning as a haulage route
- Two-way two-lane road

Flinders Highway provides connection to the following road links:

- Bruce Highway
- University Road
- Southwood Road
- Woodstock-Giru Road
- Burdekin Falls Dam Road
- Hervey Street
- Dr George Ellis Drive
- Millchester Road
- Bluff Road
- Gregory Developmental Road

Flinders Highway runs through the following townships:

- Charters Towers
- Queenton
- Breddan
- Dotswood
- Reid River
- Calcium
- Woodstock
- Toonpan
- Oak Valley
- Stuart

Gregory Developmental Road

Gregory Developmental Road runs in an approximate north-south direction and is approximately 360 km in length. The road links Charters Towers to the north with Clermont to the south. Gregory Developmental Road intersects with Bowen Developmental Road at a priority controlled T-intersection immediately south-east of Mount Douglas, and ends at a priority controlled T-intersection with Peak Downs Highway north of Clermont.

Gregory Developmental Road has the following general characteristics:

- Sealed pavement in good condition
- Heavy vehicle traffic and functioning as a haulage route

Gregory Developmental Road provides connection to the following road links:

- Flinders Highway
- Rocky Creek Road
- Harvest Home Road
- Bundabaroo Scartwater Road
- Yarrowmere Road
- Bowen Developmental Road
- Elgin Road
- Frankfield Road
- Kilcummin-Diamond Downs Road
- Ken Logan Road
- Peak Downs Highway

Bowen Developmental Road

Bowen Developmental Road is a regional road under the jurisdiction of the DTMR. It intersects with the Bruce Highway at a T-intersection in the township of Bowen and then proceeds in a south western

direction passing Bogie, Mt. Coolon and the town of Collinsville and ends at T-intersection with Gregory Developmental Road.

Bowen Developmental Road has the following general characteristics:

- Sealed pavement in good condition;
- Heavy vehicle traffic and functioning as a haulage route.

The Bowen Developmental Road corridor provides connection to the following road links:

- Rutherford Road
- Strathalbyn Road
- Strathmore Road
- Mt. Wyatt Road
- Power House Road (local)
- Corduroy Creek Road (local)
- Collinsville Elphinstone Road
- Cerito Road
- Ilamatha Road
- Suttor Developmental Road
- Upper Don River Road

Bowen Developmental Road runs through the following townships:

- Bowen
- Mount Coolon
- Collinsville
- Almoola
- Briaba
- Binbee
- Armuna

Suttor Developmental Road

Suttor Developmental Road is a partly sealed road and connects Mount Coolon to the west to Nebo to the east.

Suttor Developmental Road currently carries an average of 50-70 vehicles per day and is therefore considered to be lightly trafficked. It stretches from Mount Coolon at a T-intersection with Bowen Developmental Road to Collinsville Elphinstone Road.

The Suttor Developmental Road route provides connection to the following road links:

- Stratford Road (local)
- Ellensfield Road (local)

- Collinsville Elphinstone Road (state)
- Hail Creek Road (local)
- Kemmis Creek Road (local)
- Turrawilla Road (local)
- Leggets Road (local)

Peak Downs Highway

Peak Downs Highway links Moranbah and Goonyella to Mackay. The Highway alignment travels through undulating terrain for a distance of approximately 265 km with over 1.2 km of its length travel across vertical grades that are steeper than five (5) per cent. Peak Downs Highway has the following general characteristics:

- Sealed pavement in good condition
- Heavy vehicle traffic characteristics indicating that this is currently used as a haulage route.

Peak Downs Highway provides connection to the following road links:

- Annandale Road (local)
- Blue Mountain Road
- Bruce Highway (national highway)
- Eton - Homebush Road
- Fitzroy Developmental Road
- Gregory Developmental Road
- Gregory Highway (state)
- Mackay - Eungella Road
- Marian - Eton Road
- Moranbah Access Road
- North Eaton Road
- Oxford Downs - Sarina Road
- Suttor Developmental Road
- Winchester Road

Traffic travelling along the Peak Downs Highway corridor can access the following townships:

- Eton
- Drapers
- Walkerston
- Alexandra

Kilcummin Diamond Downs Road

Kilcummin-Diamond Downs Road runs in an approximate north-south alignment and is approximately 140km in length. The road forms a priority controlled T-intersection with Suttor Developmental Road to the south-east of Mount Coolon and continues to the south where it intersects with Gregory Developmental Road at a priority controlled T-intersection located to the north of Miclere. Kilcummin-Diamond Downs Road provides connection to the following road links:

- Gregory Developmental Road
- Mount McLaren Road
- Diamond Downs Eaglefield Road
- Suttor Developmental Road

Moray Carmichael Boundary Road

Moray Carmichael Boundary Road is a local road under the jurisdiction of the IRC. The road runs in an approximate east-west alignment and is approximately 115 km in length. The road forms a priority controlled T-intersection with Bulliwallah Road at its eastern end and forms a priority controlled T-intersection with Ulcanbah Road at its western end. Moray Carmichael Boundary Road provides connection to the following road links:

- Ulcanbah Road
- Bulliwallah Road
- Shuttleworth Carmichael Road
- Doongmabulla Road

Elgin Moray Road

Elgin Moray Road is a local road under the jurisdiction of the IRC. The road runs in an approximate north-south alignment. The road intersects Eppin Elgin Road via a priority controlled T-intersection at its southern end and forms a priority controlled T-intersection with Moray Carmichael Boundary Road at its northern end. Moray Carmichael Boundary Road provides connection to the following road links:

- Elgin Road
- Epping Elgin Road
- Moray Carmichael Boundary Road

Golden Downs Avon Road

Golden Downs Avon Road is a local road under the jurisdiction of the IRC. The road runs in an approximate north-south alignment and intersects Kilcummin-Diamond Downs Road via a priority controlled T-intersection at its southern end.

3.1.3 Existing Traffic Volumes on State Controlled Roads

Existing traffic count data was obtained from the DTMR and is presented in Table 3-2. The data is presented in the form of annual average daily traffic (AADT) flows and percentage of traffic comprising of heavy vehicles along state controlled roads. The traffic count data presented in Table 3-2 identifies the highest and lowest daily traffic volumes, which was obtained from recordings at

multiple count sites. The highest daily counts are typically associated with locations in close proximity to either the Bruce Highway and/or an urban centre and lower daily counts are generally situated some distance from other State Roads or urban centres. Based on the trends presented in Table 3-2 it is apparent that State Roads are utilised as existing haulage routes. From the traffic volumes presented in Table 3-2 it is evident that the State Strategic Roads are the routes being utilised as existing haulage routes.

Table 3-2 Existing AADT Volumes on State-Controlled Roads

Road Name	AADT	Percentage HV
Flinders Highway (Charters Towers to Townsville)		
Low	1,032	40.7%
High	4,894	20.2%
Peak Downs Highway (Clermont to Nebo)		
Low	612	20%
High	3,435	13.6%
Peak Downs Highway (Nebo to Walkerston)		
Low	3,893	15%
High	6,006	11%
Peak Downs Highway (Walkerston to Bruce Highway)		
Low	10,051	8%
High	15,990	10%
Suttor Developmental Rd (Nebo to Mt Coolon)		
Low	39	12.8%
High	1,047	21.8%
Bowen Developmental Road (Collinsville to Belyando Crossing)		
Low	32	18.8%
High	915	5%
Gregory Developmental Road (Clermont to Belyando Crossing)		
Low	334	29%
High	412	28%
Kilcummin Diamond Downs Road	52	23%

3.1.4 Existing Road Network – Local Roads

Local roads that may be used to access the Mine are managed and controlled by IRC. These are listed in Table 3-3.

3.1.5 Existing Traffic Volumes on Local Council Roads

IRC provided traffic volume data for some of the local roads impacted by the Project. This data includes the AADT and the percentage of traffic comprising of heavy vehicles and is presented in Table 3-3. It should be noted that no traffic data was available for the following local roads that are impacted by the project:

- Moray Carmichael Boundary Road

- Moray Bulliwallah Road

Based on discussions with the local Council, all of the above roads are understood to carry relatively low traffic volumes.

Table 3-3 Existing AADT Volumes on Local Roads

Road Name	AADT	% HV
Elgin Moray Road	25	40%
Golden Downs Avon Road	40	30%

3.1.6 Roadway Capacity for Two-Lane Two-Way Rural Roads

The road network performance evaluation criteria for roads impacted by the Project (Mine) is shown in Table 2-3. Table 3-4 shows the current performance as a LOS, for each state road impacted by the project. Table 3-4 indicates that all state roads act as haulage routes and operate satisfactorily and have some spare road capacity to accommodate additional traffic.

Peak Downs Highway between Walkerston and the Bruce Highway is currently operating at LOS E in the peak periods. Consideration needs to be given to this LOS during the operational planning.

Table 3-4 Road Network Capacity Assessment of Existing Network

Road Name	AADT	Peak Hour Two way Flow	Two way Flow Capacity	V/C	LOS
Flinders Highway (Charters Towers to Townsville)					
Site 92192	1,032	103	2800	0.04	A
Site 90060	4,894	489	2800	0.17	C
Gregory Developmental Road (Clermont to Belyando Crossing)					
Site 150016	334	33	2800	0.01	A
Site 159538	412	41	2800	0.01	A
Bowen Developmental Road (Bowen –Collinsville)					
Site 90019	758	76	2800	0.03	A
Site 91421	2,985	299	2800	0.11	B
Bowen Developmental Road (Collinsville – Belyando Crossing)					
Site 90069	38	4	2800	0.001	A
Site 91545	754	75	2800	0.03	A

Road Name	AADT	Peak Hour Two way Flow	Two way Flow Capacity	V/C	LOS
Suttor Developmental Road (Nebo-Mount Coolon)					
Site 82801	38	4	2800	0.001	A
Site 82701	876	88	2800	0.03	A
Peak Downs Highway (Clermont–Nebo)					
Site 150013	612	6	2800	0.001	A
Site 80193	3,435	344	2800	0.12	B
Peak Downs Highway (Nebo-Walkerston)					
Site 80009	3,893	389	2800	0.14	A
Site 80020	6,006	601	2800	0.21	C
Peak Downs Highway (Walkerston to Bruce Highway)					
Site 82777	10,051	1,005	2800	0.36	D
Site 82778	15,990	1,599	2800	0.57	E
Kilcummin Diamond Downs Road					
Site 159539	52	5	2800	0.001	A

3.1.7 Crash History

The following section summarises historical crash data obtained from the DTMR for roads impacted by the proposal. It should be noted that data across the road network is limited and as a result crash data was only assessed for the following roads:

- Flinders Highway
- Gregory Developmental Road
- Bowen Developmental Road
- Suttor Developmental Road
- Peak Downs Highway
- Marlborough – Sarina Road
- Bruce Highway (Sarina to Mackay)

Flinders Highway

The review of crash data was undertaken for a 5 year period from 2005 to 2009 for the section of Flinders Highway situated between Queenton and Wulguru which is approximately 126 km in length. A summary of the crash data is presented at Table 3-5.

Table 3-5 Crash History – Flinders Highway (2005-2009)

Year	Non-Injury	Injury	Fatal	Total
2005	9	7	2	18
2006	5	16	2	23
2007	5	16	0	21
2008	6	11	0	17
2009	8	10	2	20
Total	33	60	6	99

The crash data reveals:

- In total 99 crashes occurred along the surveyed section of Flinders Highway (126 km in length) over a five (5) year period, which is an average of 0.05 per day or 19.8 per year.
- Six per cent of crashes included a fatality, 61 per cent of the crashes resulted in an injury and 33 per cent in a non-casualty.
- 65 per cent were single vehicle crashes, 29 per cent were multi-vehicle crashes, and 20 per cent of crashes occurred at intersections.
- 71 per cent occurred on a weekday, and fatigue was recorded as a contributing factor in 19 per cent of all crashes.
- 94 per cent occurred in dry clear conditions and 59 per cent in daylight.

Gregory Developmental Road

The review of crash data undertaken for a five year period from 2005 to 2009 for the section of Gregory Developmental Road situated between Peak Downs Highway and Flinders Highway, approximately 370 km in length. A summary of the crash data is presented at Table 3-6.

