11. Transport

This section provides a summary of the transport assessment, and the potential impacts identified, in regards to the Project (Mine) during construction and operation. The assessment was undertaken in accordance with the requirements of the Terms of Reference (ToR) and a table cross-referencing these requirements is provided in Volume 4 Appendix C ToR Cross Reference Table. A detailed transport report is included in Volume 4 Appendix W Transport Assessment.

11.1 Introduction

11.1.1 Approach

The transport assessment for the construction and operational stages of the Project (Mine) and a detailed technical report is provided in Volume 4 Appendix W Mine Transport Report. A summary of this information is presented herein. The assessment was undertaken in accordance with the requirements of the Terms of Reference and based on a logistics study identifying probable transport routes for each phase of the Project. This study included consultation with the Queensland Department of Transport and Main Roads (DTMR) and Isaac Regional Council (IRC) (Refer Volume 4 Appendix F Social Impact Assessment and W Mine Transport Assessment for consultation participants).

11.1.2 Methodology

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".

While not mandatory, the guideline suggests a process and methodology to undertake the Transport Impact Assessment (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 is detailed in Table 11-1.

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 is defined in Table 11-2.

Table 11-1 Performance Criteria (GARID) – Assessment

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

Table 11-2 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*

11.1.1 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 (during 4th quarter 2011):

- A review of aerial photography and other mapping information
- Existing traffic count data for state-controlled roads (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

11.2 Description of Existing Situation

11.2.1 Existing Road Network

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 State Controlled Roads (SCRs).

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 11-3 provides the classification of each road within the Study Area and identifies the road authority that manages each road. A description of existing road conditions including general characteristics and townships is provided in Section 3.1.2 of Volume 4 Appendix W Mine Transport Assessment.

Table 11-3 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
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

Road Name	Road Authority	Classification	HV Designation
Marlborough – Sarina Road	DTMR	District	
Moray Carmichael Boundary Road (Doongmabullah Rd)	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*

11.2.1.1 Existing Traffic Volumes on State Controlled Roads

Existing traffic count data was obtained from the DTMR and is presented in Table 11-4. 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 11-4 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 data presented in Table 11-4 it is apparent that State Roads are utilised as existing haulage routes.

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.

Table 11-4 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%

Road Name	AADT	Percentage HV
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%

11.2.1.2 Existing Road Network – Local Roads

Local roads that may be used to access the Mine are managed and controlled by IRC. IRC provided traffic volume data for some of the local roads expected to be impacted by the Project (Mine). This data includes the AADT and the percentage of traffic comprising of heavy vehicles and is presented in Table 11-5. 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

All of the above roads are understood to carry relatively low traffic volumes and have been assessed on this basis.

Table 11-5 Existing AADT Volumes on Local Roads

Road Name	AADT	% HV
Elgin Moray Road	350 - 2000	40%
Golden Downs Avon Road	40	30%

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

Table 11-6 shows the current performance as a LOS, for each state road relevant to the Project. It also indicates that all state roads currently act as haulage routes and operate satisfactorily with some spare road capacity to accommodate additional traffic. However, 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 during the operational planning.

Table 11-6 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
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

Road Name	AADT	Peak Hour Two way Flow	Two way Flow Capacity	V/C	LOS
Kilcummin Diamond Downs Road Site 159539	52	5	2800	0.001	A

11.2.1.4 Crash History

The following section provides a brief summary of available historical crash data obtained from the DTMR for roads impacted by the Project (Mine). 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)

The detailed crash data is shown in Section 3.1.7 of Volume 4 Appendix W Mine Transport Assessment. 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.

11.2.1.5 Urban Areas

Table 11-7 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 vehicle routes to minimise impact on towns.

Table 11-7 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

Township Name	Township Type	Population Size
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

11.2.1.6 Asset Condition

IRC have identified that a number of the roads in the vicinity of the Project (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.

11.2.2 Existing Rail Network

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 11-1 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

11.2.2.1 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). This will provide sufficient capacity to accommodate the requirements of the Project.

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 has enabled an increase in the capacity of Abbot Point Coal Terminal 1 to 50 Mtpa.

