


Adani Mining Pty Ltd

# NORTH GALILEE BASIN RAIL PROJECT

## Environmental Impact Statement

## Chapter 14 Transport

November 2013

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# 14. Transport

## 14.1 Purpose of chapter

The purpose of this chapter is to assess the potential impacts of the NGBR Project on transport including existing transport infrastructure and performance. This chapter includes an overview of the existing environment, consideration of potential construction and operation impacts, and the identification of proposed mitigation and management measures. A detailed existing environment report for transport was prepared for the NGBR Project and is provided in Volume 2 Appendix K Transport. The key findings of that report are included within this chapter.

The transportation values that are considered in this chapter include:

- The road transport network including:
  - State-controlled and local road performance
  - Roads and stock routes intersected by the NGBR Project
  - Key intersection performance
  - Existing heavy vehicle network
  - Active transport network
- Rail transport network including:
  - Freight network
  - Passenger rail network
- Air transport facilities
- Sea transport facilities
- Proposed transport infrastructure.

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

All mitigation and management measures identified in this chapter are included within Volume 2 Appendix P Environmental management plan framework.

## 14.2 Methodology

### 14.2.1 Study area

For the purpose of this report, the study area is defined by the NGBR Project preliminary investigation corridor (nominally 1,000 m wide) and the surrounding road network which will be utilised by construction and operation traffic to access the corridor, camp sites and ancillary infrastructure. The condition and capacity of existing rail, air and sea transport infrastructure that has the potential to be used by the NGBR Project, although outside of the study area, are also considered.

### 14.2.2 Data sources

The data sources relied upon for this transport assessment are summarised in Table 14-1.

**Table 14-1 Data sources**

| Description | Source |
|---|---|
| Physical road network | Department of Natural Resources and Mines |
| Heavy vehicle network | Queensland Government - Higher mass limits map for vehicles with road friendly suspensions 2013 |
| Railway facilities | Geosciences Australia |
| Air transport facilities | Geosciences Australia |
| Sea transport facilities | Geosciences Australia |
| Planned and future transport infrastructure | Queensland Transport and Roads Investment Program 2013-14 to 2016-17 |
| Vehicular demand data | Department of Transport and Main Roads |
| Accident data | Department of Transport and Main Roads |
| Construction and operations traffic information | NGBR Project Concept Design Report (Aarvee Associates 2013) |

### 14.2.3 Legislation and guidelines

This transport assessment has been conducted according to the Guidelines for the Assessment of Road Impacts of Developments (GARID), published by the Department of Transport and Main Roads (DTMR), 2006. GARID 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 the *Transport Infrastructure Act 1994*. This approach is supported by the legislative powers of both the *Sustainable Planning Act 2009* 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. Other guidelines that were considered included:

- Austroads, “Guide to Traffic Engineering Practice - Part 2: Roadway Capacity”
- DTMR’s Road Planning and Design Manual (RPDM), 2nd edition, 2013.
- Queensland Road Safety Action Plan 2013 – 2015.

The applicability of legislation to approvals for the NGBR Project is discussed in Volume 1 Chapter 20 Legislation and approvals.

### 14.2.4 Desktop assessment

A desktop assessment was undertaken and involved identification, and review of existing information relating to the extent, condition and capacity of the transportation values outlined in Section 14.1. This included:

- Identification and review of existing vehicular demand and percentage of heavy vehicles on the key roads and intersections

- Determination of the existing road link capacity for the impacted roads
- Identification and review of historical accident statistics in proximity to the key intersections
- Identification of any planned and future transport infrastructure upgrades which may impact the network performance in the study area.

The assessment conducted for this report has been desktop only and site investigations have not been conducted to verify desktop information.

### 14.2.5 Road performance assessment

A Level of Service (LOS) analysis on all approach roads (or road links) to the study intersections has been conducted with and without the potential NGBR Project traffic based on practical capacities determined from "Austroads Guide to Traffic Engineering Practice – Part 2: Roadway Capacity". The Austroads guideline defines LOS as a qualitative measure for describing the operational performance of road. All the approach roads (or road links) to the study intersections can be classified as rural roads. The LOS performance criteria for rural roads are provided in Table 14-2.

**Table 14-2 LOS for rural roads**

| LOS | Description | Performance |
|---|---|---|
| A | Free, unrestricted flow | Very good |
| B | Mostly free flow, few disruptions | Very good |
| C | Stable flow | Good |
| D | Mostly stable flow, some delays | Acceptable |
| E | Congested flow, delays common | Poor |
| F | Forced flow | Poor |

Source: Austroads Guide to Traffic Engineering Practice Part 2: Roadway Capacity

For the LOS assessment of selected roads within the study area, the road terrain was assumed to be level and the design hour volume to Annual Average Daily Traffic (AADT) ratio was assumed to be 0.13 (13 per cent) for all selected road sections. A value of 0.13 (13 per cent) was selected as it falls within the middle of the Austroads Guide to Traffic Engineering Practice Part 2 recommended range of 11 per cent to 16 per cent for rural situations where peak to AADT percentages are not available.

AADT data for 2012 was sourced from DTMR. The AADT data available at the closest location to the study area was used. For any road section with multiple count sites, the highest AADT volume on the road was used for a conservative assessment.

Table 14-3 shows the values for various LOS categories on rural roads in level terrain, with varying ratios of design hour volume to AADT. For the purpose of the assessment, a practical capacity of 10,400 vehicles per day has been assumed as a threshold capacity limit (at LOS D) for rural roads. As per the Austroads guideline, LOS D is considered acceptable as it is an indication of generally stable flows with some delays. Remedial measures will be required for roads operating at LOS E or worse.

**Table 14-3 Maximum AADT for various LOS on rural roads on level terrain**

| Design hour volume to AADT ratio | Level of service | | | | |
|---|---|---|---|---|---|
| | 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

Therefore, the main performance criteria adopted for the assessment of approach roads (road links) within the study area was LOS D. For the assessment of percentage increase in AADT on the State-controlled roads (SCR), an increase of less than five per cent was considered acceptable.

The assessment has been conducted for eight key approach roads comprising four SCRs and four local council roads, which facilitate access for construction and operations traffic to and from the rail corridor, construction camp sites and ancillary infrastructure.

### 14.2.6 Intersection analysis

Detailed intersection modelling and assessment has not been undertaken due to the relatively low existing traffic volumes at key intersections within the study area. However, each intersection has been assessed in terms of safety, and appropriate intersection treatments proposed to mitigate any potential safety risks that may arise due to increased turn volumes. This assessment has been conducted according to DTMR's RPDM, chapter 13.

As a conservative approach, the assessment of intersection treatment types is based on existing peak hour traffic volumes and construction traffic occurring at the same time.

### 14.2.7 Accident analysis

A high level desktop accident analysis was carried out for key roads and intersections within the study area to identify existing traffic safety issues. The following crash data was provided by DTMR:

- Fatal crashes to 31 May 2013 and hospitalisation crashes to 28 February 2013
- Medical treatment, minor injury and property damage crashes to 31 December 2010.

The full set of crash data was not available for 2011 to 2013, instead accident data for five years between 2006 and 2010 were used for the purpose of the assessment.

### 14.2.8 General assumptions

Transport of hazardous/explosive materials (such as fuel) during construction and operational phase is detailed in Volume 1 Chapter 18 Hazard, risk, health and safety.

## 14.3 Existing environment

A detailed description of the existing environment is provided in Volume 2 Appendix K Transport.

### 14.3.1 Road transport network

***Key State-controlled roads and local roads***

Within the study area, the classification of roads can be used as an indication of each road's existing functional role. Roads of state or regional significance fall under the jurisdiction of DTMR and are considered SCRs. SCRs have four administrative classifications as follows:

- National highway
- State strategic road
- Regional road
- District road.

Local roads fall under the jurisdiction of the relevant local councils and play a functional role in the movement of traffic at a local level.

The SCRs and local roads that will be utilised by construction and operation traffic to access the final rail corridor, camp sites and ancillary infrastructure have been identified and are summarised in Table 14-4.

**Table 14-4 Key SCR and local roads**

| Road name | Extent |
|---|---|
| State-controlled roads | |
| Bruce Highway | The main north-south coastal road connecting Brisbane in the south to Cairns in the north. The Bruce Highway is of national importance and extends approximately 1,700 km. |
| Bowen Developmental Road | Intersects with the Bruce Highway in Bowen and culminates at an intersection with Gregory Developmental Road. |
| Gregory Developmental Road | Runs in an approximate north-south direction, linking Charters Towers in the north to Clermont in the south. Terminates at an intersection with Peak Downs Highway. Gregory Developmental Road is a State strategic road. |
| Suttor Developmental Road | Connects Mount Coolon in the west to Nebo in the east, and terminates at Collinsville Elphinstone Road. Suttor Developmental Road is of regional importance. |
| Key local roads | |
| Glenore Road | A no-through road that intersects with the Bruce Highway at its northern extent |
| Stratford Road | A no-through road that intersects with the Suttor Developmental Road at its north eastern extent |

| Road name | Extent |
|---|---|
| Strathalbyn Road | A no-through road that intersects with the Bowen Developmental Road and proceeds in a north-west direction. |
| Strathmore Road | Intersects with the Bowen Developmental Road in Collinsville and proceeds in a westerly direction, eventually changing to Mount Wyatt Road. |

**Road/rail crossings**

The NGBR Project will require the construction of crossings where the final rail corridor intersects with public roads, stock routes, road reserves and occupational (private) trails. A list of roads that will be crossed by the NGBR Project is provided in Table 14-5 and Table 14-6.