Table 3-6 Crash History – Gregory Developmental Road (2005-2009)

Year	Non-Injury	Injury	Fatal	Total
2005	6	6	0	12
2006	3	5	0	8
2007	2	7	1	10
2008	8	8	2	18
2009	7	10	0	17
Total	26	36	3	65

The crash data reveals:

- In total 65 crashes occurred along the surveyed section of Gregory Developmental Road (approximately 370 km in length) over a five year period, which is an average of 0.04 per day or 13 per year.
- Five per cent of crashes included a fatality, 55 per cent of the crashes resulted in an injury and 40 per cent in a non-casualty.
- 83 per cent were single vehicle crashes, and 11 per cent were multi-vehicle crashes.
- 48 per cent of crashes hit an object or animal, and fatigue was recorded as a contributing factor in 26 per cent of the crashes.
- 74 per cent occurred on a weekday and only five per cent of crashes occurred at intersections.
- 91 per cent occurred in dry clear conditions and 80 per cent in daylight.

Bowen Developmental Road

The review of crash data was undertaken for a five year period from 2005 to 2009 for the section of Bowen Developmental Road situated between Gregory Developmental Road and Bruce Highway, approximately 260 km in length. A summary of the crash data is presented at Table 3-7.

Table 3-7 Crash History – Bowen Developmental Road (2005-2009)

Year	Non-Injury	Injury	Fatal	Total
2005	2	10	0	12
2006	0	10	2	12
2007	2	6	0	8
2008	5	7	0	12
2009	4	15	1	20
Total	13	48	3	64

The crash data reveals:

- In total 64 crashes occurred along the surveyed section of Bowen Developmental Road (approximately 260 km in length) over a five year period, which is an average of 0.04 per day or 13 per year.
- Five per cent of crashes included a fatality, 75 per cent of the crashes resulted in an injury and 20 per cent in a non-casualty.
- 72 per cent were single vehicle crashes, and 22 per cent were multi-vehicle crashes.
- 45 per cent of crashes hit an object or animal, and fatigue was recorded as a contributing factor in 27 per cent of the crashes.
- 69 per cent occurred on a weekday and 11 per cent of crashes occurred at intersections.
- 91 per cent occurred in dry clear conditions and 61 per cent in daylight.

Suttor Developmental Road

A review of crash data was undertaken for a five year period from 2005 to 2009 for the section of Suttor Developmental Road situated between Bowen Developmental Road and Peak Downs Highway, approximately 160 km in length. A summary of the crash data is presented at Table 3-8.

Table 3-8 Crash History – Suttor Developmental Road (2005-2009)

Year	Non-Injury	Injury	Fatal	Total
2005	0	5	0	5
2006	3	2	0	5
2007	1	4	0	5
2008	1	4	0	5
2009	0	1	0	1
Total	5	16	0	21

The crash data reveals:

- In total, 21 crashes occurred along the surveyed section of Suttor Developmental Road (approximately 160 km in length) over a five year period, which is an average of 0.01 per day or 4.2 per year.
- 76 per cent of the crashes resulted in an injury and 24 per cent in a non-casualty.
- 76 per cent were single vehicle crashes, and 19 per cent were multi-vehicle crashes.
- 48 per cent of crashes hit an object or animal, and fatigue was recorded as a contributing factor in 29 per cent of the crashes.
- 71 per cent occurred on a weekday and 19 per cent of crashes occurred at intersections.
- 100 per cent occurred in dry clear conditions and 71 per cent in daylight.

Peak Downs Highway

A review of crash data undertaken for a five year period from 2005 to 2009 for the section of Peak Downs Highway situated between Gregory Developmental Road and Bruce Highway, approximately 270 km in length. A summary of the crash data is presented at Table 3-9.

Table 3-9 Crash History – Peak Downs Highway (2005-2009)

Year	Non-Injury	Injury	Fatal	Total
2005	27	34	2	63
2006	22	32	3	57
2007	24	25	2	51
2008	28	40	2	70

Year	Non-Injury	Injury	Fatal	Total
2009	23	37	4	64
Total	124	168	13	305

The crash data reveals:

- In total 305 crashes occurred along the surveyed section of Peak Downs Highway between Clermont and Mackay (approximately 270 km in length) over a five year period, which is an average of 0.17 per day or 61 per year.
- Four per cent of the crashes resulted in a fatality, and 55 per cent of the crashes resulted in an injury and 41 per cent in a non-casualty.
- 50 per cent were single vehicle crashes and 44 per cent were multi-vehicle crashes, and two per cent involved pedestrians.
- 78 per cent occurred on a weekday, 84 per cent occurred in dry clear conditions and 66 per cent in daylight.
- Fatigue was a contributing factor in 21 per cent of the crashes.

Bruce Highway (Sarina to Mackay)

A review of crash data was undertaken for a five year period from 2005 to 2009 for the section of Bruce Highway situated between Sarina and Mackay, approximately 35 km length. A summary of the crash data is presented at Table 3-10.

Table 3-10 Crash History – Bruce Highway – Sarina to Mackay (2005-2009)

Year	Non-Injury	Injury	Fatal	Total
2005	39	38	3	80
2006	27	39	0	66
2007	35	41	0	76
2008	24	47	2	73
2009	35	41	0	76
Total	160	206	5	371

The crash data reveals:

- In total, 371 crashes occurred along the surveyed section of Bruce Highway between Sarina to Mackay (approximately 35 km length) over a five year period, which is an average of 0.20 per day or 74 per year.
- One per cent of the crashes resulted in a fatality, and 56 per cent of the crashes resulted in an injury and 43 per cent in a non-casualty.
- 71 per cent were multi-vehicle crashes and 25 per cent were single vehicle, and two per cent involved pedestrians.

- 76 per cent occurred on a weekday, and 85 per cent occurred in dry clear conditions and 70 per cent in daylight.

Summary of Crash History

The key trends identified from the review of road corridor impacted by the proposal are:

- Most roads are over 30 km in length, are high speed travel environments and have at least one recorded fatality.
- Single vehicle crashes are a significant contributing crash trend along with crashes involving animals and fatigue.

3.1.8 Urban Areas

Table 3-11 provides a summary of townships located along the potential haulage routes, which may be impacted during the construction of the Project (Mine). Most of the haulage routes avoid key regional centres, and routes to the port are planned to utilise designated heavy vehicles heavy vehicle routes to minimise impact on towns.

Table 3-11 Townships Potentially Impacted During Construction

Township Name	Township Type	Population Size
Townsville	Regional Centre	145,000
Charters Towers	Local Centre	8,000
Bowen	Local Centre	15,000
Collinsville	Local Centre	2,000
Mount Coolon	Local Centre	200
Mackay	Regional Centre	85,000
Sarina	Local Centre	3,500
Nebo	Local Centre	7,000
Moranbah	Local Centre	7,000
Clermont	Local Centre	2,000

3.1.9 Asset Condition

IRC have identified that a number of the roads in the vicinity of the Mine are currently unsealed. This poses potential issues for construction traffic, as the condition of unsealed roads would be expected to rapidly deteriorate under heavy and repetitive loadings if the roads became wet through rain or any other means.

Roads, which are currently unsealed and need to be further considered for accessing for the Mine are:

- Moray Bulliwallah Road

- Elgin Moray Road
- Moray Carmichael Road (Doongmabulla Rd)

In the majority of cases, the condition of unsealed roads is average, flood prone and may support some level of construction traffic.

3.2 Existing Rail Network

3.2.1 Overview

The Project (Rail) will provide a connection between the Mine and the existing Goonyella rail system. The planned junction with the existing Goonyella rail system is anticipated to be located approximately 8 km south of Moranbah. Coal from the Mine will be transported to ports at Hay Point (Dudgeon Point expansion) and Abbot Point. Figure 3-1 shows the following:

- Existing rail network
- Location of the proposed rail line connection to the Goonyella rail system
- The connection between the existing Goonyella and Newland rail systems

3.2.2 Goonyella Rail System

The Goonyella rail system is owned and operated by QR National and comprises of approximately 925 km of narrow gauge rail line servicing 30 coal mines in the Bowen Basin. The Goonyella rail system is fully electrified, with the overhead line equipment operating at 25,000 volts, 50 Hertz alternating supply, and the predominant train type is three electric locomotives hauling 120 wagons. The track is a bi-directional duplicated track between Dalrymple Junction, near Hay Point and Wotonga, near Moranbah, with the remainder being single line.

QR National has a current program of capacity upgrades which will initially increase capacity from the current 129 Mtpa to 140 Mtpa for export via the Port of Hay Point (and the proposed Dudgeon Point expansion).

The Goonyella Abbot Point Expansion (GAPE) project, completed in December 2011, provides a link from the existing Goonyella rail system to the Newlands rail system, therefore enabling export of coal from the northern Bowen Basin through the Port of Abbot Point. The completion of the GAPE project sees the capacity of Abbot Point Coal Terminal 1 increase to 50 Mtpa.

3.2.3 Newlands Rail System

The Newlands rail system is owned and operated by QR National and comprises of approximately 190 km of narrow gauge single track rail line. The Newlands rail system is capable of operating with diesel trains, which predominantly consist of three diesel locomotives hauling 82 wagons.

It services three coal mines in the northern Bowen Basin and is currently contracted to export 17 Mtpa. QR National is developing master plans for the expansion of the Newlands Rail Line to accommodate rail movement transporting 120 Mtpa of coal.

LEGEND

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

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

N

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Job Number	41-25215
Revision	F
Date	16-10-2012

Project Area Ports and Airports

Figure: 3-1

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Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

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.

3.3 Existing Port Facilities

3.3.1 Overview

- 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 3-2):
- 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
- Abbot Point – dedicated coal export facility with planned general cargo handling facility
- Bowen – limited facilities and not current 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

3.3.2 Cargo Ports

Townsville

The Port of Townsville is located within Townsville and operated by Port of Townsville Limited (POTL). The port comprises nine berths catering for the import and export of a number of commodities, including:

- Fuel, oil, and LP gas
- Minerals, nickel ore, lead ingots, copper, zinc concentrates
- Containers
- Frozen beef, live cattle
- Cement
- Sugar, molasses
- Sulphuric acid, fertiliser
- scrap metal, timber, general cargo; and
- Cruise ships
- Commodities are supplied to the port via both rail and road. Townsville provides facilities suitable for the import of construction materials, components and pre-assembled modules for construction of the Project (Mine). POTL are currently investigating the Port Expansion Project which will include development of six new berths and reclamation of approximately 100 ha.

LEGEND

- Homestead
- Town
- Major Port
- State Road
- Local Road
- Existing/Other Rail Network
- Rail (West)
- Rail (East)
- Project (Mine)
- Mine (Offsite)
- Airport International
- Airport Regional
- Local Temporary Airstrips

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

N

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Job Number 41-25215
Revision B
Date 16-10-2012

Project Area Ports and Airports

Figure: 3-2

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Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data Source: GHD: Ports (2010); 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.

Mackay

The Port of Mackay is located within Mackay harbour and is Queensland's fourth busiest multi-commodity port in terms of cargo throughput. The port is operated by North Queensland Bulk Ports Corporation Limited (NQBP). The port comprises four berths catering for the import and export of a number of commodities, including:

- Sugar and sugar products, molasses
- Grain
- Sulphuric acid, fertilisers
- Petroleum, ethanol; and
- Vehicles, machinery

Cargo is supplied to Mackay by rail and road. Mackay provides facilities suitable for the import of construction materials, components and pre-assembled modules for construction of the Project (Mine).

3.3.3 Coal Export Ports

Port of Hay Point and Associated Coal Export Terminals

The Port of Hay Point is located approximately 40 km south of Mackay and is operated by North Queensland Bulk Ports Corporation Limited (NQBP). The port is one of the largest coal terminals in the world. The port comprises two separate coal export terminals, Dalrymple Bay Coal Terminal (DBCT), leased from the State government by DBCT Management Pty Ltd, and the Hay Point Coal Terminal (HPCT), owned and operated by BHP Billiton Mitsubishi Alliance (BMA). Each terminal comprises onshore coal handling facilities and offshore trestle and ship-loading facilities.