11.2.2.2 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.

Should the proposed expansion be implemented sufficient capacity exists for the Project.

LEGEND

- Town
- Major Port
- Project (Mine)
- Mine (Offsite)
- Rail (West)
- Rail (East)

Other Rail Networks

- Finch Hatton Branch
- Goonyella System
- Great Northern Line
- Newlands System
- North Coast Line
- Townsville Mount Isa

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Kilometres

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

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Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Job Number 41-25215
Revision D
Date 10-10-2012

Existing Rail Network

Figure: 11-1

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Data Source: © Commonwealth of Australia (Geoscience Australia): Towns, Railways (2007); DERM: LGA (2011); DME: EPC1690 (2010), EPC1080 (2011);
Adani: Alignment Opt9 Rev3 (SP1 & 2) (2012); Gassman/Hyder: Mine (Offsite) (2012); ESRI: Terrain Basemap (2012). Created by: BW, JVC, MS

11.2.3 Existing Port Facilities

11.2.3.1 Queensland Central and North Queensland Ports

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 11-2):

- 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
- 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

11.2.3.2 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 regulated 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 rail in-loading facilities, onshore coal handling and stockpile areas, and offshore trestles, wharves and ship loading facilities. The DBCT wharf is 3.8 km offshore and includes three ship-loaders and the HPCT wharf is 1.8 km offshore with two ship-loaders.

In 2010-11, total throughput for the port was approximately 88 Mt, of which 33 Mt was through HPCT and 55 Mt through DBCT, which was delivered via 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, which is regulated 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 (APCT 1) which is owned (under long-term 99 year lease) by Adani Abbot Point Terminal Pty Ltd (Adani APT), a subsidiary of the Adani Group and operated by Abbot Point Bulk Coal Pty Ltd (a subsidiary of X-Strata).

APCT 1 comprises a rail in-loading facility, coal handling and stockpile areas, and a dual trestle jetty and conveyors connected to two berths and ship-loaders, located 2.75 km offshore, with a capacity of 50 Mtpa. Coal is supplied to the port via the Newlands rail system.

Adani APT is proposing to develop a second terminal, Terminal 0, in 2013, 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.