**Table 14-5 Public road, stock route and road reserve crossings**

| Crossing | Chainage | Treatment proposed | Property owner |
|---|---|---|---|
| Abbot Point Road | -5.25 km | Road Under Rail | Privately owned by NQBP passing through MIDQ property. |
| Abbot Point Road | -6.70 km | Road under rail | Privately owned by NQBP passing through MIDQ property. |
| Abbot Point Road | 6.11 km | At-grade | Privately owned by NQBP passing through MIDQ property. |
| Bruce Highway | 12.27 km | Road under rail | DTMR SCR passing through MIDQ property. |
| Glenore Road | 34.05 km | At-grade | WRC road passing through Salisbury Plains property. |
| Road / stock crossing (gazetted stock route U398BOWN05) | 57.34 km | At-grade | DNRM have governance over the easements which form part of the National Stock Route Network. WRC road passing through Eton Vale property. |
| Strathalbyn Road | 61.58 km | At-grade | WRC road passing through Eton Vale property. |
| Stock crossing (identified gazetted stock route) | 62.77 km | At-grade | DNRM have governance over the easements which form part of the National Stock Route Network. This stock route passes adjacent to Eton Vale and Glen Alpine properties. |
| Road / stock crossing (identified gazetted stock route) | 79.55 km | At-grade | DNRM have governance over the easements which form part of the National Stock Route Network. WRC road passing adjacent to Tabletop and Bakara properties. |
| Road reserve (not constructed) | 83.70 km | Close | WRC road passing through Bakara property. |

| Crossing | Chainage | Treatment proposed | Property owner |
|---|---|---|---|
| Strathmore Road / stock crossing (gazetted stock route U321BOWN01) | 97.89 km | At-grade | DNRM have governance over the easements which form part of the National Stock Route Network. WRC road passing through Strathmore property. |
| Road reserve (not constructed) | 117.11 km | Close | WRC road passing through Birralee property. |
| Road crossing (minor road) | 120.46 km | At-grade | WRC road passing through Birralee property. |
| Stock crossing (gazetted stock route U409BOWN02) | 133.34 km | At-grade | DNRM have governance over the easements which form part of the National Stock Route Network. |
| Road reserve (not constructed) | 139.27 km | Close | WRC road passing through Havilah property. |
| Road crossing (minor road) | 153.92 km | At-grade | WRC road passing through Fig Tree property. |
| Bowen Developmental Road | 173.20 km | Road over rail | DTMR State-controlled road passing through Cerito property. A road diversion is proposed to maintain or improve horizontal geometry and to mitigate any resultant skew angle on the proposed bridge structure. |
| Cerito Road (Minor Road) | 177.82 km | Close | WRC road passing through Cerito property. |
| Cerito Road (Minor Road) | 180.25 km | At-grade | WRC road passing through Cerito property. |
| Stock crossing (gazetted stock route U403BOWN02) | 186.37 km | At-grade | DNRM has governance over the easements which form part of the National Stock Route Network |
| Road reserve (not constructed) | 205.84 km | Close | WRC road passing through Terang property. |
| Suttor Developmental Road | 231.27 km | At-grade | DTMR State-controlled road passing adjacent to Gleneva and Chesterfield properties. A road diversion is proposed to maintain or improve horizontal geometry and to mitigate any resultant skew angle on the proposed bridge structure. |
| Kilcummin Diamond Downs Road | 244.68 km | At-grade | WRC road passing through Glen Avon property. |

| Crossing | Chainage | Treatment proposed | Property owner |
|---|---|---|---|
| Stratford Road | 262.95 km | At-grade | IRC road passing through Stratford property. |
| Stock crossing (gazetted stock route U402BOWN01) | 269.63 km | At-grade | DNRM has governance over the easements which form part of the National Stock Route Network. |
| Gregory Developmental Road | 303.79 km | Road over rail | DTMR SCR passing through Disney property. |

**Table 14-6 Occupational (private farm) trails**

| No | Chainage | Treatment proposed | Lot plan | Property name |
|---|---|---|---|---|
| 1 | 10.85 km | Underpass | 1RP705785 | Unnamed |
| 2 | 18.55 km | At-grade | 3HR1686 | Unnamed |
| 3 | 20.59 km | Underpass | 24RP805036 | Salisbury Plains |
| 4 | 26.69 km | At-grade | | |
| 5 | 36.53 km | At-grade | 4SB687 | Nevada |
| 6 | 37.73 km | At-grade | | |
| 7 | 42.42 km | Underpass | | |
| 8 | 43.63 km | Underpass | SB279 | Thurso |
| 9 | 48.58 km | At-grade | 3SB514 | White Kangaroo |
| 10 | 52.65 km | Underpass | | |
| 11 | 58.80 km | Underpass | 13SP232519 | Eton Vale |
| 12 | 67.32 km | At-grade | 5047PH370 | Glen Alpine |
| 13 | 72.09 km | At-grade | | |
| 14 | 83.55 km | Underpass | 86DK154 | Bakara |
| 15 | 84.84 km | At-grade | | |
| 16 | 91.35 km | Underpass | 3SP132678 | Strathmore |
| 17 | 105.70 km | At-grade | | |
| 18 | 109.56 km | At-grade | 9DK17 | Myuna |
| 19 | 114.48 km | At-grade | | |
| 20 | 115.25 km | At-grade | 618PH2106 | Birralee |
| 21 | 119.50 km | Underpass | | |
| 22 | 125.41 km | At-grade | | |
| 23 | 126.83 km | At-grade | | |

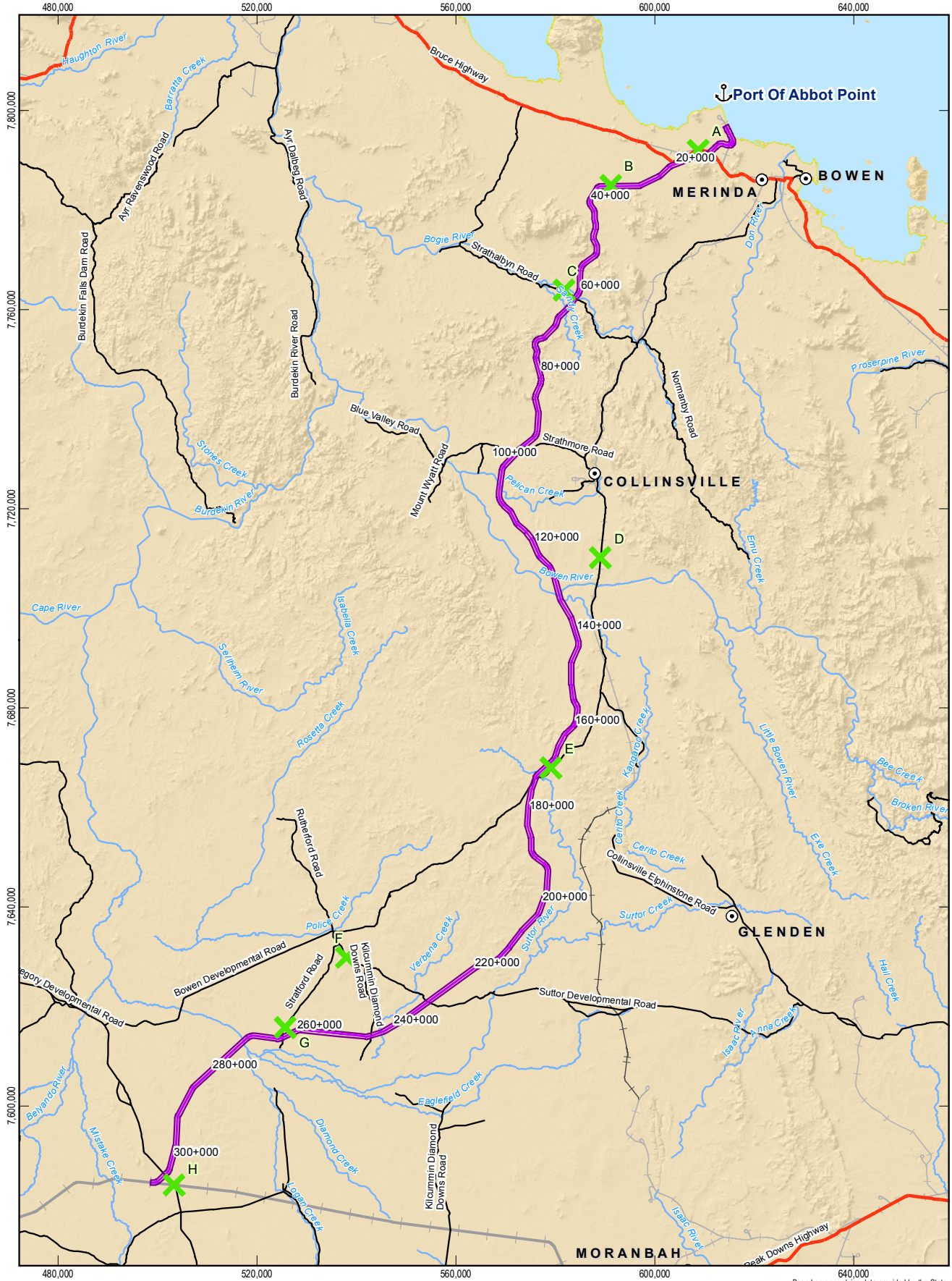
| No | Chainage | Treatment proposed | Lot plan | Property name |
|---|---|---|---|---|
| 24 | 131.75 km | Underpass | | |
| 25 | 140.35 km | At-grade | 62SP195387 | Havilah |
| 26 | 142.07 km | At-grade | | |
| 27 | 151.90 km | Underpass | 4SP171921 | Fig Tree |
| 28 | 157.05 km | Underpass | | |
| 29 | 169.90 km | Underpass | 1510SP171920 | Cerito |
| 30 | 184.35 km | Underpass | | |
| 31 | 186.60 km | Underpass | | |
| 32 | 187.95 km | At-grade | 667PH1321 | Mount Lookout Holdings |
| 33 | 193.45 km | At-grade | | |
| 34 | 200.27 km | Underpass | | |
| 35 | 211.65 km | At-grade | 1DK244 | Terang |
| 36 | 215.58 km | At-grade | | |
| 37 | 219.54 km | At-grade | | |
| 38 | 222.50 km | At-grade | | |
| 39 | 224.95 km | At-grade | | |
| 40 | 229.40 km | At-grade | 1943SP221555 | Verbena |
| 41 | 230.24 km | At-grade | | |
| 42 | 232.15 km | At-grade | 1DK150 | Chesterfield |
| 43 | 234.95 km | At-grade | 3DC91 | Cantaur Park |
| 44 | 241.95 km | At-grade | | |
| 45 | 250.05 km | At-grade | 3821PH1304 | Stratford |
| 46 | 253.98 km | At-grade | | |
| 47 | 266.62 km | At-grade | | |
| 48 | 273.0 km | At-grade | | |
| 49 | 274.05 km | At-grade | 10BL49 | Avon Downs |
| 50 | 283.37 km | At-grade | | |
| 51 | 289.08 km | At-grade | 4SP116046 | Disney |
| 52 | 295.51 km | Underpass | | |
| 53 | 298.97 km | At-grade | | |
| 54 | 302.92 km | At-grade | | |

### Key intersections and road sections

Key intersections (new and existing) that will facilitate access to the NGBR Project final rail corridor, construction camp sites and other ancillary infrastructure are described in Table 14-7. The locations of these key intersections are shown in Figure 14-1.