Each terminal comprises rail in-loading facilities, onshore coal handling and stockpile areas, and offshore wharves. The offshore wharves are serviced by conveyor systems, supported jetties to deliver coal to the offshore facilities. The DBCT wharf is 3.8 km offshore and includes three ship-loaders and HPCT is 1.8 km offshore with two ship-loaders.

In 2011-12, total throughput for the port was approximately 83 Mt, of which 32 Mt was through HPCT and 51 Mt through DBCT, which was supplied by the Goonyella rail system.

NQBP is currently undertaking environmental and engineering studies for the development of the Dudgeon Point expansion at the port. The expansion comprises two new terminals providing an expected 150 to 180 Mtpa additional capacity to the port. Adani Mining Pty Ltd 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.

Port of Abbot Point and Associated Coal Export Terminals

The Port of Abbot Point, is operated by North Queensland Bulk Ports Corporation Limited (NQBP). 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 terminals, Abbot Point Coal Terminal 1 (T1) which is leased (under long-term 99 year lease) by Adani Abbot Point Terminal Pty Ltd, a subsidiary of the Adani Group and operated by Abbot Point Bulk Coal Pty Ltd.

- T1 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.
- Adani is proposing to develop a second terminal, Terminal 0, which will provide an additional rail in-loading facility, coal handling and stockpile areas, and a second trestle jetty and conveyors connected to two additional berths and ship-loaders. This will to be located east of the existing terminal and have a capacity of 35 Mtpa.
- Two other terminals, Terminal 2 and Terminal 3, are also currently proposed for development in 2013-2014, each having a nominal capacity of 60 Mtpa.

3.4 Existing Airport Facilities

There is one international airport, two domestic airports, one regional airport and numerous additional local airstrips in the vicinity of the Study Area. The majority of the workforce will fly directly to the site based airport from domestic Australian airports. Domestic and regional airports and local airstrips that could potentially serve construction and operational workers as part of FIFO employment contracts are as follows (see also Table 3-12). There is also the possibility that staff will be flown in from other domestic airports such as Cairns, Brisbane, Sunshine Coast and Gold Coast depending upon where the workforce is finally recruited and domiciled.

- Townsville (International)

  Townsville International Airport is the largest and only international airport in the Central Queensland region, providing connections from capital cities with direct flights servicing Brisbane, Melbourne and Sydney to outlying Central and North Queensland. The airport is situated approximately 5 km to the north of Townsville City Centre. The airport has two runways, of which the longest is 2,438 m long. Townsville International Airport has four aerobridges (one international and three domestic) for aircraft up to the size of Boeing 767; and three ground level tarmac departure / arrival gates for regional flights at the Northern end of the terminal. Passenger airlines operating from Townsville International Airport include Qantas, Virgin Australia, Jetstar, Skytrans and American Airlines. A number of mining charter flights also currently operate from Townsville Airport to Cannington Mine, Century Mine, Phosphate Hill Mine, Mount Isa, Osbourne Mine, Mount Dore, Selwyn Mine and Emerald. The airlines, which provide these chartered flights, include Alliance Airlines and Brindabella Airlines.

- Mackay (Domestic)

  Mackay Airport operates flights to Brisbane, Sydney, Melbourne, Gladstone, Rockhampton, Townsville and Cairns. Airlines operating from Mackay Airport include Jetstar, Pel-Air (cargo), QantasLink, Sunstate Airlines, Tiger Airways and Virgin Australia. Mackay Airport has two asphalt surfaced runways, of which the longest is 1,981 m long, which places a limitation on the type of aircraft it can handle.

- Proserpine (Domestic)

  Proserpine Airport is located approximately 10 km south of Proserpine and has two runways, of which the longest is 2,073 m long. Jetstar Airways and Virgin Australia currently operate daily flights between Proserpine and Brisbane.

- Emerald (Regional)

  Emerald Airport is located approximately 6 km from the town of Emerald and has two runways, of which the longest is 1,900 m long. Australian Air Express, QantasLink, Sunstate Airlines and Virgin Australia currently operate flights between Emerald and Brisbane.

- Moranbah

  Moranbah Airport is located off Goonyella Road, approximately 6 km south of Moranbah. The airport has one runway which is 1,524 m long. Works at the airport (completed mid-2011) included resurfacing the airport runway, improving safety and enabling the airport to be used by larger capacity Q400 aircraft.

  The airlines currently operating from Moranbah Airport include QantasLink, Sunstate Airlines and Skytrans, with flights operating between Moranbah and Brisbane, Cairns, Townsville and Sunshine Coast.

- Clermont

  Clermont Airport has two runways, of which the longest is 1,311 m long. This is a local airport operated by Isaac Regional Council.

- Bowen

  Bowen Airport has two runways, of which the longest is 1,341 m long. This is a local airport operated by Whitsunday Regional Council.

- Collinsville

  Collinsville Airport has one runway, which is 1,402 m long. This is a local airport operated by Whitsunday Regional Council.

Table 3-12 Existing Airport Facilities

Runway No.	Length	Width	Surface	Lighting
Townsville				
1	1,100 m	30 m	Asphalt	Yes
2	2,438 m	45 m	Asphalt	Yes
Mackay				
1	1,344 m	30 m	Asphalt	Yes
2	1,981 m	45 m	Asphalt	Yes
Proserpine				
1	1,100 m	30 m	Asphalt (unmarked)	Yes
2	2,073 m	45 m	Asphalt	Yes
Emerald				
1	926 m	18 m	Gravel	Yes

Runway No.	Length	Width	Surface	Lighting
2	1,900 m	30 m	Asphalt	Yes
Moranbah				
1	1,524 m	30 m	Asphalt	Yes
Clermont				
1	1,068 m	30 m	Gravel	No
2	1,311 m	30 m	Asphalt	Yes
Bowen				
1	1,003 m	-	Grass	No
2	1,341 m	-	Grass	No
Collinsville				
1	1,402 m	-	Gravel	No

3.5 School and Public Transport Services

Local school buses operate in the area servicing the schools of Moranbah and Clermont, these buses generally operate on local roads and the Peak Downs Highway.

3.6 Summary of Key Findings

The assessment of the existing traffic and transport conditions in the vicinity of the Mine has identified:

- The majority of the state roads could potentially be utilised as haulage routes to the site and have available capacity to accommodate additional traffic.
- 2005 to 2009 crash data obtained from DTMR highlights the potential haulage route between the site and Townsville via Flinders Highway and Gregory Developmental Road as a lower crash rate to the other haulage route alternatives.
- Flinders Highway, Gregory Developmental Road and Peak Downs Highway are designated Road Train routes and the Bruce Highway is a designated B-Double route.
- Peak Downs Highway has a LOS D and E during peak periods at its eastern end.
- Moranbah and Clermont airports are capable of accommodating regional air services.
- The majority of ports assessed have the capabilities to accommodate construction material imports.

4. Proposed Construction Arrangement

4.1 Overview

This section of the report provides details of the planned construction arrangement and activities associated with the staged delivery of the Mine.

4.2 Construction Activities

The Carmichael Macro-conceptual Mining Study (Runge 2011), has been reviewed in order to obtain an understanding of the planned construction of the Mine and its associated infrastructure.

This study analyses the potential construction vehicle movements from the start-up of proposed coal Mine, until the three years after the full rate of coal production is expected to be first achieved at the Mine, a period of approximately ten years.

The logistics plan for the project indicates that traffic volumes generated by the construction of the Mine will vary and will depend on the construction timetable. The logistics plan for construction of the Mine has been categorised as follows:

- **Coal Handling Processinf Plant (CHPP)** – Items associated with the CHPP including plant equipment, steel structures and buildings in the vicinity
- **Major Underground Face and Mobile Equipment (North and Central Mine Only)** – This accounts for the major items underground including the items associated with the longwall units and continuous miners.
- **Electrical Infrastructure** – General electrical infrastructure required for the operations including substations, HV cables and lighting
- **North Underground Mine Facility** – Mine facilities in relation to the northern underground section of the Mine
- **Central Underground Mine Facility -** Mine facilities in relation to the central underground section of the Mine
- **South Underground Mine Facility (N/A) -** Mine facilities for the section of the Mine south of the Carmichael River. This section is not applicable to the timeframe of this study
- **Underground Coal Stockpile Areas** – Stockpile areas and associated equipment for the coal from the underground operations
- **Reclaim Stations –** This includes transfer stations, reclaim stations and train load out equipment for the underground and open cut operations
- **Open Cut Stockpile Areas –** Areas designated for the stockpiling of open cut product
- **North Open Cut Mine Facilities –** Open cut facilities situated in the northern section of the coal Mine
- **Central Open Cut Mine Facilities –** Open cut facilities situated in the central section of the coal Mine

- **South Open Cut Mine Facilities (N/A)** – Mine facilities for the section of the open cut area of the Mine south of the Carmichael River. This section is not applicable to the timeframe of this study
- **Overland Conveyors** – Conveyors for the general transfer of materials across the site to various locations
- **Airfield** – Airfield for fly-in, fly-out arrangements
- **Workers Accommodation Village** – Accommodation village for construction and operations workforce.

Refer to Table 4-3 for a further understanding of construction stage relationships with truck movements.

4.2.1 Construction Hours

Currently a panel, seven-day roster system is proposed for the construction phase of the Mine. It has been assumed the haulage of materials and plant would operate seven days a week, although this would not be continuous throughout the construction period. Material deliveries would most likely come from Townsville or Mackay and there may also be some night-time haulage to the site.

4.2.2 Construction Traffic (Vehicles and Equipment)

A range of vehicles and plant would be used during the construction of the Mine. Heavy vehicles that are required to transport plant and material to the site include three, five- and seven-axle trucks, flatbed semitrailers, extendable trailers and B doubles.

Tippers and standard truck size (i.e.: prime mover and semi-trailer combinations up to a length of 19 m) are expected to be mostly utilised for the transporting of material and equipment along haulage routes and the internal road corridor, which will be constructed as part of the project. Vehicles, crane, excavator, bulldozers, drilling and boring machinery will be brought to site in most cases on standard sized trucks and will then be transferred between construction zones. In some cases, oversized vehicles may be required to transport large equipment.

4.2.3 Transport Corridors

The study period for the construction of the Mine is from the beginning of construction, until three years after the output of the Mine reaches the target of 60 Mtpa. The study period for the construction of the Mine covers a ten-year period.