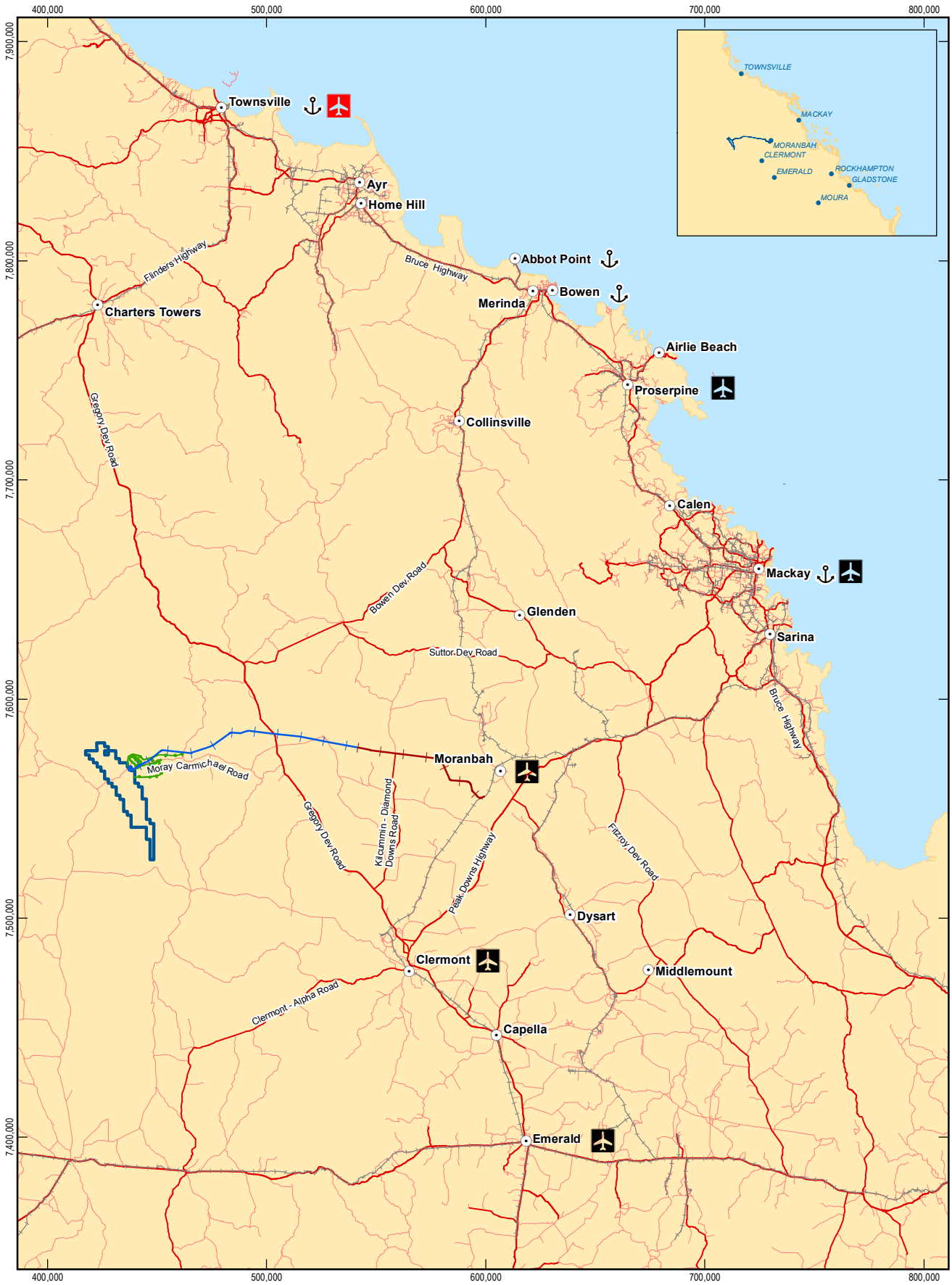
The majority of ports assessed have the capabilities to accommodate construction material imports

11.2.4 Existing Airport Facilities

A 2,200 m long airstrip will be required within proximity to the mine village. This will allow for efficient transport of employees for the construction and operation of onsite and offsite Project (Mine) infrastructure.

There is one international airport, two domestic airports, one regional airport and numerous additional local airstrips in the vicinity of the Study Area. A proposed personnel transport strategy for the construction phase and operation phase of the Project (Mine) is likely to require a proportion of fly-in fly-out (FIFO) with the workforce transported by coaches for transfer between the Mine village and 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:

- Townsville (International)
  - 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.
  - Situated approximately 5 km to the north of Townsville City Centre.
  - Four aerobridges (one international and three domestic) for aircraft up to the size of Boeing 767
  - 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.
  - Mining charter flights 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.



LEGEND

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

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Kilometres

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

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Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Job Number 41-25215
Revision E
Date 10-10-2012

Project Area Ports and Airports

Figure: 11-2

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

- Mackay (Domestic) 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.
- Proserpine (Domestic) located approximately 10 km south of Proserpine with Jetstar Airways and Virgin Australia currently operate daily flights between Proserpine and Brisbane.
- Emerald (Regional) located approximately 6 km from the town of Emerald. Australian Air Express, QantasLink, Sunstate Airlines and Virgin Australia currently operate flights between Emerald and Brisbane.
- Moranbah Airport is located off Goonyella Road, approximately 6 km south of Moranbah. 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 is a locally operated strip with no regular commercial services.
- Bowen is a locally operated strip with no regular commercial services.
- Collinsville is a locally operated strip with no regular commercial services.

Moranbah and Clermont airports are capable of accommodating regional air services.

Table 11-8 outlines details of the above mentioned airports.

A proportion of the FIFO workforce could also depart from Cairns, Sunshine Coast, Gold Coast and Brisbane Airports, all of which are outside of the study area

Table 11-9 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
2	1,900 m	30 m	Asphalt	Yes

Runway No.	Length	Width	Surface	Lighting
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

11.2.5 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.