**Table 14-7 Summary of key intersections**

| ID | Key intersection | Approximate chainage (km) | Extent and condition | Historical accident data (2006 to 2010) |
|---|---|---|---|---|
| A | Bruce Highway/New Access Road | 14 | Proposed two-way, two-lane, sealed road to access Construction Camp 1 and Concrete Batch Plant 1. | Two collisions |
| B | Glenore Road/New Access Road | 34 | Proposed unsealed, two-way, two-lane road to access ancillary infrastructure. | No collisions |
| C | Strathalbyn Road/New Access Road | 62 | Proposed two-way, two-lane, unsealed road to access Construction Camp 2 and Concrete Batch Plant 2. | No collisions |
| D | Bowen Developmental Road/New Access Road | 120 | Proposed two-way, two-lane, sealed road to access Construction Camp 3 and Concrete Batch Plant 3. | No collisions<br>Single accident 3.4 km to south of intersection |
| E | Bowen Developmental Road/New Access Road | 170 | Proposed two-way, two-lane, sealed road to access Construction Camp 4, construction yard, Concrete Batch Plant 4 and bridge laydown area. | No collisions<br>Single accident 2.2 km southwest of intersection |
| F | Suttor Developmental Road/Stratford Road | 230 | Existing two-way, two-lane, unsealed road will provide access to bridge laydown area | One hit object collision |
| G | Stratford Road/New Access Road | 262 | Proposed two-way, two-lane road, unsealed intersection to access Construction Camp 5 and Concrete Batch Plant 5. | No collisions |
| H | Gregory Developmental Road/New Access Road | 305 | Proposed two-way, two-lane road, sealed intersection to access ancillary infrastructure. | No collisions |




LEGEND

- Population Centres
- Major Port
- Key Intersections
- Highway
- Main Road
- Carmichael Project (Rail)
- Existing/Other Rail Network
- Watercourses (Major)
- North Galilee Basin Rail 1000m Corridor
- North Galilee Basin Rail 100m Corridor



1:1,100,000 Paper Size A4

0 10 20 40

Kilometres

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

N

GHD

adani

**Adani Mining Pty Ltd**
North Galilee Basin Rail Project

| | |
|---|---|
| Job Number | 41-26457 |
| Revision | B |
| Date | 29 Aug 2013 |

# Key intersections

Figure 14-1



Level 9, 145 Ann Street Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com



Data source: GA: Populated Places, Railway, Watercourse/2007; Adani: NGBR Corridor 13/05/2013 NGBR Corridor 06/06/2013, Camichael Rail Project/2013, Chainage/2013; DNRM: Roads/2010; GHD: Study Intersections/2013. Created by:MS

### Traffic volumes and capacity of key roads

A LOS approach was used to determine the existing performance of key roads within the study area (refer Section 14.2.5). Table 14-8 provides the AADT and subsequent LOS on all the selected key roads. It should be noted that peak AADT percentages indicating peak hour traffic volumes were not available and therefore 13 per cent of AADT volumes was selected as the peak hour volume in accordance with the Austroads Guide to Traffic Engineering Practice Part 2 recommended range.

**Table 14-8 Existing traffic volumes and LOS (2012)**

| Road name (location) | 2012 AADT (Light vehicles) | 2012 AADT (Heavy vehicles) | Total (Vehicles /day) | LOS (2012) |
|---|---|---|---|---|
| Bruce Highway (near chainage 14 km)[1] | 2,987 | 605 | 3,592 | B |
| Glenore Road (near chainage 34 km)[2] | 26 | 3 | 29 | A |
| Strathalbyn Road (near chainage 62 km)[1] | 1,101 | 115 | 1,216 | A |
| Bowen Developmental Road (near chainage 120 km)[3] | 1,234 | 152 | 1,386 | A |
| Bowen Developmental Road (near chainage 170 km)[3] | 286 | 49 | 335[4] | A |
| Suttor Developmental Road (near chainage 230 km)[1] | 26 | 3 | 29 | A |
| Stratford Road (near chainage 262 km)[1] | 26 | 3 | 29 | A |
| Gregory Developmental Road (near chainage 305 km)[3] | 586 | 124 | 710 | A |

Note:
1. No data available at location, closest AADT selected
2. No AADT is provided, therefore based on the road location and AADT of a similar road type has been used
3. No data available at location, closest and maximum AADT selected
4. Substantial decrease in traffic along this section of Bowen Developmental Road could be because this station is located further away from town or more built-up areas

All the key roads in Table 14-8 are operating at an existing LOS A with the exception of the Bruce Highway (near chainage 14 km), which is operating at LOS B. The existing LOS at all the selected key roads indicates free and uninterrupted travelling conditions.

### Heavy vehicle network

The percentage of heavy vehicles on key roads within the study area is provided in Table 14-9. The heavy vehicle data was based on 2012 AADT counts sourced from DTMR. For any road with multiple count sites, the highest percentage of heavy vehicle information (nearest the study area) was used for a conservative assessment. A map of the DTMR heavy vehicle network is provided in Figure 14-2.

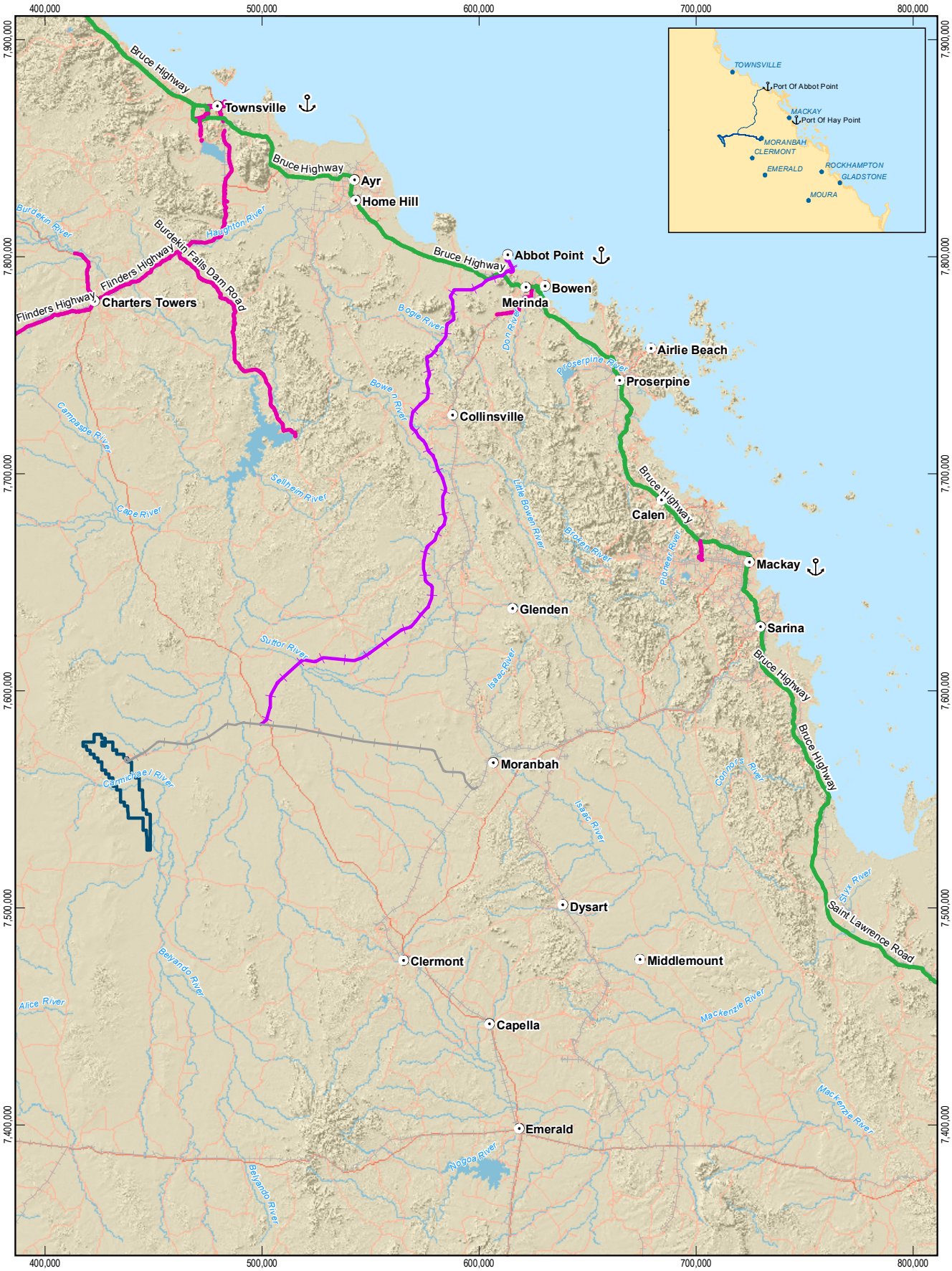
**Table 14-9 Percentage heavy vehicles on key roads**

| Road name (location) | Heavy vehicles |
|---|---|
| Bruce Highway (near chainage 14 km)[1] | 16.8% |
| Glenore Road (near chainage 34 km)[2] | 10.3% |
| Strathalbyn Road (near chainage 62 km)[1] | 9.4% |
| Bowen Developmental Road (near chainage 120 km)[3] | 10.9% |
| Bowen Developmental Road (near chainage 170 km)[3] | 14.6% |
| Suttor Developmental Road (near chainage 230 km)[1] | 10.3% |
| Stratford Road (near chainage 262 km)[1] | 10.3% |
| Gregory Developmental Road (near chainage 305 km)[3] | 17.4% |