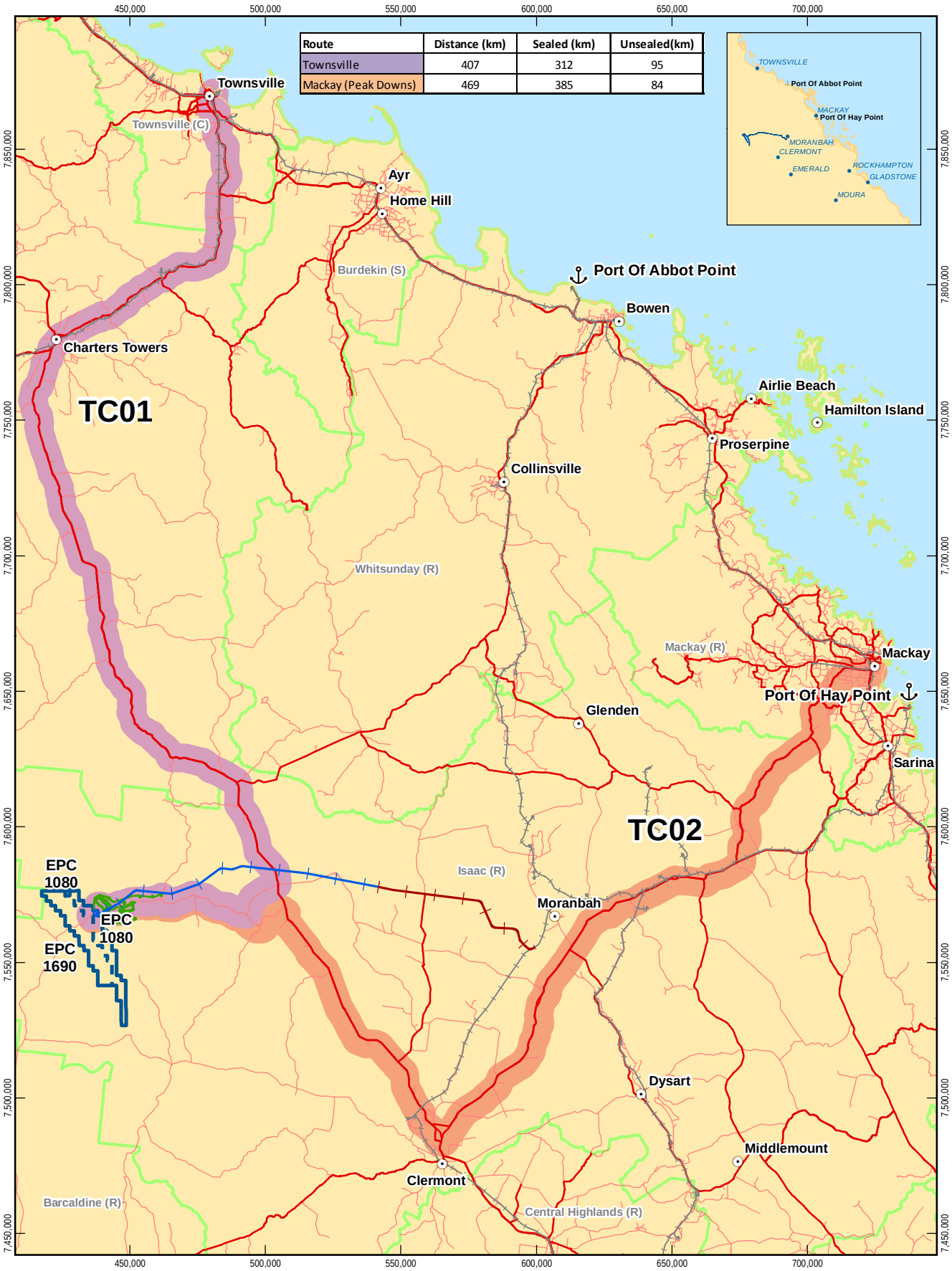
Transport corridors have been identified for the purpose of assessing the impact of construction traffic on the surrounding highway network. These corridors comprise of both state and local controlled roads and will be the primary routes to be utilised during the construction phase for transporting of equipment and materials. These routes are identified in Table 4-1 and Figure 4-1.

Road access to the Mine will be via approximately 90 km of currently unsealed local roads off the Gregory Developmental Road. It is anticipated that access and egress to and from the mine would be from Moray-Carmichael Road (also known to Council as Doongmabulla Road). Adani has entered into an agreement with IRC regarding the long term maintenance and development of the entire lengths of the Elgin Moray and the Moray Carmichael roads, which run from the intersection of the Gregory Developmental Road westerly through the Mine to intersect with the Shuttleworth Carmichael

Road. As an element of the agreement with IRC it is proposed that the roads will be upgraded and maintained to a similar engineering standard as the Gregory Developmental Road.

Table 4-1 Haulage Routes

Route ID	State Road	Local Road	Comments
TC01	Flinders Highway		Access from Townsville to the Mine
	Gregory Developmental Road		
		Elgin Moray Road	
		Moray Carmichael Road	
TC02	Bruce Highway		Access from Mackay to the Mine
	Peak Downs Highway		
	Gregory Developmental Road		
		Elgin Moray Road	
		Moray Carmichael Road	



Route	Distance (km)	Sealed (km)	Unsealed(km)
Townsville	407	312	95
Mackay (Peak Downs)	469	385	84

LEGEND

- Town
- Major Port
- Existing/Other Rail Network
- State Road
- Local Road
- Rail (West)
- Rail (East)
- Project (Mine)
- Mine (Offsite)
- Local Government Area

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 Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Project (Mine)

Indicative Haulage Route

Job Number 41-25215
Revision E
Date 27-08-2012

Figure: 4-1

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Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data Source: GA: Towns, Railways, Roads (2007); DME: EPC1690 (2010), EPC1080 (2011); ABS: Local Govt Boundaries (2010); GHD: Major Ports (2010), Haulage Routes (2011); Adani: Alignment Opt9 Rev3, SP3 (2012); Gassman/Hyder: Mine (Offsite) (2012). Created by: BW, jvc

4.2.4 Transport Routes for Construction Vehicles

Based on the findings provided in Section 3 of this report, the proposed route from Townsville to the Mine site is considered to be the most appropriate corridor between origin and destination based on distance, asset condition and crash history. The assessment included in Section 4 is based on this route. For the purposes of this assessment, it has been assumed that Flinders Highway and Gregory Developmental Road are suitable construction vehicle access routes for transporting materials between Townsville and the Mine.

An assessment of the use of the Mackay corridor is included in the Volume 4 Appendix AG Rail Transport Assessment. This option could be used for particular items being imported to the mine site.

4.2.5 Construction Workforce (workers accommodation village)

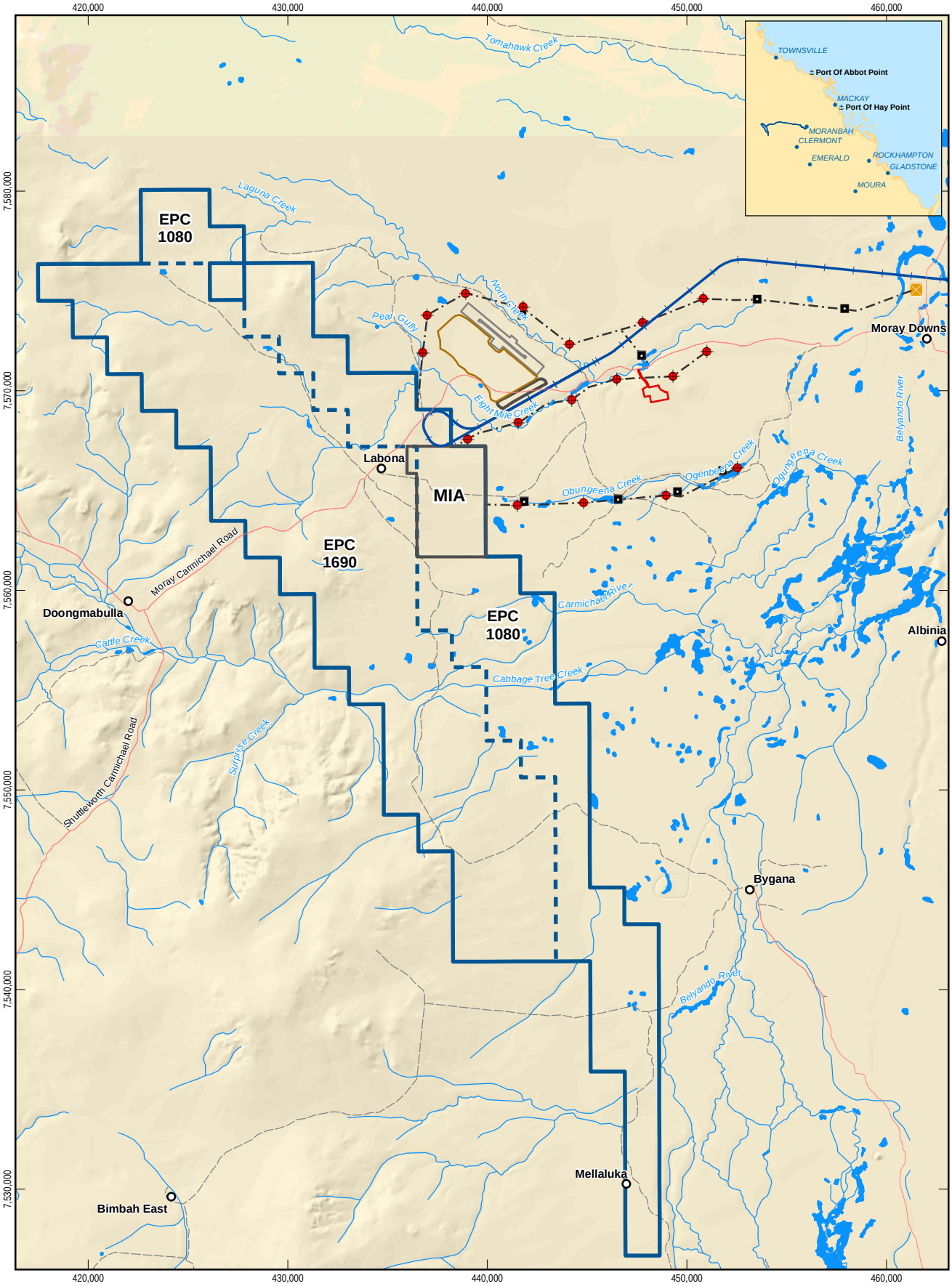
It is expected that the total number of staff working at the Mine would be approximately 440 people in the first year, with 950 people in around 2015 and would gradually build up to approximately 2,800 people in 2022 when full production of the Mine is reached. These workforce numbers include both construction and operational staff with both phases initially running in parallel.

A 3,000 person workers accommodation village will be provided between the Mine and Gregory Developmental Road. It is also proposed to provide a new airstrip, which would be located between the Mine and the workers accommodation village. Figure 4-2 shows the proposed location of the workers accommodation village and airstrip in relation to the Mine.

The workforce is expected to leave and return to the workers accommodation village at the allocated shift times. As the workers accommodation village is to be located in vicinity of the Mine, staff movements between the workers accommodation village and the Mine would have no impact on the external road network.

Workers would FIFO from anywhere on the east coast of Australia to the airport, which is expected to be operational in 2015. Personnel would then be transferred to the workers accommodation village via buses. Trips between the proposed airstrip and workers accommodation village be internal only, and would therefore not impact on the external (strategic) road network.

Prior to the opening of the proposed airport, workers would initially FIFO to the existing Doongmabulla airstrip.



LEGEND

- Homestead
- Local Road
- Track
- Watercourse
- Waterbody
- Rail (West)
- Mine (Onsite)
- Mine Infrastructure Area

Mine (Offsite)

- Borehole
- Storage Site (Instream)
- Storage Facility (Offstream)
- Pipeline Network
- Airport Location
- Rail Siding
- Industrial Area
- Workers Accommodation Village

1:275,000 (at A4)

0 2 4 6 8 10

Kilometres

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

N

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Location of Mine Offsite Infrastructure in Relation to Project (Mine)

Job Number 41-25215
Revision C
Date 03-09-2012

Figure: 4-2

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Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data Source: DERM: Waterbody (2011); © Copyright Commonwealth of Australia - Geoscience Australia: Road, Homestead, Watercourse (2007); Adani: Alignment Opt9 Rev3 (2012); Gassman/Hyder: Mine (Offsite) (2012); DME: EPC1690 (2010), EPC1080 (2011). Created by: TH, MS.

4.3 Construction Traffic Generation

4.3.1 Construction Activity

The peak traffic generation during the construction phase is likely to be associated with the transporting of plant, equipment and material deliveries. An indication of this activity is listed in Table 4-2. Table 4-3 provides the estimated truck movements associated with the construction of the Mine, and identifies concrete related trips which would not operate on the external road network (local batch plants). This estimate has been provided by the Logistics Report (GHD 2012). It should be noted that the figures provided in Table 4-3 include trips to and from mine (two-way trips) and are estimated on the basis of two truck movements per delivery.

Table 4-2 Construction Plant and Material

Construction Activity	Plant and material required
CHPP	CHPP facility including structural steelwork and, equipment. Buildings in the vicinity including administration, workshop, bathhouse, mess building, kitchen building. Concrete allowance for car park area (delivery from batch plant to site). Sewerage treatment facility and water treatment facility.
Major Underground Face and Mobile Equipment	Longwall Units, Continuous Miners and Diesel Equipment.
Electrical Infrastructure	Substation equipment and HV cables.
North Underground Mine Facility	Various buildings and associated areas including administration, bathhouse, helipads and workshops. Reclaim tunnel. Coal valves for stockpiles (pre-assembled). Concrete allowance for car park areas (delivered from batch plant to site). Sewerage treatment plant, raw water tanks and HDPE lining for dirty water dams. Structural steelwork for overland conveyors, stacker conveyor system, crushing stations, chutes, primary and secondary crushers.
Central Underground Mine Facility	Various buildings and associated areas including administration, bathhouse, helipads and workshops. Reclaim tunnel. Coal valves for stockpiles (pre-assembled). Concrete allowance for car park areas (delivered from batch plant to site). Sewerage treatment plant, raw water tanks and HDPE lining for dirty water dams. Structural steelwork for overland conveyors, stacker conveyor system, crushing stations, chutes, primary and secondary crushers.