11.3 Potential Impacts and Mitigation Measures

11.3.1 Overview

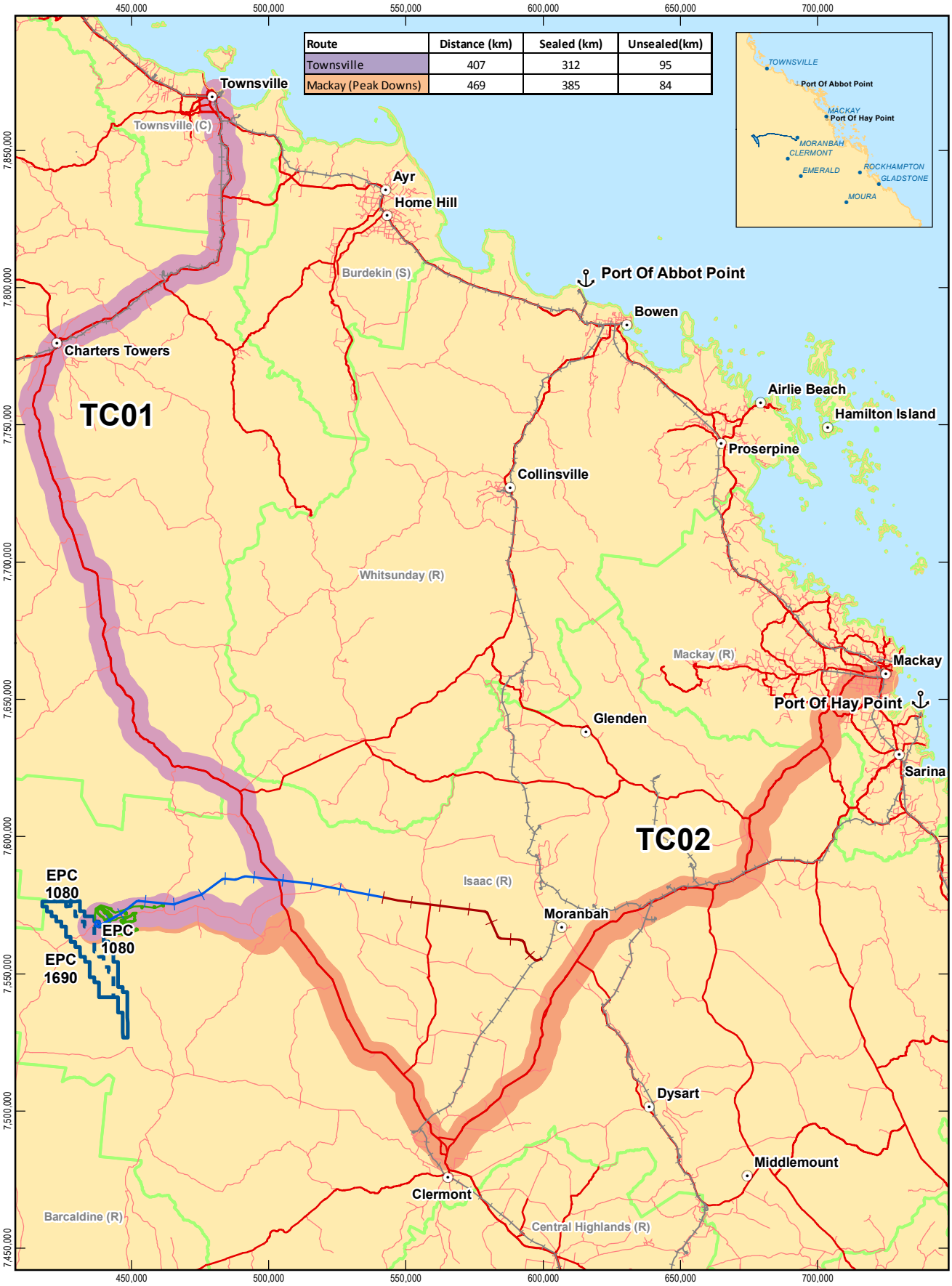
The study period for the construction of the Project (Mine) covers the ten year period 2013 – 2022. This period includes the construction of the mine, production ramp up, and three years of maximum production at 60 Mtpa (Runge, 2011).