Note:
1. No data available at location, closest AADT selected
2. No AADT is provided, therefore based on the road location and AADT of a similar road type has been used
3. No data available at location, closest and maximum AADT selected

A review of the DTMR heavy vehicle route network shows that:

- Bruce Highway near NGBR final rail corridor is an approved route for B-Double vehicles. This will provide access for B-Double vehicles to Construction Camp 1 and other ancillary infrastructures in the vicinity of this camp
- Bowen Developmental Road between Bowen and Collinsville is an approved route for Type 1 (11 axle and 36.5 metres long) vehicles. This will provide direct access for Type 1 vehicles from the Port of Abbot Point to Construction Camp 3 and other ancillary infrastructure in the vicinity of the Construction Camp 3.
- Bowen Developmental Road between Collinsville, Mount Coolon and Belyando is also an approved route for Type 1 and Type 2 (16 axle and 53.5 metres long) vehicles. This will provide direct access for Type 1 vehicles from the Port of Abbot Point to Construction Camp 4 and associated ancillary infrastructure between Newlands rail system and Mount Coolon
- Suttor Developmental Road between Mount Coolon and Eaglefield is also an approved route for Types 1 and 2 vehicles. This route will be used by Type 1 and Type 2 vehicles to access the bridge and track laydown areas and other ancillary infrastructures in the vicinity
- Gregory Developmental Road between Belyando and Clermont is also an approved route for Type 1 and 2 vehicles. This route will be used by Type 1 and Type 2 vehicles to access the track construction depot and other ancillary infrastructures in the vicinity.




LEGEND

- Town
- Major Port
- Major Road
- Minor Road
- Watercourse

Heavy Vehicle Road

- Major Highway System (Approved for Higher Mass Limits)
- Additional Roads Approved for Higher Mass Limits
- Existing/Other Rail Network

- Carmichael Project (Rail)
- Carmichael Project (Mine)
- North Galilee Basin Rail



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**
North Galilee Basin Rail Project

Job Number 41-26457
Revision B
Date 29 Aug 2013

Heavy vehicle transport network

Figure 14-2

G:\41\26457\06 GIS\Maps\MXD\1000_Transport\41_26457_1003_rev_b.mxd Level 9, 145 Ann 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), NGBR Rail Option 6 Rev 2 (06/06/2013), Carmichael Project Rail (2013). Created by: AJ

**Existing public transport network**

There is a lack of public and private bus services within the study area. Services operating within the vicinity of the study area include:

- A school bus between Bowen and Collinsville State School (Bowen Transit)
- A school bus between Mount Coolon and Collinsville State School (Bowen Transit)
- Greyhound intercity coaches, servicing Mackay, Proserpine and Bowen via the Bruce Highway.

**Active transport network**

Active transport networks include footpaths, on-street facilities such as bikeways, bike lanes and shared bicycle facilities. There is currently no pedestrian or cyclist infrastructure along key roads within the study area due to the rural setting, long distances from surrounding communities, the high speed environment of the road network and the low pedestrian and cyclist volumes.

### 14.3.2 Rail transport network

**Freight network**

The existing freight rail network within Central Queensland is shown in Figure 14-3 and includes the following freight line services:

- Blair Athol Branch Railway
- Central Line
- Collinsville-Newlands Branch Railway
- Curragh Branch Railway
- Finch Hatton Branch Railway
- Goonyella Branch Railway
- Great Northern Line
- Gregory Branch
- Kinrola Branch Railway
- Laleham Branch Railway
- North Coast Line
- Northern Missing Link
- Norwich Park Branch Railway
- Springsure Branch Railway
- Wotonga-Blair Athol Branch Railway
- Yaraka Branch Railway.

The NGBR Project final rail corridor is situated to the west of the Newlands rail network primarily interacting with this rail service (via proposed grade-separated crossing) in the northern section of the final rail corridor in the vicinity of Abbot Point.

All the existing freight rail networks in the region are narrow gauged track with 26.5 tonnes axle loads.

Other proposed rail transport infrastructure in the vicinity of the NGBR Project includes:

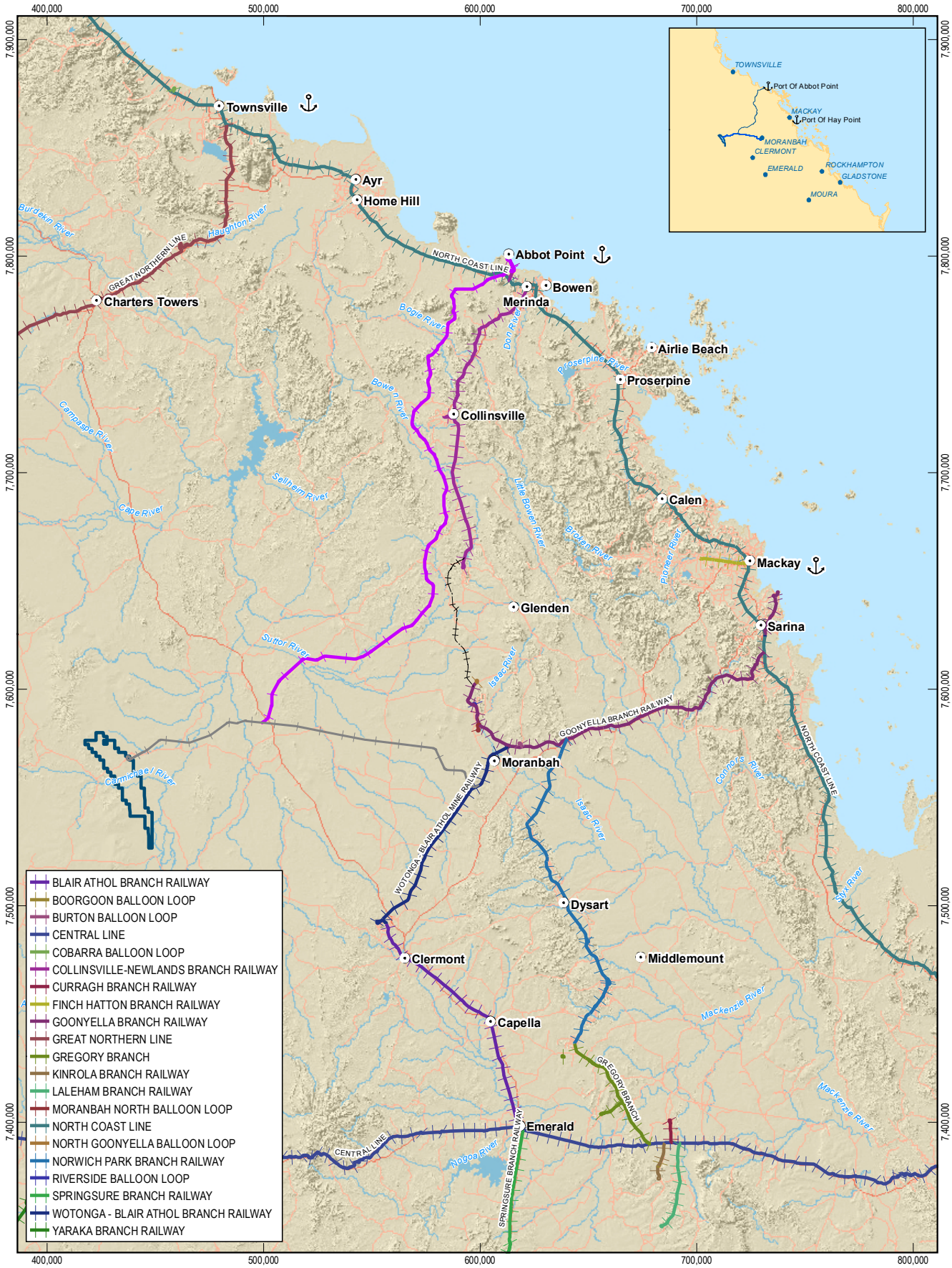
- GVK Hancock Coal Infrastructure Pty Ltd (GVK-Hancock) is developing the Alpha Coal Railway between its Alpha Coal and Kevin's Corner projects in the Galilee Basin near Alpha, Central Queensland. Technical design has been completed, and State and commonwealth approvals are advanced, however no funding is currently allocated. Aurizon and GVK-Hancock have signed a non-binding term sheet to jointly progress the development of rail and port infrastructure to unlock Galilee Basin coal reserves including GVK Hancock's Alpha, Kevin's Corner and Alpha West coal mines and a process to support the next phase of coal growth in the Bowen Basin.
- Waratah Coal Pty Ltd's Galilee Coal Project which includes a new underground coal mine and associated infrastructure located 30 km north of Alpha in the Galilee Basin as well as a standard gauge rail link, from the mine to the boundary of the Abbot Point Sate Development Area. State approval was received from the Coordinator-General on 9 August 2013.
- The Central Queensland Integrated Rail Project is proposed by Aurizon and would incorporate a 180 km rail corridor from the Galilee Basin to the existing Newlands system, upgrades and deviation to the Newlands system. Aurizon is preparing an EIS for the Central Queensland Integrated Rail Project. It is noted that there is limited publically available information available for this project.