Construction Activity	Plant and material required
Underground Coal Stockpile Areas	Structural steelwork for conveyors, including stacking, reclaim, and train load-out conveyors. Pre-assembled coal-valves.
Reclaim Stations	Steel structure, service monorails and chutes for various reclaim stations.
Open Cut Stockpile Areas	Structural steelwork for conveyors. Coal valves. Reclaim tunnels. Thickeners stations and rejects bin
North Open Cut Mine Facilities	Steelwork for crushing stations (crushers, chutes, roller screen, and service monorails) Steelwork for truck dump station
Central Open Cut Mine Facilities	Steelwork for crushing stations (crushers, chutes, roller screen, and service monorails) Steelwork for truck dump station
Overland Conveyors	Steelwork for overland conveyors
Airfield	Material for airstrip, access road, apron and terminal buildings
Workers accommodation village	Sleeping pods, laundry, footpaths, first aid, toilet block, mobile refrigerator, ice room, gymnasium, IT room and internet, dry mess, wet mess, kitchen, and workshops.
Concrete and Concrete Materials	Concrete for buildings (delivered from batch plant to site) and delivery of concrete materials from quarries to batch plants.

Table 4-3 Summary of Estimated Mine Construction Truck Movements by Category (Commencement – 2025)

Category	Estimate of Mine Construction Truck Movements (no.)		
	Truck Movements on Internal Roads	Truck Movements on External Roads	Total
CHPP	1,046	210	1,256
Major Underground Face and Mobile Equipment	0	1,996	1,996
Electrical Infrastructure	0	130	130
North Underground Mine Facility	528	792	1,320
Central Underground Mine Facility	528	820	1,348
Underground Coal Stockpile Areas	0	652	652

Category	Estimate of Mine Construction Truck Movements (no.)		
	Truck Movements on Internal Roads	Truck Movements on External Roads	Total
Reclaim Stations	0	214	214
Open Cut Stockpile Areas	0	1,060	1,060
North Open Cut Mine Facilities	0	114	114
Central Open Cut Mine Facilities	0	100	100
Overland Conveyors	0	1,708	1,708
Airfield	0	17,110	17,110
Workers Accommodation	0	14,136	14,136
Concrete and Concrete Materials	2,952	0	2,952
Total	5,054	39,042	44,096

4.3.2 Construction Staging

This study analyses the potential construction vehicle movements from the start-up of proposed Mine, until the three years after the full rate of coal production is expected to be first achieved at the Mine (in around 2022), a period of ten years. Figure 4-3 presents the likely staging of the works, with an indication of expected duration of the project.

Figure 4-3 shows that construction of the Mine would occur over a 10 year period, coinciding with the year that full rate of coal production is expected to be first achieved.

Construction of the proposed airport is expected to be in 2015 and the workers accommodation village will be staged from a construction camp through to a permanent village. This EIS assessment addresses the construction camp through to completion of the workers accommodation village providing accommodation for 2,000 bed/3,000 person workforce.

With reference to Figure 4-3 the peak period for construction vehicle movements would occur in the first year, during the construction of the workers accommodation village and the airstrip, with approximately 25,000 vehicle movements per annum.

Table 4-4 provides estimated average and worst case daily construction vehicle movements along Flinders Highway and Gregory Developmental Road. The estimated average daily heavy vehicle generation has been derived from the total Mine construction truck movements and averaged for a 10 year construction period. The worst-case peak heavy vehicle generation is based on the worst-case scenario, which is identified to be in the first year of construction, when the construction of the Mine will peak attracting approximately 25,000 vehicle trips per annum. It should be noted that the figures

provided in Table 4-4 represent trips to and from site and are estimated on the basis of two truck movements per delivery and that the worst case scenario is 618 per cent higher than the average construction traffic estimates during the construction period.

Figure 4-3 Construction Heavy Vehicle Profile (Trips on External Roads) across the Project

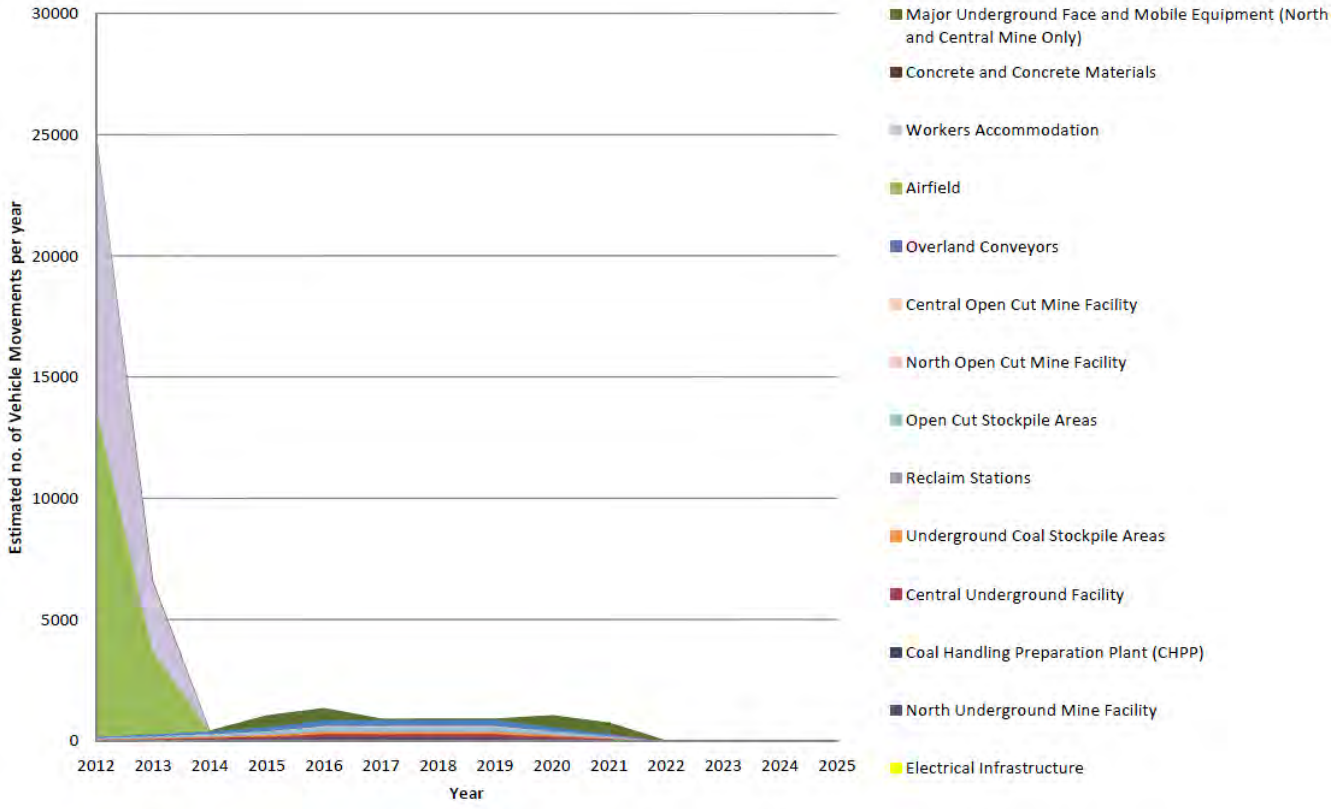


Table 4-4 Estimated Heavy Vehicle Construction Traffic (Two-way)

	Annual Heavy Vehicle Traffic	Monthly Heavy Vehicle Traffic	Daily Vehicle Traffic
Average	3,904	325	11
Worst Case (commencement)	25,000	2,083	68

5. Mine Operation Activities

5.1 Overview

This section of the report provides details of the Mine operation transportation activities, including operation hours, proposed haulage routes and the expected traffic volumes associated with operation activities.

5.2 Mine Operation Activities

5.2.1 Overview

Once commenced, the output of the Mine is expected to reach the target of 60 Mtpa in around 2025. Mining is expected to be sustained at 60 Mtpa until production rates are constrained by lack of pit room for pre-strip, which is expected to be around 2087. Traffic volumes generated by the Mine are therefore expected to remain at a consistent level each year from 2025 to 2087.

The Logistics Report (GHD 2012) indicates that traffic volumes generated by the construction of the Mine will vary and will depend on the construction timetable. The logistics plan for operation of the Mine has been categorised as follows:

- **Operations Equipment** – Delivery of equipment required for the operations at the site. This does not include delivery of water via vehicles
- **Operations Workforce** – Light vehicle movements due to local travel of operations workforce
- **Consumables for Workforce** – Consumables such as food and miscellaneous items required to sustain the anticipated workforce

5.2.2 Transport Routes for Operation Vehicles

Based on the findings provided in Section 3 of the report, the routes chosen provide the most appropriate corridor between origin and destination based on distance, asset condition and crash history. For the purposes of this assessment, it has been assumed that Flinders Highway and Gregory Developmental Road are suitable construction vehicle access routes for transporting materials between Townsville and the Mine.

5.2.3 Mine Operations Traffic (Vehicles and Equipment)

Various types of machinery will be used for the operation of the Mine. The different types of heavy vehicles that are required are three, five- and seven-axle trucks, flatbed semitrailers, extendable trailers and B double to transport plant and material to the site. Buses for transporting workers would also be required.

The tipper and standard truck sizes (i.e.: prime mover and semi-trailer combinations up to a length of 19 m) are expected to be mostly utilised for the transporting of material and equipment along haulage routes. Vehicles, crane, excavator, bulldozer, drilling and boring machinery will be brought to site in most cases on standard sized trucks and then transferred between construction zones. In some cases oversized vehicles may be required to transport large equipment.

5.2.4 Workforce (workers accommodation village)

A 3,000 person workers (2,000 bed) accommodation village (including messing area) will be provided in closed proximity to the Mine, located between the Mine and Gregory Developmental Road. It is also proposed to provide a new airstrip, which will be located between the Mine and the workers accommodation village. Figure 4-2 shows the location of the workers accommodation village and airstrip in relation to the Mine.

Vehicular access to the Mine, workers accommodation village and airstrip would be provided from Gregory Developmental Road via Elgin Moray Road and Moray-Carmichael Road. As part of the development of the Mine it is proposed that Elgin Moray and the Moray-Carmichael Road are both upgraded to a similar engineering standard as Gregory Developmental Road.

Total project workforce will average approximately 3,000 people by the time the Mine reaches target production of 60 Mtpa in around 2022. Workers will be transported from the workers accommodation village to the Mine by four wheel drive vehicles or buses.

Workers will FIFO from anywhere on the east coast of Australia to the proposed airstrip, which is expected to be operational in 2015. Personnel will then be transferred to the workers accommodation village site via buses. As such, the transportation of workface between the workers accommodation village during the peak for Mine operation vehicle movements (2025 and beyond), and would therefore not impact on the State road network. Prior to the opening of the proposed airport, workers would initially FIFO to the existing Doongmabulla airstrip.

5.3 Operation Traffic Generation

5.3.1 Vehicle Movements

The main traffic generated through the construction phase will be from plant, equipment and material deliveries, as listed in the Table 5-1.

Table 5-1 Construction Plant and Material

Operation Activity	Plant and material required
Operations Equipment	Major and minor equipment (Runge 2011), light vehicles and water required for CHPP activities.
Operations Workforce	Movement of staff in the Mine area on non-site roads. Movement between accommodation and Mine via buses.
Consumables for Workforce	Fuel, food, water and additional allowances for miscellaneous items to be delivered by truck.