Transport corridors used by the Project (Mine) are comprised of state and local controlled roads and will be used for haulage of equipment and materials during construction and operation. Table 11-10 outlines two key transport corridors that may be utilised. Transport Corridor 1 (TC01) from Townsville to the Mine via the Flinders Highway and Gregory Developmental Road, plus two local roads, is the most probable transport corridor, based on distance, asset condition and crash history.

The assessment herein is based on this route. An assessment of Transport Corridor 2 (TC02) from Mackay to the Mine via the Bruce Highway, Peak Downs highway and Gregory Developmental Road, plus two local roads, is included in the Volume 4 Appendix W Mine Transport Report. TC02 may be used for the transport of particular items to the Mine.

Table 11-10 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

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

1:2,000,000 (at A4)

0 10 20 30 40 50

Kilometres

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

N

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Project (Mine)

Indicative Haulage Route

Job Number 41-25215
Revision E
Date 10-10-2012

Figure: 11-3

G:\41\25215\GIS\Maps\MXD\100_Planning\41-25215_139_rev_e.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

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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

11.3.2 Construction Traffic Generation

11.3.2.1 Construction Activity

The construction of the Mine is scheduled to commence in 2013, with full rate of coal production expected in 2022. The traffic assessment analyses the potential construction vehicle movements from the start-up of proposed coal Mine (2013), until the three years after the full rate of coal production is expected to be first achieved at the Mine (2023), a period of ten years. Construction activity assessment below is specific to the Project (Mine), the Project (Rail) is assessed separately (Refer Volume 3, Section 11 and Volume 4 Appendix AG).

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 Preparation Plant (CHPP)** – Items associated with the Coal Handling and Preparation Plant 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** – Accommodation village for construction and operations workforce.

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 11-11. Table 11-12 provides the estimated truck movements associated with the construction of the Mine, and identifies trips associated with concrete which would not operate on the external road network. This estimate has been provided by the Logistics Study (GHD 2012). It should be noted that the figures provided in Table 11-12 include trips to and from mine (two-way trips) and are estimated on the basis of two truck movements per delivery.

Table 11-11 Construction Plant and Material

Construction Activity	Plant and material required
Coal Handling Preparation Plant (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.
Underground Coal Stockpile Areas	Structural steelwork for conveyors, including stacking, reclaim, and train load-out conveyors. Pre-assembled coal-valves.

Construction Activity	Plant and material required
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	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 11-12 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
Coal Handling Preparation Plant (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
Reclaim Stations	0	214	214

Category	Estimate of Mine Construction Truck Movements (no.)		
	Truck Movements on Internal Roads	Truck Movements on External Roads	Total
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

11.3.2.2 Construction Staging

Figure 11-4 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. With reference to Figure 11-4 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 11-13 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 11-13 represent trips to and from site and are estimated on the basis of two truck movements per delivery.

Figure 11-4 Construction Heavy Vehicle Profile (Trips on External Roads) across the Project