Adani has previously considered co-utilising a consolidated corridor with GVK Hancock Coal Infrastructure, Waratah Coal and Aurizon. However, with the railway's 60 mtpa capacity already fully allocated, uncertain development timeframes and a route that traverses large areas of floodplain, the potential for co-use of the railway is limited. Further discussion relating to the NGBR Project's relationship to other proposed infrastructure is provided in Volume 1 Chapter 1 Introduction.

**Passenger rail network**

The existing passenger rail network within Central Queensland is shown in Figure 14-4. The only passenger rail network to be intersected by the NGBR Project final rail corridor (via proposed grade-separated crossing) is the North Coast Line in the northern extent of the study area. There are three services currently operating in the vicinity of the NGBR Project study area:

- Brisbane to Cairns – Queensland Rail's Sunlander and Tilt Train passenger services links Brisbane to Cairns. Two Tilt Train services and two Sunlander services operate per week (each way).
- Brisbane to Longreach – Queensland Rail's Sprit of the Outback passenger service links Brisbane and Longreach. Two train services operate per week (each way).
- Mt Isa to Townsville – Queensland Rail's The Inlander passenger service links Mt Isa and Townsville. One train service operates per week (each way).




LEGEND

Town
Major Port
Major Road
Minor Road
Watercourse
Northern Missing Link
Carmichael Project (Rail)
Carmichael Project (Mine)
North Galilee Basin Rail



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**
North Galilee Basin Rail Project

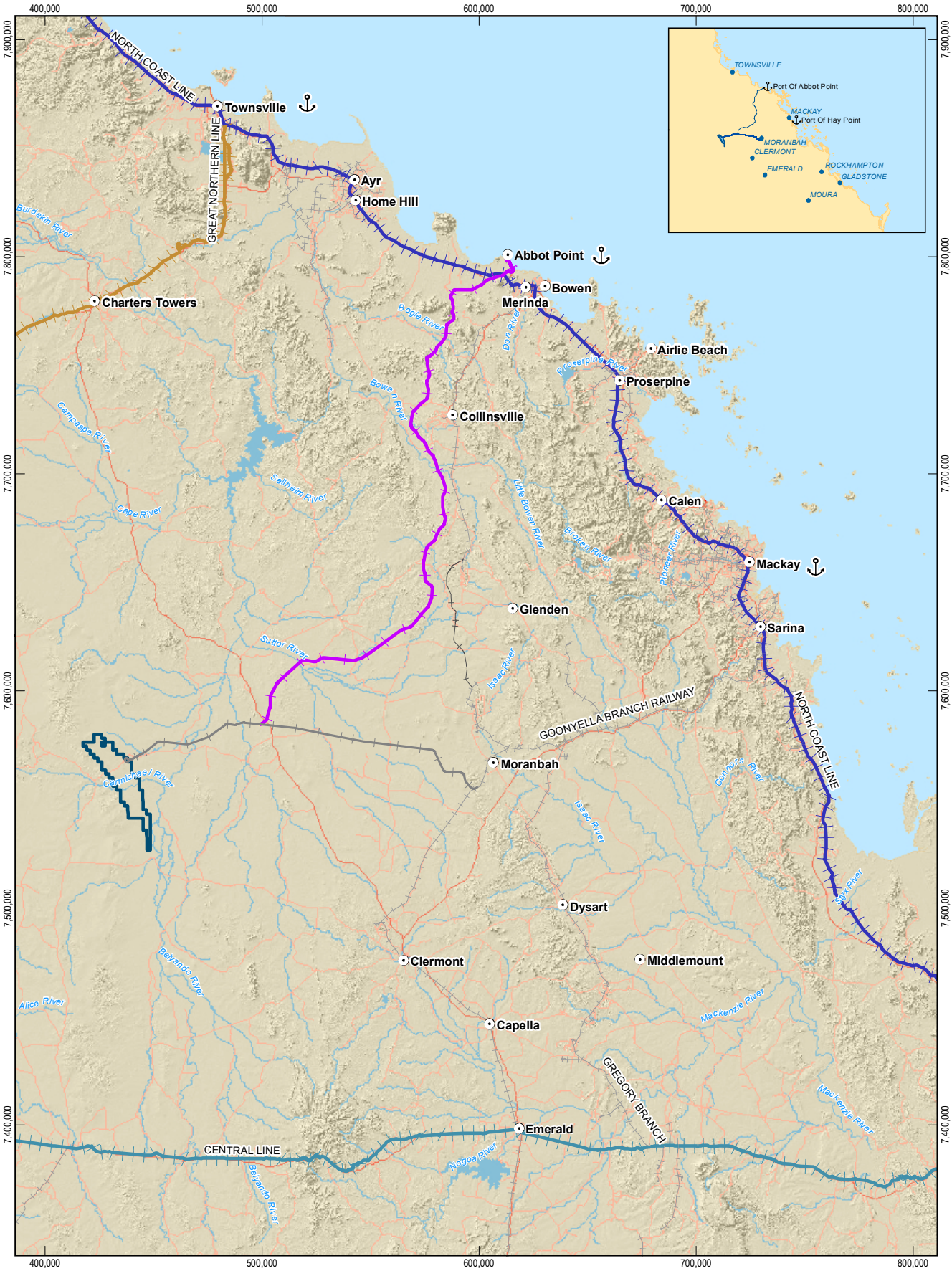
Job Number 41-26457
Revision B
Date 29 Aug 2013

Freight rail transport network

Figure 14-3

G:\41\26457\06 GIS\Maps\MXD\1000_Transport\41_26457_1007_rev_b.mxd
Level 9, 145 Ann 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), NGBR Rail Option 6 Rev 2 (06/06/2013), Carmichael Project Rail (2013). Created by: BW,JVC.




LEGEND

- Town
- Major Port
- Major Road
- Minor Road
- Watercourse
- Northern Missing Link
- Existing/Other Rail Network
- Brisbane to Cairns
- Brisbane to Longreach
- Townsville to Mt Isa
- Carmichael Project (Rail)
- Carmichael Project (Mine)
- North Galilee Basin Rail



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**

North Galilee Basin Rail Project

Job Number 41-26457
Revision B
Date 29 Aug 2013

Passenger rail transport network

Figure 14-4

G:\41\26457\06 GIS\Maps\MXD\1000_Transport\41_26457_1008_rev_b.mxd Level 9, 145 Ann 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), NGBR Rail Option 6 Rev 2 (06/06/2013), Carmichael Rail Project (2013). Created by: MS

### 14.3.3 Air transport facilities

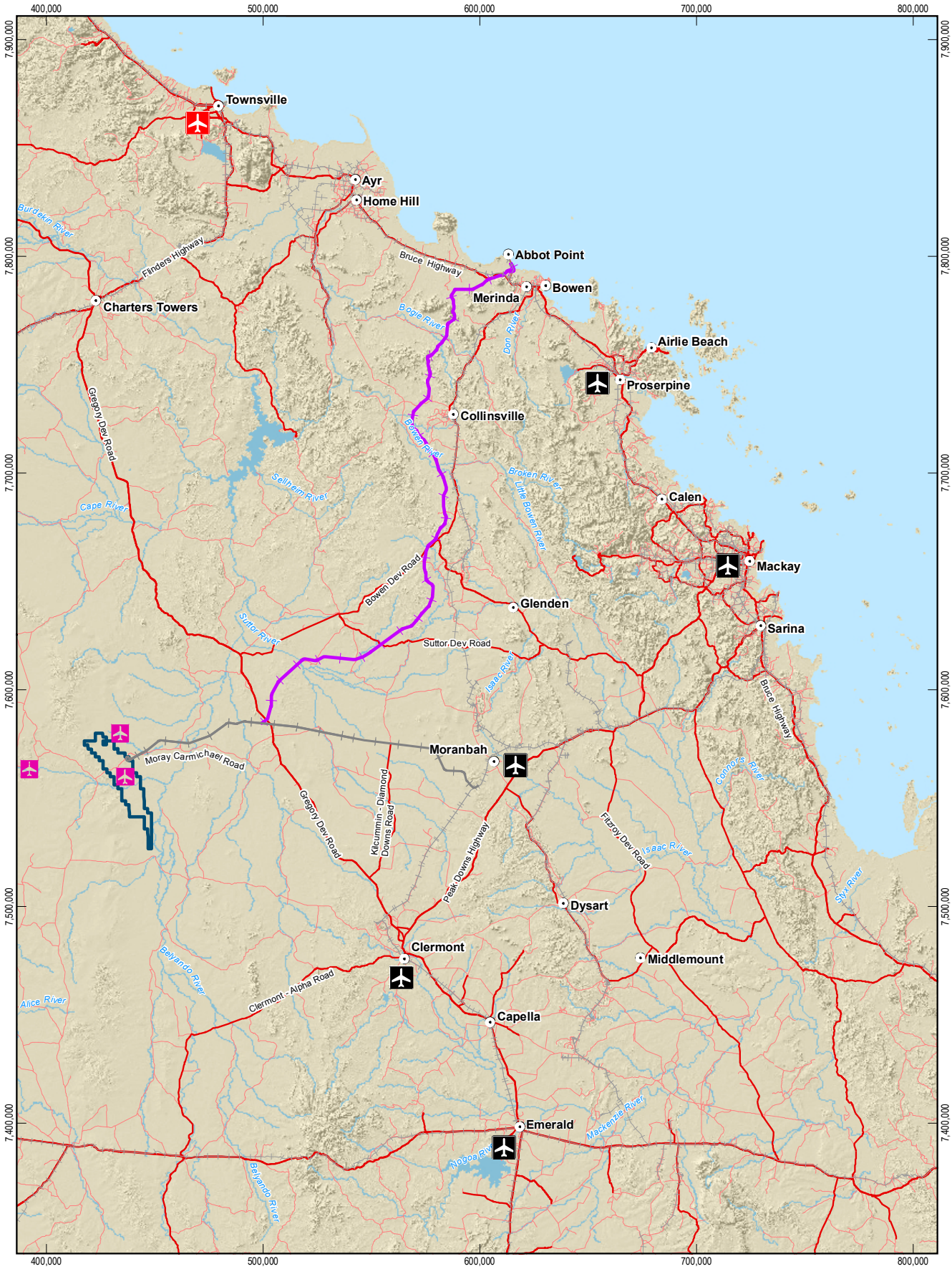
International and regional airports could potentially serve the fly-in fly-out (FIFO) workforce for the NGBR Project. Currently there are six airports located within the vicinity of the NGBR Project. The nearest international airport is Townsville International Airport. Townsville International Airport 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 five kilometres to the north of Townsville city centre. Townsville Internal Airport processes over 1.6 million passengers annually. The airport has two runways, of which the longest is 2,438 m. 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 International 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.