Table 5-2 provides a summary of the estimated vehicle movements in relation to each of the abovementioned categories for this project. The figures account for the movement anticipated from the start-up of proposed Mine, until the three years after the full rate of coal production is expected to be first achieved at the Mine (2025). Please note that the figures provided in Table 5-2 include trips to and from site (two-way trips) and are estimated on the basis of two truck movements per delivery or an inbound and outbound workforce light vehicle trip.

With reference to Table 5-2, it should be noted that the Logistics Report (GHD 2012) assumes that operations workforce trips accounts for personal trips only, which are likely to be light vehicle trips. This represents 1 per cent of the total expected workforce trips and impact on external road network with the other 99 per cent of workforce movement occurring internally, involving movement between the Mine and workers accommodation village or proposed air strip and therefore does not generate an impact.

Table 5-2 Summary of Estimated Mine Operation Vehicle Movements by Category (Commencement – 2025)

Category	Estimate of Mine Operation Vehicle Movements (no.)
Operations Equipment (Heavy Vehicles)	446,482
Operations Workforce (Light Vehicles)	62,792
Consumables for Workforce (Heavy Vehicles)	60,561
Total	569,835

5.3.2 Mine Operation Staging

Figure 5-1 presents the likely staging of the works, with an indication of expected duration up until three years after the full rate of coal production is expected to be first achieved at the Mine (2025). It should be noted that following full rate of coal production traffic volumes are expected to remain at consistent level until production rates are constrained in 2087. Figure 5-1 shows that the peak for Mine operation vehicle movements would occur in 2025 (and beyond), with approximately 52,000 vehicle movements per annum.

Table 5-3 provides the estimated average and worst case daily Mine operational vehicle movements that would occur along Flinders Highway and Gregory Developmental Road.

The estimated average daily vehicle generation has been derived based on total vehicle movements provided in Table 5-2 (assuming 569,835 vehicle movements occurring over a 13 year period between 2012 and 2025). The worst-case peak vehicle generation is based on the worst-case scenario where in 2025 the Mine operation related movements peak to approximately 52,000 vehicle trips per annum. It should be noted that the figures provided in Table 5-3 represent trips to and from site and are estimated on the basis of two truck movements per delivery.

Figure 5-1 Estimated number of Vehicle Movements Per Year During Mine Operations

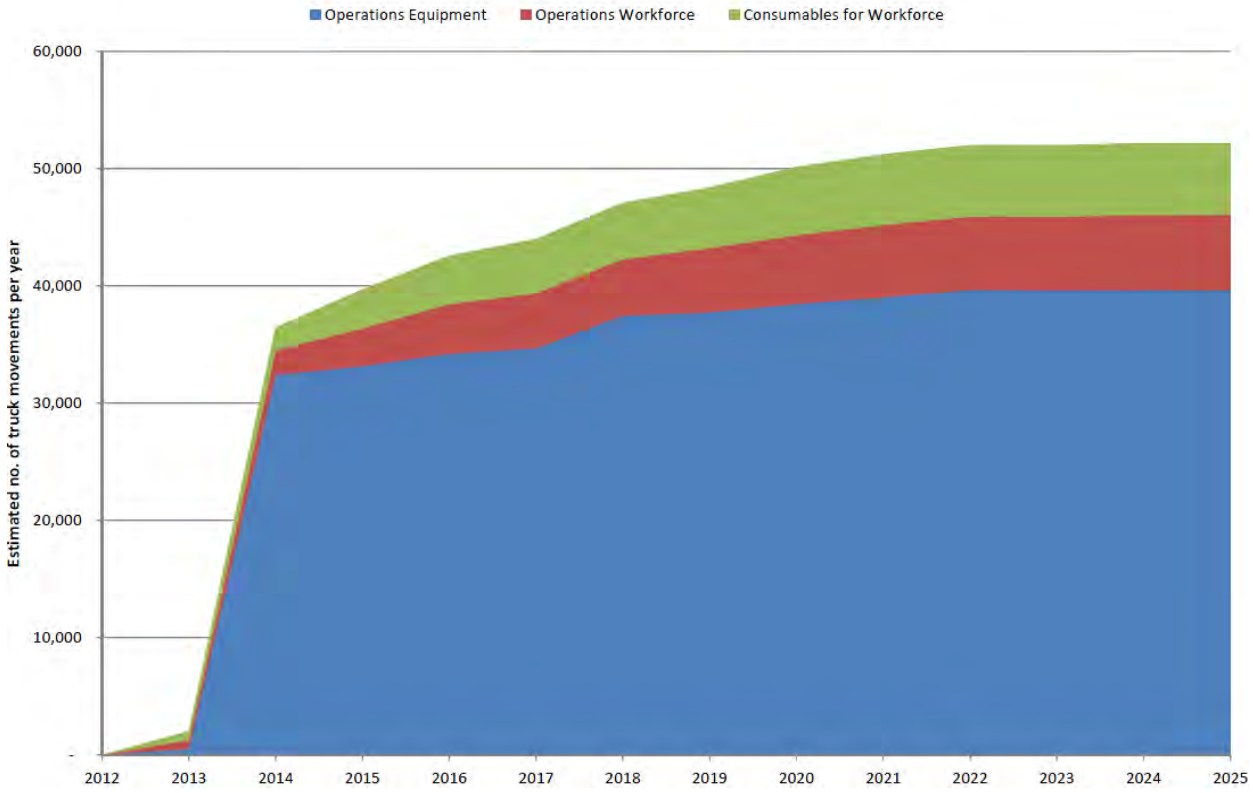


Table 5-3 Estimated Vehicle Mine Operation Traffic (Two-way)

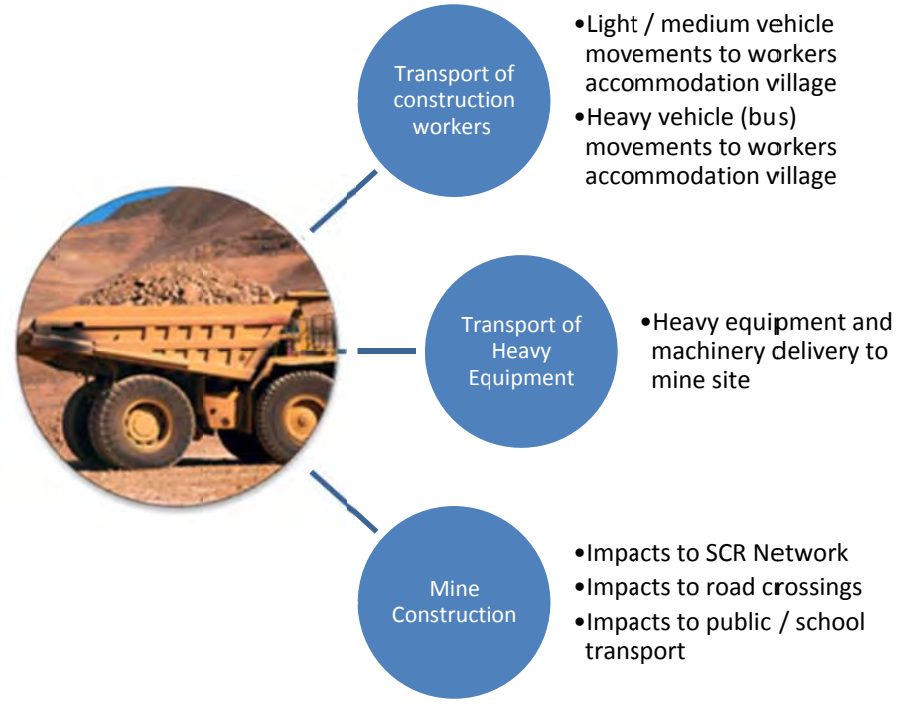
	Annual Vehicle Traffic	Monthly Vehicle Traffic	Daily Vehicle Traffic
Average	43,833	3,372	120
Worst Case (2025+)	52,000	4,000	144

6. Impact Assessment – Mine Construction

6.1 Overview

This section of the report provides an assessment of the traffic and transport impacts associated with the proposed construction of the Mine. Figure 6-1 provides an overview of the potential impacts associated with the construction phase.

Figure 6-1 Conceptual Overview of Construction Impacts



6.2 Transport of Construction Workers

As detailed in Section 5.2, trips between the Mine, workers accommodation village and proposed airport will be internal only, and will therefore not impact on the external (strategic) road network. Prior to the opening of the proposed airstrip in 2015, workers would initially FIFO to the existing Doongmabulla airstrip.

6.3 Transport of Heavy Vehicles and Equipment

6.3.1 Potential Impact

Heavy vehicle movements associated with the movement of earthworks and supply of plant and material have been estimated and then distributed along the haulage corridor identified in Section 4.2.3. The proportion of movements occurring during the AM and PM peak periods has been estimated at approximately 10 per cent, which is a worst-case estimate for the movement of these types of products. Table 6-1 summarises the estimated total vehicle movements during AM and PM peak under a worst-case scenario.

Table 6-1 Estimated Total Vehicle Movements (Worst-case Scenario)

Heavy Vehicle Movements	Daily (vehicles per day)	Peak Hour (vehicles per hour)
Flinders Highway	68	7
Gregory Developmental Road	68	7
Peaks Down Highway	0	0
Kilcummin Diamond Downs Rd	0	0

Table 6-2 presents the estimated AADT traffic volumes on state controlled roads within the Study Area with the additional construction traffic movements, assuming worst-case traffic scenario.

Table 6-2 Impact of Additional Traffic Movements on the State-Controlled Roads (Commencement)

Road ID	Road Name	Existing		With Project			
		ADT	Per cent Heavy Vehicles	Light (per day)	Heavy (per day)	ADT	Per cent Heavy Vehicles
14A	Flinders Highway (Townsville to Charters Towers)	4,894	20.2	0	68	4,962	21.30%
98B	Gregory Developmental Road (Charters Towers to Belyando Crossing)	633	17.0	0	68	701	25.10%
98A	Gregory Developmental Road (Belyando Crossing to Clermont)	412	28.0	0	68	480	38.26
33A	Peak Downs Highway (Clermont – Nebo)	3,435	13.6	0	0	3,435	13.60
33B	Peak Downs Highway (Nebo – Walkerston)	6,006	11.0	0	0	6,006	11.00
33B	Peak Downs Highway (Walkerston to Bruce Highway)	15,990	10.0	0	0	53	23.00

Road ID	Road Name	Existing		With Project			
		ADT	Per cent Heavy Vehicles	Light (per day)	Heavy (per day)	ADT	Per cent Heavy Vehicles
5309	Kilcummin Diamond Downs Road	53	23.0	0	68	4,962	21.30

6.3.2 Impact of Construction on State Controlled Road Network

DTMR's GARID stipulates that the extent of impact of the project on the SCR network can be assessed on the basis of percentage increase in existing AADT. Where the construction or operational traffic generated by the development equals or exceeds 5 per cent of the existing AADT on the road section, traffic operation impacts need to be considered.

Table 6-3 provides a summary of the percentage increase in traffic and the expected LOS on SCRs in the Study Area with the additional increase in traffic associated with the construction of the Mine. Table 6-3 shows that the estimated traffic generated by the project will exceed the threshold of a five per cent increase in ADT on Flinders Highway and Gregory Developmental Road. However, the analysis undertaken for this study indicates that the expected increase in traffic associated with the construction of the Mine (based on the worst case scenario) would only occur over a period of two years and would not impact on midblock LOS Performance.

Table 6-3 Construction Traffic Impact on State Controlled Roads (2012)

Road ID	Road Name	AADT	Percentage Impact	LOS
14A	Flinders Highway (Townsville to Charters Towers)	4,962	1.40	C
98A	Gregory Developmental Road (Charters Towers to Belyando Crossing)	701	10.82	A
98A	Gregory Developmental Road (Belyando Crossing to Clermont)	480	16.62	A
33A	Peak Downs Highway (Clermont – Nebo)	4,962	1.40	C
33B	Peak Downs Highway (Nebo – Walkerston)	6,006	0.00	C
33B	Peak Downs Highway (Walkerston – Bruce Highway)	15,990	0.00	E
5309	Kilcummin Diamond Downs Road	53	0.00	A

Note: LOS based on Table 2-2

6.4 Infrastructure Alterations

Road access to the Mine will be via approximately 130 km of currently unsealed local roads off the Gregory Developmental Road. Adani has entered into an agreement with IRC regarding the long-term maintenance and development of the entire lengths of the Elgin Moray and the Moray Carmichael Roads, which run from the intersection of the Gregory Developmental Road westerly through the Mine to intersect with the Shuttleworth Carmichael Road. The roads will be upgraded in stages and maintained to a similar engineering standard as the Gregory Developmental Road.