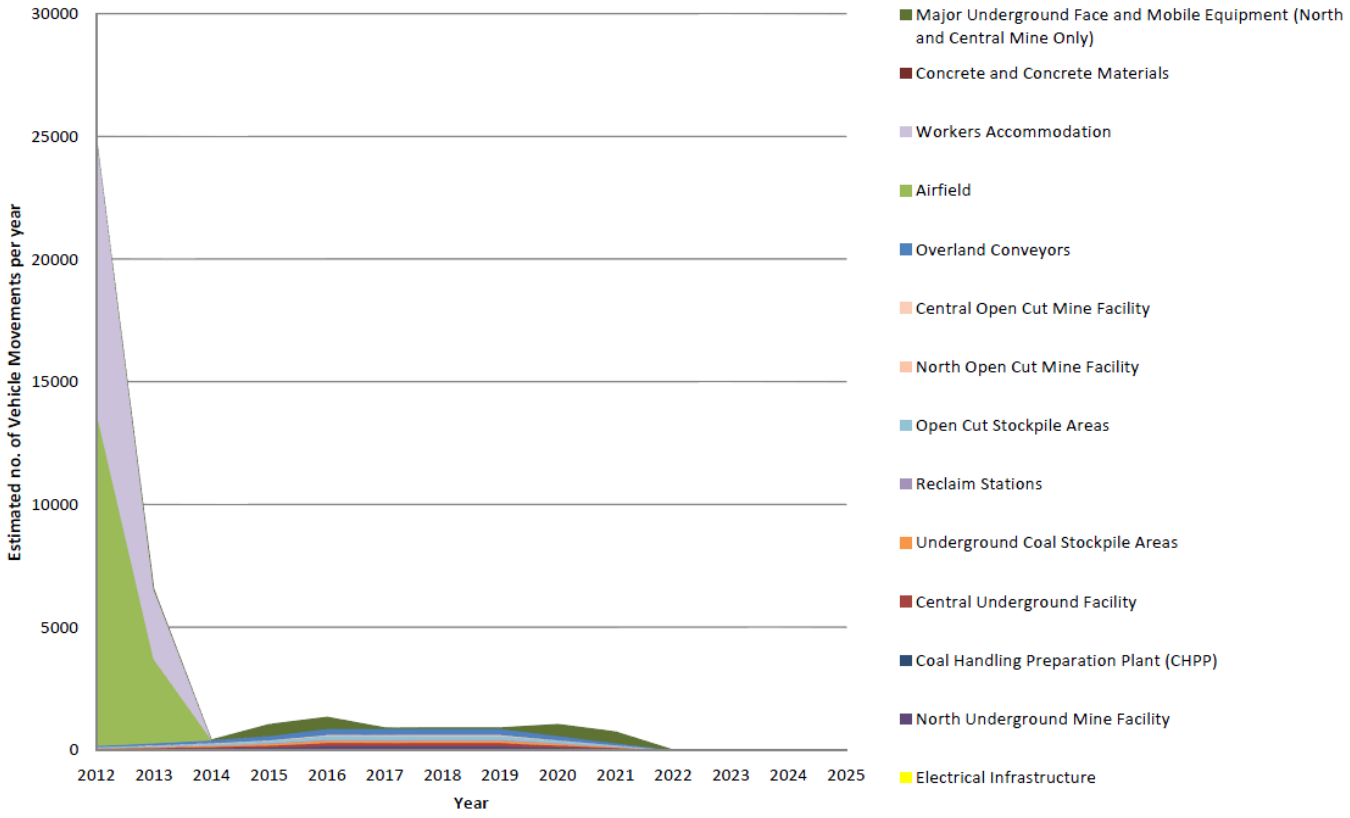

Table 11-13 Estimated Heavy Vehicle Construction Traffic (Two-way)

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

11.3.3 Operation Traffic Generation

11.3.3.1 Vehicle Movements

The main traffic generated through the construction phase will be from plant, equipment and material deliveries, as listed in the Table 11-11.

Table 11-14 Construction Plant and Material

Operation Activity	Plant and material required
Operations Equipment	Major and minor equipment (Runge Carmichael Macro-Conceptual Mining Study), 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 11-15 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 11-15 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 11-15, 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 11-15 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

11.3.3.2 Mine Operation Staging

Figure 11-5 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 11-5 shows that the peak for Mine operation vehicle movements would occur in 2025 (and beyond), with approximately 52,000 vehicle movements per annum.

Table 11-16 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 11-15 (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 11-16 represent trips to and from site and are estimated on the basis of two truck movements per delivery.