The regional airports include:

- Proserpine/Whitsunday Coast Airport - Whitsunday Regional Council is the operator. Proserpine Airport is a domestic airport located approximately 10 km south of Proserpine. It has two asphalt surface runways, of which the longest is 2,073 m. Jetstar and Virgin Australia currently operate daily flights between Proserpine and Brisbane.
- Mackay Airport - Mackay Airport Pty Ltd is the operator. Mackay Airport is a domestic airport that operates flights to Brisbane, Sydney, Melbourne, Gladstone, Rockhampton, Townsville and Cairns. Airlines operating from Mackay Airport include Jetstar, Pel-Air (cargo), Qantas, Tiger Airways and Virgin Australia. Mackay Airport has two asphalt surfaced runways, of which the longest is 1,981 m. This places a limitation on the type of aircraft it can handle.
- Moranbah Airport - BHP Billiton Mitsubishi Alliance is the operator. Moranbah Airport is located off Goonyella Road, approximately six kilometres 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 and Skytrans, with flights operating between Moranbah and Brisbane, Cairns, Townsville and Sunshine Coast.
- Clermont Airport - Isaac Regional Council is the operator of this airport. Clermont Airport has two runways, of which the longest is 1,311 m. It is situated just off the Peak Downs Highway near Clermont. Clermont Airport is operated by the IRC and caters to FIFO workforces of nearby mines.
- Emerald Airport – Central Highlands Regional Council are the operator. Emerald Airport is a regional airport located approximately six kilometres from the town of Emerald. It has two runways, of which the longest is 1,900 m. The airport is serviced by two commercial airlines, Qantaslink and Virgin, which fly in and out of Emerald with over 60 services per week.

The locations of air transport facilities are provided in Figure 14-5. The closest airports to the NGBR Project are Proserpine/Whitsunday Coast Airport and Moranbah Airports.




LEGEND

- Town
- Major Road
- Minor Road
- Existing/Other Rail Network
- Watercourse
- Airport International
- Airport Regional
- Local Temporary Airstrips
- Carmichael Project (Rail)
- Project (Mine)
- North Galilee Basin Rail



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**

North Galilee Basin Rail Project

Job Number 41-26457
Revision B
Date 29 Aug 2013

Air transport facilities

Figure14-5

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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), NGBR Rail Option 6 Rev 2 (06/06/2013), Carmichael Project Rail (2013). Created by: AJ

### 14.3.4 Sea transport facilities

The existing bulk ports within the vicinity of the NGBR Project include:

- Port of Townsville
- Port of Mackay
- Port of Hay Point including Dalrymple Bay Coal Terminal and Hay Point Coal Terminal
- Port of Abbot Point
- Dudgeon Point Coal Terminal.

All of these ports are controlled by North Queensland Bulk Ports Corporation (NQBP) with the exception of the Port of Townsville, which is operated by the Port of Townsville Limited. The Ports of Townsville and Abbot Point would provide facilities suitable for the import of construction materials, components and pre-assembled modules for construction of the NGBR Project.

The locations of the existing sea port infrastructure within the vicinity of the NGBR Project are provided in Figure 14-6.

**Port of Townsville**

The Port of Townsville comprises nine berths catering for the import and export of a number of commodities, including:

- Fuel, oil and liquid petroleum gas
- Minerals, nickel ore, lead ingots, copper and zinc concentrates
- Containers
- Frozen beef and live cattle
- Cement
- Sugar and molasses
- Sulphuric acid and fertiliser
- Scrap metal, timber and general cargo
- Cruise ships.

Commodities are supplied to the port via both rail and road. The Port of Townsville provides facilities suitable for the import of construction materials, components and pre-assembled modules for construction of the NGBR Project.

An expansion to develop six new berths and reclamation of approximately 100 ha is currently being investigated.

**Port of 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 NQBP. The port comprises four berths catering for the import and export of a number of commodities, including:

- Sugar and sugar products, such as molasses
- Grain
- Sulphuric acid and fertilisers

- Petroleum and ethanol
- Vehicles and machinery.

**Port of Hay Point**

Hay Point is situated about 40 kilometres south of Mackay. The Port of Hay Point is one of the largest coal export ports in the world. It comprises two coal export terminals, Dalrymple Bay Coal Terminal and Hay Point Coal Terminal.

Dalrymple Bay Coal Terminal is leased from the State Government by Dalrymple Bay Coal Terminal Management Pty Ltd and Hay Point Coal Terminal is owned by BHP Billiton Mitsubishi Alliance and operated by Hay Point Services. Together these coal terminals service the mines in the Bowen Basin in central Queensland. The mines are linked to the port terminals through an integrated rail-port network.

Both terminals have purpose-built, rail in-loading facilities, onshore stockpile yards and offshore wharves. The offshore wharves are serviced by conveyor systems, supported on jetties, which run out to sea and allow loading in deep water.

Plans are progressing for the proposed Dudgeon Point Coal Terminals Project. This expansion at the Port of Hay Point involves two new coal terminals in the port, with an estimated capacity of up to 180 mtpa. The two terminals will be constructed in stages over a 20-year period to meet industry demand. The first stage of development is expected to be a single terminal with a capacity of 30 mtpa.

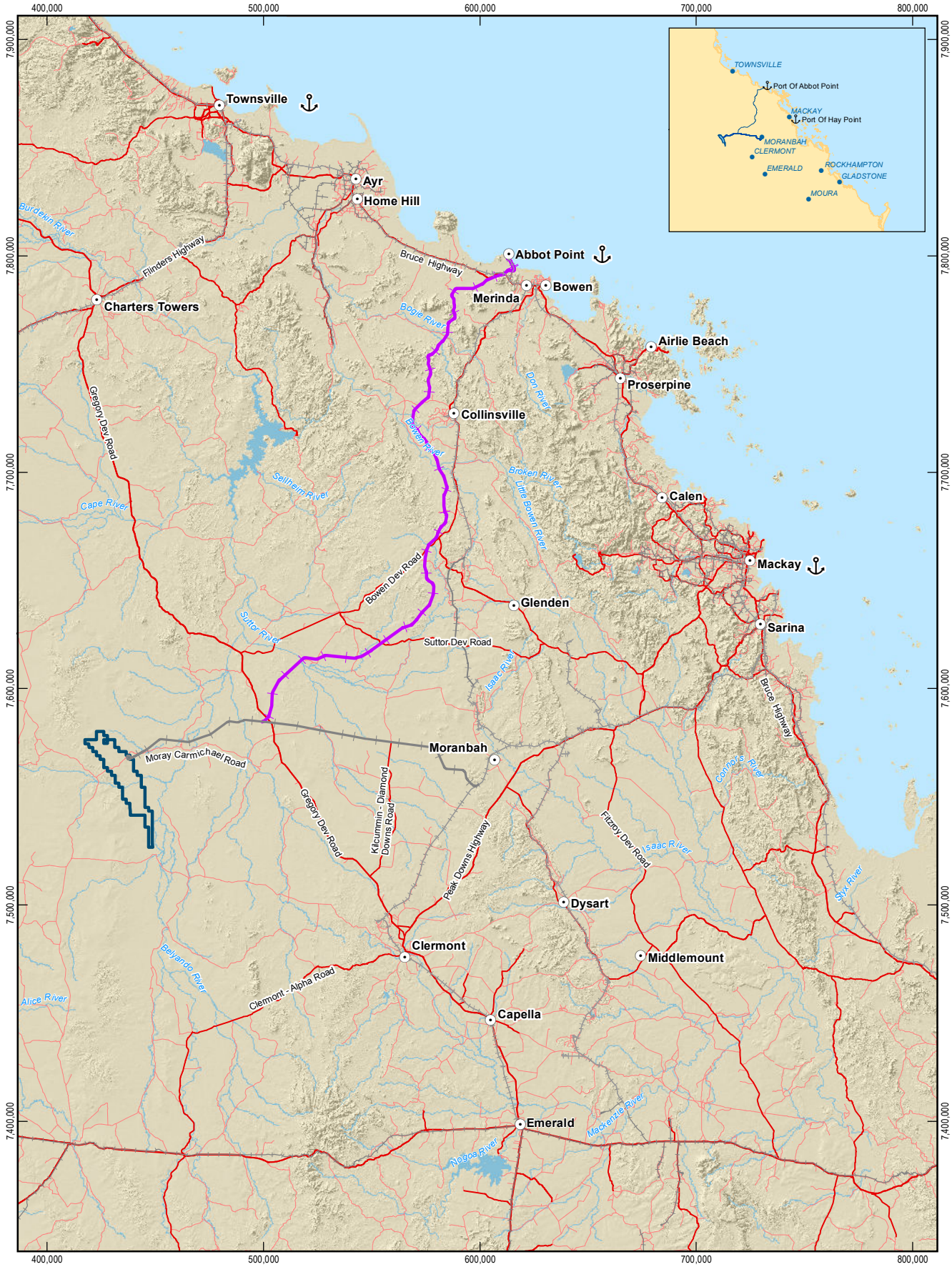
Dudgeon Point Coal Terminals Project (DPPM) and Adani Mining Pty Ltd (Adani Group) are the preferred proponents for the development of new coal export infrastructure at Dudgeon Point.