6.4.1 Impact of Construction on School Bus Routes

Haulage routes for the project may overlap with school bus routes. However, given the relatively low number of school bus services, townships situated along the routes, and the likely short period of time of operation within the day, it is expected that there would be a negligible impact on the safe operation of current school bus services. Any potential impacts will be addressed in detail when traffic management plans for construction and operation are prepared and the logistic plan for the delivery of each construction stage is further refined.

Communication and promoting awareness to the community of the Mine construction activity will be critical to managing impacts on school bus services during both construction and operation of the Mine. Bus operators would then be made aware of any potential safety concerns, and construction activity could be adjusted to minimise impact on the routes and timing of school bus services.

6.4.2 Impact of Construction on Public Transport Routes

Public transport routes have not been identified within the Study Area. The potential impact of the construction traffic on public transport operations will be addressed as part of developing a construction TMP. It is anticipated that any construction access routes which impact on public transport routes will be identified and site specific TMPs will be prepared to mitigate any potential impact on the public transport operation.

6.4.3 Mitigation Measures

Table 6-3 shows that the expected increase in traffic associated with the construction of the Mine can be accommodated on the state roads which would provide access to the site. However, a number of mitigating measures have been identified to ensure that transport and traffic impacts arising from the construction are minimised. These measures will be incorporated through the development of the Construction Traffic Management Plan (TMP).

An important measure relating to construction traffic impacts is the implementation of a community information awareness program. This program will need to be initiated prior to construction commencing and throughout the entire construction period to ensure that local residents are aware of the construction activities, with particular regard to construction traffic issues.

Other initiatives that would be undertaken as part of the Construction TMP include:

- In consultation with DTMR, ensure general signposting of access roads with appropriate heavy vehicle and construction warning signs;
- Review speed restrictions along road corridors;
- Install specific warning signs at access roads to warn road users of entering and exiting traffic;

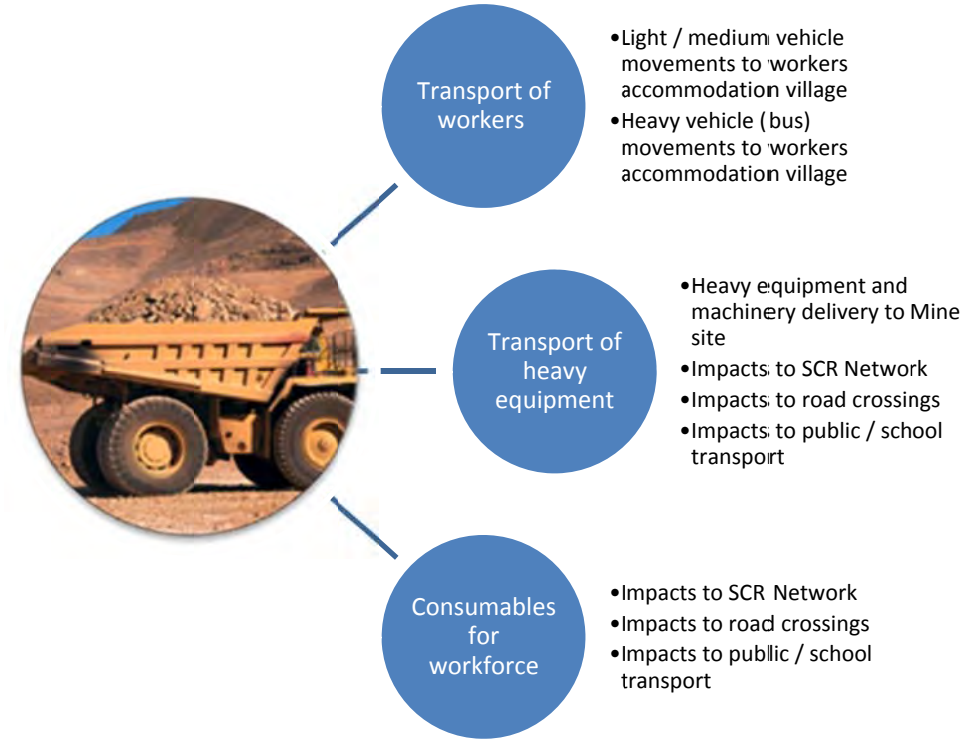
- Provide advance notice of road/lane closures and advice on alternative routes;
- Provide appropriate traffic control and warning signs for areas identified where potential safety risk issues exist;
- Manage the transportation of construction materials, using QPS and Pilots to maximise vehicle loads in order to minimise vehicle movements.

7. Impact Assessment – Mine Operation

7.1 Overview

This section of the report provides an assessment of the traffic and transport impacts associated with the operation of the Mine. Figure 7-1 provides a summary of potential impacts associated with the operation phase.

Figure 7-1 Conceptual Overview of Operation Phase Impacts



7.2 Transport of Mine Workers

7.2.1 Light / Medium-sized Vehicles

Light/medium-sized vehicle movements associated with the operation of the Mine are assumed to be the local travel of operational workforce which are likely to be spread out throughout the day. Table 5-2 shows that there is expected to be 62,792 operations workforce movements between commencement and around 2025, which is an average of 4,830 per year, or 13 per day. The Logistics Report indicates that during the Mine's full coal production period (2022), there are expected to be to 6,430 annual trips, or 18 trips per day.

For purposes of a worst-case scenario, it is assumed that 50 per cent of the light vehicle movements would occur during the peak hour during the peak Mine operation assessment year (2022+), resulting in an estimated nine vehicle movements to the camp occurring during the peak hour.

7.2.2 Bus Movements

As detailed in Section 4.2.5, workers will FIFO from anywhere on the east coast of Australia to the proposed airport, which is expected to be operational in 2015. Personnel will then be transferred to the workers accommodation village via buses or four wheel drive vehicles. As such, the transportation of workforce to/from the workers accommodation village in 2015 and beyond will not impact on the State road network.

7.3 Transport of Heavy Vehicles Equipment

7.3.1 Potential Impact

Heavy vehicles will comprise of the following:

- Heavy vehicle movements attributed to transport and delivery of plant and material.

Heavy vehicle movements associated with plant and material supply deliveries have been estimated for each transport corridor, as shown in Table 5-3. The proportion of these movements occurring during the AM and PM peak periods has been conservatively estimated at approximately 10 per cent.

Table 7-1 summarises the estimated total vehicle movements for the AM and PM peak worst-case scenario. Table 7-2 presents the estimated AADT traffic volumes on state controlled roads within the Study Area with the additional traffic movements associated with the operation of the Mine, assuming worst-case traffic scenario.

Table 7-1 Estimated Total Vehicle Movements (Worst-case Scenario)

Vehicle Movements	Daily (vehicles per day)	Peak Hour (vehicles per hour)
Light vehicle movements by service personnel	18	9
Heavy vehicle movements on:		
Flinders Highway	125	12
Gregory Developmental Road	125	12
Peaks Down Highway	0	
Kilcummin Diamond Downs Rd	0	

Table 7-2 Impact of Additional Traffic Movements on the State-Controlled Roads (2025+)

Road ID	Road Name	Existing		With Project			
		ADT	Percentage Heavy Vehicles	Light (per day)	Heavy (per day)	ADT	Percentage Heavy Vehicles
14A	Flinders Highway	4,894	20.2	18	125	5,036	22.11

Road ID	Road Name	Existing		With Project			
		ADT	Percentage Heavy Vehicles	Light (per day)	Heavy (per day)	ADT	Percentage Heavy Vehicles
	(Townsville to Charters Towers)						
98B	Gregory Developmental Road (Charters Towers to Belyando Crossing)	633	17.0	18	125	775	29.98
98A	Gregory Developmental Road (Belyando Crossing to Clermont)	412	28.0	18	125	554	43.32
33A	Peak Downs Highway (Clermont – Nebo)	3,435	13.6	0	0	3,435	13.60
33B	Peak Downs Highway (Nebo – Walkerston)	6,006	11.0	0	0	6,006	11.00
33B	Peak Downs Highway (Walkerston – Bruce Highway)	15,990	10.0	0	0	15,990	10.00
5309	Kilcummin Diamond Downs Road	53	23.0	0	0	53	23.00

7.3.2 Impact of Operation on State Controlled Road (SCR) Network

DTMR's GARID stipulates that the extent of impact of the project on the SCR network can be assessed on the basis of percentage increase in existing AADT. Where the construction or operational traffic generated by the development equals or exceeds 5 per cent of the existing AADT on the road section, traffic operation impacts need to be considered.

Table 7-3 provides a summary of the percentage increase in traffic and the expected LOS on SCR in the Study Area with the additional increase in traffic associated with the operation of the Mine. It should be noted that no traffic growth has been applied to the surveyed traffic flows for the future year assessment given the rural location of these roads and uncertainty of potential development in the surrounding areas.

As shown in Table 7-3, the estimated traffic generated by the project will exceed the threshold of a five per cent increase in AADT along Flinders Highway and Gregory Developmental Road. Therefore, with regard to the impact of the proposed development on pavement loadings the assessment shows that the predicted increase in traffic does not meet the GARID criteria set out in Table 2-1 and Adani will be required to have discussions with DTMR to establish how this should be

managed. However, it should be noted that the assessment is based on the worst-case scenario and would not impact on midblock LOS performance of either road, which are expected to operate with LOS A.

Table 7-3 Construction Traffic Impact on State Controlled Roads (2025+)

Road ID	Road Name	AADT	Percentage Impact	LOS
14A	Flinders Highway (Townsville to Charters Towers)	5,036	2.91	C
98A	Gregory Developmental Road (Charters Towers to Belyando Crossing)	775	22.51	A
98A	Gregory Developmental Road (Belyando Crossing to Clermont)	554	34.58	A
33A	Peak Downs Highway (Clermont – Nebo)	3,435	0.00	B
33B	Peak Downs Highway (Nebo – Walkerston)	6,006	0.00	C
33B	Peak Downs Highway (Walkerston to Bruce Highway)	15,990	0.00	E
5309	Kilcummin Diamond Downs Road	53	0.00	A

Note: LOS based on Table 2-2

7.3.3 Impact on School Bus Routes

Haulage routes for the project may overlap with school bus routes. However, given the relatively low number of school bus services, townships situated along the routes, and the likely short period of time of operation within the day, it is expected that there would be a negligible impact on the safe operation of current school bus services. Any potential impacts will be addressed in detail when TMPs for construction and operation are prepared. Communication and promoting awareness to the community of the Mine operations activity will be critical to managing impacts on school bus services.

7.3.4 Impact on Public Transport Routes

Public transport routes are not in operation within the Study Area. The potential impact of the operations traffic on public transport operations will be addressed as part of developing a TMP. Site-specific TMPs will be prepared to mitigate any potential impact on the public transport operation.

7.3.5 Mitigation Measures

Table 7-3 shows that the expected increase in traffic associated with the operation of the Mine can be accommodated on the state roads which would provide access to the site. However, a number of mitigating measures have been identified to ensure that transport and traffic impacts arising from the operation of the Mine are minimised. These measures will be incorporated through the development of a TMP.

An important measure relating to traffic impacts is the implementation of a community information awareness program. This program will need to be initiated prior to operation of the Mine commencing and throughout the entire operation period to ensure that local residents are aware of activities.