Figure 11-5 Estimated number of Vehicle Movements Per Year During Mine Operations

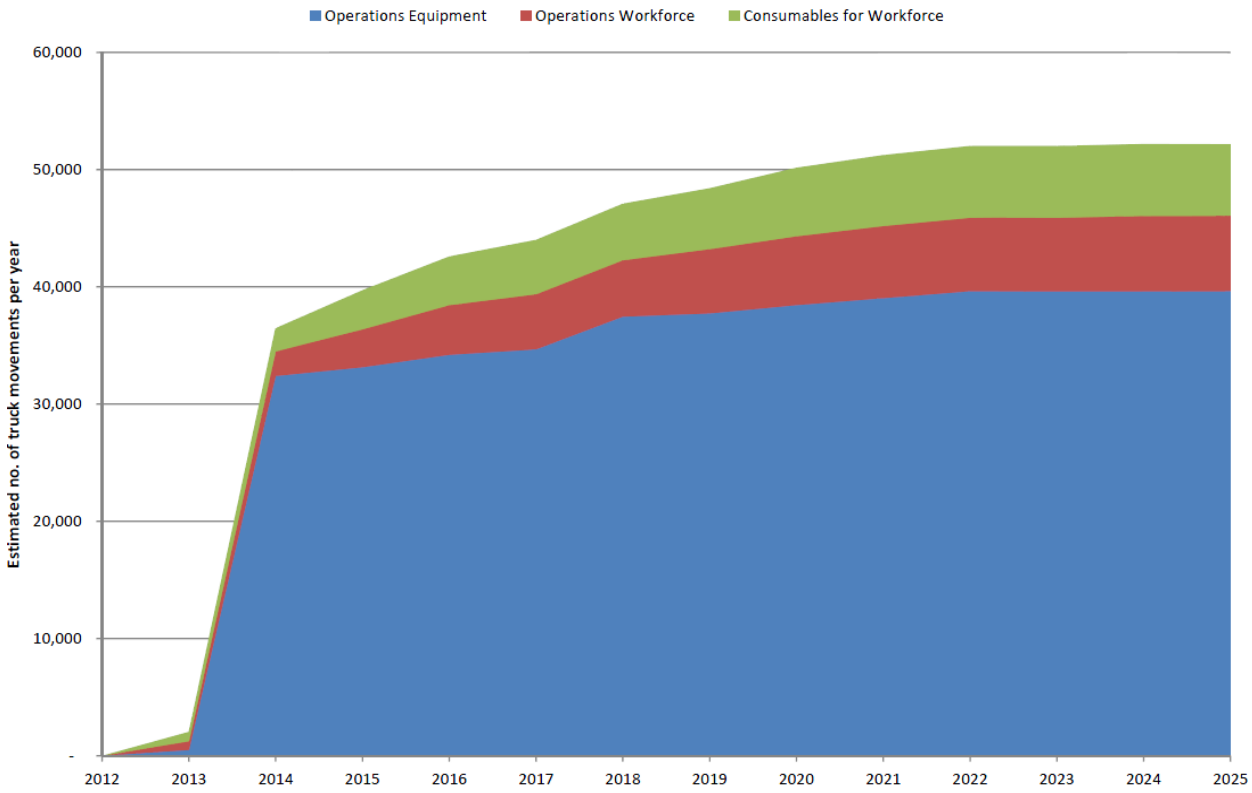

Table 11-16 Estimated Vehicle Mine Operation Traffic (Two-way)

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

11.3.4 Construction

This section of the report provides an assessment of the traffic and transport impacts associated with the proposed construction of the Mine.

11.3.4.1 Transport of Construction Workers

Trips between the Mine, workers accommodation village and permanent airport would be internal only, and would therefore not impact on the external (strategic) road network.

11.3.4.2 Transport of Heavy Vehicles Equipment

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 Figure 11-3. 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 11-17 summarises the estimated total vehicle movements during AM and PM peak under a worst-case scenario**.**

Table 11-17 Estimated Total Vehicle Movements (Worst-case Scenario)

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

Table 11-18 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 11-18 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
5309	Kilcummin Diamond Downs Road	53	23.0	0	68	4,962	21.30

11.3.4.3 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 11-19 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 11-19 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 11-19 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 11-2

11.3.4.4 Infrastructure Alterations

Road access to the Mine will be via approximately 90 km of currently unsealed local roads off the Gregory Development 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.