**Port of Abbot Point and associated coal export terminals**

The Port of Abbot Point is operated by NQBP. The Port of Abbot Point is located approximately 25 km north of Bowen and is Australia's most northerly coal port. The port comprises a single coal export terminal, Abbot Point Coal Terminal 1, which is owned (under a 99 year lease) by Adani Abbot Point Terminal Pty Ltd, a subsidiary of the Adani Group, and operated by Abbot Point Bulkcoal Pty Ltd which is a subsidiary of Xstrata.

Abbot Point Coal Terminal 1 comprises a rail in-loading facility, coal handling and stockpile areas, and a dual trestle jetty and conveyors connected to two berths and ship-loaders, located 2.75 km offshore, with a capacity of 50 million tonnes per annum (mtpa). Coal is supplied to the port via the Newlands rail system. Other terminals currently being proposed for development at the Port of Abbot Point include:

- Terminal 0 – proposed for development by Adani with a 70 mtpa capacity
- Terminal 2 – proposed for development by BHP Billiton with a 60 mtpa capacity
- Terminal 3 – proposed for development by GVK-Hancock with a 60 mtpa capacity.




LEGEND

- Town
- Major Port
- Major Road
- Minor Road
- Existing/Other Rail Network
- Watercourse
- Carmichael Project (Rail)
- Carmichael Project (Mine)
- North Galilee Basin Rail



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**
North Galilee Basin Rail Project

Job Number 41-26457
Revision B
Date 29 Aug 2013

Sea transport facilities

Figure 14-6

G:\41\26457\06 GIS\Maps\MXD\1000_Transport\41_26457_1001_rev_b.mxd
Level 9, 145 Ann 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), NGBR Rail Option 6 Rev 2 (06/06/2013), Carmichael Project Rail (2013). Created by: AJ

### 14.3.5 Proposed transport infrastructure

The Queensland Transport and Roads Investment Program 2013-14 to 2016-17 (QTRIP) details the program of road works DTMR plan to deliver throughout Queensland over a four year period. Projects which have been identified in the immediate vicinity of the NGBR Project are summarised in Table 14-10.

**Table 14-10 QTRIP program of works (2013-14 to 2016-17)**

| Road name | Proposed works | Indicative total cost | Cost and timing |
|---|---|---|---|
| Bruce Highway | Overtaking lanes (Sarina-Cairns) | $78,000 | Approved 2013-14 |
| Bruce Highway | Rest areas (Sarina-Cairns) | $337,000 | Approved 2013-14 |
| Bruce Highway | Safety initiatives | $259,000 | Approved 2013-14 |
| Bruce Highway (Bowen-Ayr) | Improve intersection with Bowen Developmental Road | $3,720,000 | Estimated expenditure June 2013 $120,000. Approved 2013-14 $1,000,000. Indicative 2014-15 $2,600,000 |
| Bruce Highway (Bowen-Ayr) | Improve intersection with Lower Don Road | $1,504,000 | Estimated expenditure June 2013 $104,000. Approved 2013-14 $200,000. Indicative 2014-15 $1,200,000 |
| Bruce Highway (Bowen-Ayr) | Construct overtaking lanes south of Homestead Road | $4,898,000 | Estimated expenditure June 2013 $601,000. Approved 2013-14 $4,297,000 |
| Bruce Highway (Bowen-Ayr) | Construct overtaking lanes at Rossiter Hill South | $5,300,000 | Estimated expenditure June 2013 $807,000. Approved 2013-14 $4,493,000 |
| Bruce Highway (Bowen-Ayr) | Install, upgrade and replace roadside delineation | $300,000 | Estimated expenditure June 2013 $100,000. Approved 2013-14 $200,000 |
| Bruce Highway (Bowen-Ayr) | Rehabilitate pavement | $2,363,000 | Estimated expenditure June 2013 $314,000. Approved 2013-14 $2,049,000 |
| Bruce Highway (Bowen to Ayr) | Rehabilitate bridges and culverts | $43,750,000 | Estimated expenditure June 2013 $22,281,000. Approved 2013-14 $5,800,000. Indicative 2014-15 $6,000,000. Indicative 2015-16 to 2016-17 $9,669,000 |

| Road name | Proposed works | Indicative total cost | Cost and timing |
|---|---|---|---|
| Bowen Developmental Road (Bowen to Collinsville) | Rehabilitate and overlay | $10,000,000 | Approved 2013-14 $7,000,000. Indicative 2014-15 $3,000,000 |
| Strathmore Road | Pave and seal | $700,000 | Approved 2015-16 to 2016-17 $350,000 |
| Strathmore Road | Rehabilitate pavement | $490,000 | Approved 2014-15 to 2015-16 $245,000 |
| Townsville Port Road | Improve Woolcock Street/Mather Street interchange | $10,000,000 | Estimated expenditure June 2013 $8,000,000. Approved 2013-14 $2,000,000 |
| Townsville Port Road | Improve traffic signals at Pilkington Street intersection | $225,000 | Approved 2013-14 $225,000 |
| Townsville Port Road | Improve traffic signals at Duckworth Street intersection | $178,000 | Approved 2013-14 $178,000 |

Source: Queensland Transport and Roads Investment Program 2013-14 to 2016-17 (QTRIP)

Proposed rail infrastructure and proposed port infrastructure are discussed in Section 14.3.2 and Section 14.3.4 respectively.

## 14.4 Development traffic generation

### 14.4.1 Construction

Construction of the NGBR Project is anticipated to occur over a period of approximately two years and is scheduled to commence in late 2014. It is estimated that traffic will be generated both within the final rail corridor and on the external road network by the following four types of vehicles during construction:

- Material supply vehicles
- Service vehicles
- Construction workforce via Fly-in/Fly-out (FIFO)
- Construction workforce via Drive-in/Drive-out (DIDO).

**Material supply vehicles**

The following arrangements, based on the NGBR Concept Design Report (Aarvee Associates 2013), are anticipated for the supply of materials during construction and have been assumed for the purpose of this assessment:

**Girders**

- Girders will be stockpiled at Townsville Port until a specific bridge site is ready for delivery

- Girders will be transported directly to each bridge site in the month prior to proposed bridge completion
- One 20 m girder will be loaded on each truck from Townsville with no pilot

**Culverts**

- The likely number of culverts per truck is nine
- Culverts will be delivered directly to each specific drainage structure point or held at bridge sites

**Concrete**

- The batching rate from each concrete batching plant is anticipated to be 500 $m^3$ per day
- The northern portion of the NGBR Project will have two batching plants, the central portion will have two batching plants and the southern portion will have one batching plant
- A concrete mix of 450 $m^3$ of material (sand, aggregate and cement) will be required to achieve 500 $m^3$ of concrete per day
- Truck capacity of 20 cubic metres or 50 tonne

**Sleepers and rail**

- Sleepers and rail are expected be delivered to flash butt welding yards between months 13 and 20 of construction
- Sleepers and rail will be delivered by B-Double trailers (120 sleepers per trailer resulting in 547 trucks per month) and extendible trailers (15 rail sections (each 25 m in length) per trailer resulting in 228 trucks per month).

**Ballast**

- Approximately 3,330 tonnes are required per kilometre of corridor resulting in approximately 615,000 $m^3$ in total
- A total of 3,250 $m^3$ per day of ballast will be used on work trains
- The ballast is likely to be delivered to the flash butt welding yard and laydown yard between months 13 and 20 of construction and to the siding at chainage 170 km between months 15 and 22
- The capacity of each truck will be 20 cubic metres or 50 tonnes.

**Earthworks**

- Quantities as per the Mass Haul Calculations dated 12 June 2013, Option 6 Rev 2
- Indicative cut and fill earthwork volumes are provided in Volume 1 Chapter 2 Project description and will be refined during detailed design when more detailed geotechnical field data becomes available
- Fill will be delivered via trucks or scrapers, depending on final source locations
- Rippable material that does not contain oversized rocks will be removed and transported by dozers and scrapers, whereas rocky material will be removed by excavator and transported by dump truck.

**Summary of material supply vehicle types**

The vehicle types assumed for the purpose of this assessment for the supply of materials during construction are as follows:

- Sleepers – 12.5 m flatbed semitrailer
- Rail (25 m lengths) – 25 m extendable trailers and require vehicle escorts for rails
- Ballast – 19 m trucks for rail line ballast
- Girders – 12.5 m flatbed semitrailer
- Culverts – 12.5 m flatbed semitrailer
- Batching plants – 35 m B-Triple truck
- General fill – Tipping trailer
- Structural fill – 12.5 m flatbed semitrailer
- Capping – B-Double tanker.

While the above material supply vehicle types and configurations have been assumed for the purpose of this assessment, essentially representing a worst-case traffic generation model, there is potential to use other vehicle configurations during construction. These alternate vehicle types and configurations include potential use of B-Double (two trailer) and/or B-Triple (three trailer) road trains to move general and structural fill, capping material, ballast, sleepers and culverts. The capacity of these vehicles could be in the order of approximately 166$m^3$ or 180 – 200 tonnes. The alternate vehicle types and configurations will result in lesser truck trips to move rail materials.

The estimated material supply traffic generation required during the construction phase, based on vehicle types assumed for the assessment, is tabulated in Table 14-12. This table also provides the indicative routes which these vehicles would take to travel between their origin and destinations.