Other initiatives that would be required to be undertaken as part of the TMP include:

- In consultation with DTMR, ensure general signposting of access roads with appropriate heavy vehicle and construction warning signs
- Review speed restrictions along haulage routes
- Install specific warning signs at access roads to warn road users of entering and exiting traffic
- Provide appropriate traffic control and warning signs for areas identified where potential safety risk issues exist
- Manage the transportation of materials to maximise vehicle loads (using QPS and Pilots) in order to minimise vehicle movements

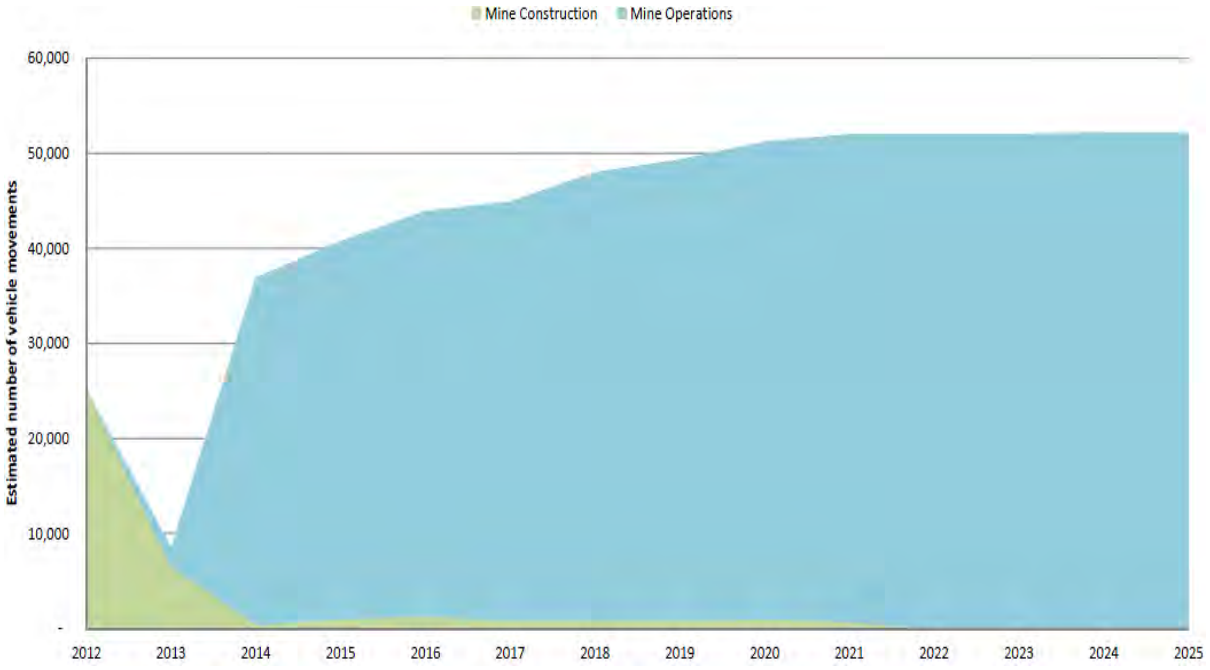
8. Conclusion

Construction of the Project (Mine) is expected to occur over a period of approximately ten years. The volume and intensity of truck movements will vary over the construction period. The worst-case construction period was identified to occur during the first year following commencement and generate 25,000 trips or 68 daily trips on the external road network.

The volume and intensity of the operation vehicle movements will increases over the operation period following commencement, peaking three years after the target output production of the Mine is reached (60 Mtpa). In around 2025 the operation of the Mine is expected to generate approximately 52,000 trips on the external road network, which is equal to 142 daily trips.

Figure 8-1 summarises the expected Mine construction and operation vehicle movements between 2012 and 2025. As can be seen from Figure 8-1, the peak traffic generation occurs in 2025 which consists of traffic associated with the Mine operations only.

Figure 8-1 Summary of Estimated Vehicle Movements by Major Categories



The analysis of the road network during this period indicates that the expected increase in traffic associated with the both the construction and operation of the Mine can be adequately accommodated and does not impact on the operating performance of the road network.

However, worst case estimates predict that traffic generated by the Mine operations will exceed the threshold of a five per cent increase in AADT along Flinders Highway and Gregory Developmental Road. Therefore, the assessment shows that the predicted increase in traffic does not meet the GARID criteria and that Adani should have discussions with DTMR to establish how this should be managed. However, it should be noted that the assessment is based on the worst-case scenario and would not impact on midblock LOS performance of either road, which are expected to operate with LOS A.

The delivery of materials and equipment will be managed in order to minimise impact on the local community. Key offsite traffic issues mainly relate to:

- Use of identified road segments on the road network for access by heavy vehicles for the delivery of plant and material
- Disruption to traffic due to road/lane closures brought about by construction activities
- Increase in travel time to existing road users due to road works and increase in heavy vehicle movement.
- Consult with QPS to mitigate impacts of heavy (multi-dimensional) vehicles on the roads
- Use logistics technology to plan heavy vehicle movements and the loading of equipment on these vehicles to address the appropriate QPS & Pilot support when delivering equipment to the mine

Traffic management issues will be addressed through the preparation and implementation of construction and operation TMPs, which will be developed during the detailed design phase. The TMPs will be developed in consultation with the relevant DTMR Regional offices, QPS and local authorities.

The TMPs will address key safety and logistical issues that may arise from the construction and operation of the Mine and will focus on:

- 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 in the TMPs to address each of the above issues. If necessary, separate site-specific (local) TMPs will be prepared.

A number of mitigating measures have been identified to ensure that transport and traffic impacts associated with the construction and operation of the Mine are minimised. These measures will be incorporated into the TMPs. An important mitigation measure relating to traffic impacts is the implementation of a community information and awareness program. This program will need to be initiated prior to construction commencing and continue throughout the entire construction period and operational period to ensure that local residents are fully aware of the activities. The awareness program will identify communication protocols for community feedback on issues relating to vehicle driver behaviour and construction-related matters.

Other initiatives that will be undertaken as part of the TMPs include:

- Consult with the DTMR to identify mitigation measures to address increases in traffic levels of over five per cent on Gregory Developmental Road and Flinders Highway during the Mine construction and operational periods
- Consult with DTMR to ensure that general signposting of access roads are appropriate and provide adequate warning of heavy vehicle and construction activity
- Review signposted and non-signposted speed restrictions along the road network and where necessary, provide additional signposting of speed limitations
- Distribute construction activity warning notices to advise local road users of scheduled construction activities

- Provide advance notice of road/lane closures and advice on alternative routes
- Install appropriate traffic control and warning signs for areas identified to have existing potential safety risks
- Manage the transportation of materials to maximise vehicle loads and minimise vehicle movements
- Whenever practical, promote the use internal and haulage access roads rather than public roads by construction vehicles
- Project induction training for truck and vehicle operators as a requirement in the TMPs.

9. References

Department of Transport and Regional Services, June 2007, 'Brisbane – Cairns Corridor Strategy: Building Our National Transport Future'.

GHD Pty Ltd, 2012, Report for Proposed Carmichael Coal Mine: Logistics Report. Report prepared for Adani Mining Pty Ltd. 19 January 2012.

Synergies Economic Consulting for Regional Economic Development Corporation, July 2008, 'Freight Transport Study – Stage 1'.

Queensland Department of Employment, Economic Development and Innovation, August 2007, 'Northern Economic Triangle – Infrastructure Plan 2007-2012'.

Queensland Government Department of Transport and Main Roads, April 2006, 'Guidelines for Assessment of Road Impacts of Development'.

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Appendix A

Terms of Reference and Cross Reference

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Terms of Reference Requirement/Section Number	Section of this report
3.9 Transport	
3.9.1 Existing Transport	
Present the transport assessment in separate reports for each project-affected mode (road, rail, air and sea) as appropriate. These assessment reports should provide sufficient information to allow an independent assessment of how existing transport infrastructure will be affected by project transport at the local and regional level. They should also include all base data assumptions, including current condition of the affected network and its performance.	Single report has been prepared across all modes as this is considered appropriate for the project. Section 1.5, 2.5, 3.1 to 3.6
An overview map of the state-controlled road (SCR) network showing other major inventory features (e.g. bridges) should be included to enable the site to be fully understood in context of this network. The map should include the location of construction activities, access locations (existing and proposed) to the SCR network (if applicable), and potential crossings of the SCR network associated with the proposed rail line, as well as any construction camps likely to be used.	Section 3.1 and Figure 1-1
Section 3.9.2 For all phases of the project, describe the following (for example traffic data should be presented as average annual daily traffic and percentage of vehicle by class— including light vehicles, heavy vehicles etc):	
◗ expected volumes of project inputs and outputs of transported raw materials, wastes, hazardous goods, finished products	Section 4, 5
◗ how identified project inputs and outputs will be moved through the transport network (volume, composition, trip timing, routes and haulage of materials)	Section 4.3, 5.2.3
◗ traffic generated by construction and operational workforce personnel including visitors (volume, composition, timing and routes) and likely accommodation facilities including possible bussing strategies to manage peak hour travel from major accommodation centres	Section 4.2.5, 5.2.4
◗ likely heavy and oversize/indivisible loads (volume, composition, timing and routes) highlighting any vulnerable bridges and structures along proposed routes	Section 6.3, 7.3
Section 3.9.3 Potential Impacts	
Impact assessment reports should include:	
◗ details of the adopted assessment methodology (for impacts on roads, the road impact assessment report in general accordance with the Guidelines for Assessment of Road Impacts of Development)	Section 6, 7
◗ description of input data and assumptions	Section 2.4
◗ a summary of consultation undertaken with transport authorities and Queensland Police Service (QPS) regarding scope of impact assessment and methodology	Section 2.3
Assess project impacts on:	
◗ capacity, safety, efficiency and condition of transport operations, services and assets (from either transport or project operations)	Section 2.2

Terms of Reference Requirement/Section Number	Section of this report
◗ any other proposed rail projects in the vicinity of the subject proposal	Section 6.3.1, 7.3.1
◗ possible interruptions to transport operations	Section 3.1.9
◗ possible impacts on the existing road network from building the proposed rail infrastructure (e.g. haulage of construction inputs)	See Volume 4 Appendix AG
◗ road safety and efficiency due to where and how rail crossings will be built	See Volume 4 Appendix AG
◗ the natural environment within the jurisdiction of an affected transport authority (e.g. road and rail corridors)	N/A
◗ the nature and likelihood of product-spill during transport if relevant	See Volume 2 Section 12
◗ driver fatigue for workers travelling to and from regional centres and key destinations	See Volume 2 Section 12
◗ Any existing or proposed strategies for public passenger transport and active transport and address, where relevant, requirements of Part 2A of the Transport Planning and Coordination Act 1994	N/A
◗ access to transport for people with a disability	Section 7.3.4
Detail any proposed new rail infrastructure to be constructed and operated.	See Volume 4 Appendix AG
For listed species with the potential to occur within or near the proposed site, provide an analysis of all direct and indirect impacts of the each railway option, including; habitat lost, edge effects, incursion of vertebrate pests, noise and disturbance, habitat fragmentation, as a direct source of mortality and cumulative impacts as a result of the presence of other linear infrastructure (eg where habitat becomes isolated between the proposed railway and other linear infrastructure).	See Volume 1 Section 1
This section must discuss the uncertainties in information provided and risks to the viability of listed species populations locally, regionally and nationally.	See Volume 1 Section 1
Section 3.9.4 Detail infrastructure alterations	
Detail:	
◗ any proposed alterations or new transport-related infrastructure and services required by the project (as distinct from impact mitigation works)	Section 4
◗ construction of any project-related plant and utilities, within or impacting on the jurisdiction of any transport authority	Section 4.3.1, 5.2.2
◗ requirements to upgrade existing level crossings due to increased project traffic during both the construction and operations phases of the project including community indirect costs and benefits and later staged upgrading requirements over the life of the mine	See Volume 4 Appendix AG
Section 3.9.5 Management and mitigation	
Discuss and recommend how identified impacts will be mitigated so as to maintain safety, efficiency and condition of each mode.	Section 6.4.3, 7.3.3
Prepare these mitigation strategies in close consultation with relevant transport authorities and QPS, considering each authority's works program and forward planning.	Section 6.4.3, 7.3.3

Terms of Reference Requirement/Section Number	Section of this report
Use the findings of studies and transport infrastructure impact assessments to prepare a transport management plan.	Section 6.4.3, 7.3.3

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