11.3.4.5 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 traffic management plans for construction and operation are prepared and the logistic plan for the delivery of each construction stage is further refined. This may include specific reference to times during which school buses run.

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.

11.3.4.6 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.

11.3.5 Operation

This section of the report provides an assessment of the traffic and transport impacts associated with the operation of the Mine.

11.3.5.1 Transport of Mine Workers

It is expected that the number of staff working at the Mine will be approximately 440 people in 2013, 950 people in 2015 and 2,800 people at full production in 2022. A workers accommodation village will be established south of Moray Carmichael Road to accommodate staff.

A permanent airport will be established adjacent to the Mine to service fly-in fly-out (FIFO) staff. FIFO staff will travel from anywhere on the east coast of Australia. The permanent airport will be operational 15 – 18 months after commencement of construction. Prior to completion of the permanent airport, FIFO staff will use the existing Doongmabulla airstrip.

Movements between the temporary airstrips, permanent airport and workers accommodation village are not expected to impact on the road network at an external level.

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 11-15 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 (circa 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 (2025+), resulting in an estimated nine vehicle movements to the camp occurring during the peak hour.

11.3.5.2 Bus Movements

Workers would fly-in-fly-out (FIFO) from anywhere on the east coast of Australia to the proposed airport, which is expected to be operational in 2015. Personnel would 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 would not impact on the State road network.

11.3.5.3 Transport of Heavy Vehicles Equipment

Heavy vehicles will comprise of the following:

- Coach movements for personnel transport from the nominated airports to the camp site; and
- 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 11-16. The proportion of these movements occurring during the AM and PM peak periods has been conservatively estimated at approximately 10 per cent.

Table 11-20 summarises the estimated total vehicle movements for the AM and PM peak worst-case scenario. Table 11-21 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 11-20 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 Development Road	125	12
Peaks Down Highway	0	
Kilcummin Diamond Downs Rd	0	

Table 11-21 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 (Townsville to Charters Towers)	4,894	20.2	18	125	5,036	22.11
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	3,435	13.6	0	0	3,435	13.60

Road ID	Road Name	Existing		With Project			
		ADT	Percentage Heavy Vehicles	Light (per day)	Heavy (per day)	ADT	Percentage Heavy Vehicles
	(Clermont – Nebo)						
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

11.3.5.4 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 11-22 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 11-22, 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 11-1 and Adani would 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 11-22 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

Road ID	Road Name	AADT	Percentage Impact	LOS
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 11-2

11.3.5.5 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 traffic management plans 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.

11.3.5.6 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.

11.3.6 Mitigation Measures

11.3.6.1 Construction

Table 11-19 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.

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 will be undertaken as part of the Construction Traffic Management Plan 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.

11.3.6.2 Operation

Table 11-22 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 Traffic Management Plan.

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 will be required to be undertaken as part of the Traffic Management Plan include:

- In consultation with DTMR, ensure general signposting of access roads with appropriate heavy vehicle and construction warning signs
- 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

11.4 Summary

Construction of the Project (Mine) is expected to occur over a period of approximately ten years between 2013 and 2022. The volume and intensity of truck movements will vary over the construction period. The worst-case construction period was identified to occur during 2013 and generate 25,000 trips or 68 daily trips on the external road network.

Operation of the Project (Mine) is expected to commence in 2013. The volume and intensity of the operation's vehicle movements would increases over the operation period, peaking three years after the target output production of the Mine is reached (60 Mtpa), which is planned to be by 2022. 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, the estimated 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 will 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. Traffic management issues would be addressed through the preparation and implementation of construction and operation Traffic Management Plans, which will be developed during the detailed design phase. The TMPs would be developed in consultation with the relevant DTMR Regional offices, police and local authorities.

The TMPs would 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 need 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.
- 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 and Pilot support when delivering equipment to the Mine.

The Project (Mine) Traffic Assessment has demonstrated that the potential impacts of the Project (Mine) will be managed through mitigation and management techniques in accordance with relevant approvals and maintenance agreements - particularly the Traffic Management Plan - and with ongoing consultation with relevant authorities.