**Table 14-11 Estimated monthly material supply truck traffic generation – return trips**

| | Track | | | | Bridges/ culverts and concrete | | | | | | | | | Earthworks | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sleepers | Rail (25m lengths) | Ballast | Ballast | Girders north | Girders central | Girders south | Culverts north | Culverts central | Culverts south | Batching plants north | Batching plants central | Batching plants south | General fill north | General fill south | Structural fill north | Structural fill central | Structural fill south | Capping north | Capping central | Capping south |
| From | Townsville | Townsville | Borrow 7 | QR quarry-Byerwen | Townsville | Townsville | Townsville | Townsville | Townsville | Townsville | Mackay | Mackay | Mackay | Northern extremities of the Clarke Ranges | Borrow 7 | Northern extremities of the Clark Ranges | Existing QR quarry-Bywewen | Borrow 7 | Northern extremities of the Clark Ranges | Exisiting QR quarry-Byerwen | Borrow 7 |
| To | Construction depot 305 km | Construction depot 305 km | Flashbutt welding facility 304 km | Siding-chainage 170 km | Bridge sites x 9 SITES | Bridge sites x 6 SITES | Bridge sites x 5 SITES | Bridge sites x 9 SITES | Bridge sites x 6 SITES | Bridge sites x 5 SITES | Batching plants (1 & 2) | Batching plants (3 & 4) | Batching plant 5 | Within corridor through access road | Within corridor through access road | Within corridor through access road | Within corridor through access road | Within corridor through access road | Within corridor through access road | Within corridor through access road | Within corridor through access road |
| Indicative routes | Via Chaters Towers | Via Chaters Towers | Local access road | Bowen Development Road | Bruce Highway/ Bowen Development Rd | Bruce Highway/ Bowen Development Rd | Gregory Development Rd/ Bowen Development Rd/ Suttor Development Rd | Bruce Highway/ Bowen Development Rd | Bruce Highway/ Bowen Development Rd | Gregory Developmental Rd/ Bowen Developmental Rd/ Suttor Developmental Rd | Bruce Highway/ Bowen Developmental Rd | Peak Downs Highway/ Suttor Developmental Rd/ Bowen Developmental Rd | Peak Downs Highway / Suttor Developmental Rd/ Stratford Rd | Glenmore Rd | Temp Haul Rd | Glenore Rd | Local Rd/ Temp Haul Rd | Temp Haul Rd | Glenore Rd | Local Rd/ Temp Haul Rd | Temp Haul Rd |
| Month 6 | | | | | | | | | | | | | | | 1,877 | | 2,320 | 4,335 | | | |
| Month 7 | | | | | | | | | | 145 | 1,350 | 1,350 | 675 | 7,921 | 1,877 | 2,153 | 2,320 | 4,335 | | | |
| Month 8 | | | | | | | 33 | | | 145 | 1,350 | 1,350 | 675 | 7,921 | 1,877 | 2,153 | 2,320 | 4,335 | | | 865 |
| Month 9 | | | | | | | 33 | | | 145 | 1,350 | 1,350 | 675 | 7,921 | 1,877 | 2,153 | 2,320 | 4,335 | | 930 | 865 |
| Month 10 | | | | | | | 33 | | | 145 | 1,350 | 1,350 | 675 | 7,921 | 1,877 | 2,153 | 2,320 | 4,335 | | 930 | 865 |
| Month 11 | | | | | | | 33 | | | | 1,350 | 1,350 | 675 | 7,921 | | 2,153 | 2,320 | | | 930 | 865 |
| Month 12 | | | | | | | 33 | | 147 | | 1,350 | 1,350 | 675 | 7,921 | | 2,153 | 2,320 | | | 930 | 865 |
| Month 13 | 590 | 252 | 1,747 | | | 20 | 9 | | 147 | | 1,350 | 1,350 | 675 | 7,921 | | 2,153 | 2,320 | | | 930 | 865 |
| Month 14 | 590 | 252 | 1,747 | | | 24 | | | 147 | | 1,350 | 1,350 | 675 | 7,921 | | 2,153 | 2,320 | | 1,370 | 930 | 865 |
| Month 15 | 590 | 252 | 1,747 | 2,315 | | 25 | | 143 | | | 1,350 | 1,350 | 675 | 7,921 | | 2,153 | 2,320 | | 1,370 | 930 | 865 |
| Month 16 | 590 | 252 | 1,747 | 2,315 | | 22 | | 142 | | | 1,350 | 1,350 | 675 | 7,921 | | 2,153 | 2,320 | | 1,370 | 930 | |
| Month 17 | 590 | 252 | 1,747 | 2,315 | 9 | 23 | | 142 | | | 1,350 | 1,350 | 675 | 7,921 | | 2,153 | | | 1,370 | 930 | |
| Month 18 | 590 | 252 | 1,747 | 2,315 | 46 | | | | | | 1,350 | 1,350 | 675 | 7,921 | | 2,153 | | | 1,370 | 930 | |
| Month 19 | 590 | 252 | 1,747 | 2,315 | 38 | | | | | | 1,350 | 1,350 | 675 | 7,921 | | 2,153 | | | 1,370 | 930 | |
| Month 20 | 590 | 252 | 1,747 | 2,315 | | | | | | | 1,350 | 1,350 | 675 | 7,921 | | 2,153 | | | 1,370 | 930 | |
| Month 21 | | | | 2,315 | | | | | | | | | | 7,921 | | 2,153 | | | 1,370 | | |
| Month 22 | | | | 2,315 | | | | | | | | | | | | | | | | | |

NGBR Project Concept Design Report (Aarvee Associates 2013)

**Service supply vehicles**

The service supply vehicles that are anticipated to access construction camps during construction include:

- Food transport
- Linen laundering
- Fuel, chemical and explosive supplies
- Waste management contractors
- Maintenance servicemen.

The service supply vehicles are anticipated to be light goods vehicles (with the exception of fuel, chemical and explosive supplies). It has been assumed that there will be 20 service vehicle movements (return trips) per week at each construction camp. At this stage, trips which can be associated with vehicles supplying fuel, chemicals and explosive materials have not been considered in the trip estimation during the construction. However, the number of vehicles supplying these materials is expected to be minimal and would not have any detrimental impact on the road network.

Table 14-12 provides the indicative route that service vehicles would take to travel between origin and destinations.

**Table 14-12 Service vehicles indicative route**

| | Construction Camp at chainage 15 km | Construction Camp at chainage 62 km | Construction Camp at chainage 124 km | Construction Camp at 170 km chainage | Construction Camp at chainage 263 km |
|---|---|---|---|---|---|
| From | Bowen | Collinsville | Collinsville | Mount Coolon | Mount Coolon |
| To | Construction Camp at chainage 15 km | Construction Camp at chainage 62 km | Construction Camp at chainage 124 km | Construction Camp at chainage 170 km | Construction Camp at chainage 263 km |
| Indicative route | Bruce Highway | Bowen Developmental Road/ Strathalbyn Road | Bowen Developmental Road | Bowen Developmental Road | Suttor Developmental Road/ Stratford Road |

**Construction workforce via FIFO**

A large proportion of the construction workforce will be sourced from areas outside the local area. It is anticipated that approximately 80 per cent of the workforce (1,360 persons at peak) will be flown in from the nearest airports and then transported to the construction camps via buses at the commencement of each work roster. Accommodation for the workers will be provided in purpose built temporary construction camps and each bus will carry 40 passengers. The FIFO workforce has been assumed to fly-in/fly-out from the Proserpine/Whitsunday and Moranbah airports, and transferred to and from the camp sites via buses.

Specialist tradesmen will be sourced from within Queensland and interstate, if necessary, to complete the rail works and skilled labour may be sourced locally from Mackay, Rockhampton and surrounding areas.

The approximate size of construction camps is estimated to be as follows:

- Construction Camp 1 (chainage 15 km) - 300 workers
- Construction Camp 2 (chainage 62 km) - 400 workers
- Construction Camp 3 (chainage 124 km) - 300 workers
- Construction Camp 4 (chainage 170 km) - 400 workers
- Construction Camp 5 (chainage 263 km) - 300 workers.

Table 14-13 provides the indicative route which FIFO vehicles would take to travel between origin and destinations.

**Table 14-13 FIFO vehicles indicative route**

| | Construction Camp at chainage 15 km | Construction Camp at chainage 62 km | Construction Camp at chainage 124 km | Construction Camp at chainage 170 km | Construction Camp at chainage 263 km |
|---|---|---|---|---|---|
| From | Proserpine/ Whitsunday Airport | Proserpine/ Whitsunday Airport | Proserpine/ Whitsunday Airport | Moranbah Airport | Moranbah Airport |
| To | Construction Camp at chainage 15 km | Construction Camp 62 km chainage | Construction Camp at chainage 124 km | Construction Camp at chainage 170 km | Construction Camp at chainage 263 km |
| Indicative route | Bruce Highway | Bruce Highway/Bowen Development Road/ Strathalbyn Road | Bruce Highway/ Bowen Developmental Road | Peak Downs Highway/ Suttor Developmental Road/ | Peak Downs Highway/ Gregory Developmental Road |

**Construction workforce via DIDO**

The remaining approximately 20 per cent (approximately 340 persons at peak) of the workforce will be sourced from regional townships in the vicinity of the NGBR Project. The local workforce will make daily trips from regional townships to one of the five temporary construction camp sites. However, due to large travel distances, particularly in the central to southern sections of the final rail corridor, the local workforce may be required to reside in the temporary construction camps when on roster as fatigue management requirements will likely prevent long drives at either end of a shift.

It is anticipated that the typical type of DIDO workforce vehicles will be car or 4WDs with one passenger per vehicle. It was assumed that all the DIDO workforce vehicles will arrive and leave during the morning and afternoon peak hour periods.

Table 14-6 provides the indicative route which DIDO vehicles would take to travel between origin and destinations.

**Table 14-14 Estimated DIDO traffic generation (return trips)**

| | Construction Camp at chainage 15 km | Construction Camp at chainage 62 km | Construction Camp at chainage 124 km | Construction Camp at chainage 170 km | Construction Camp at chainage 263 km |
|---|---|---|---|---|---|
| From | Bowen | Collinsville | Collinsville | Mount Coolon | Mount Coolon |
| To | Construction Camp at chainage 15 km | Construction Camp at chainage 62 km | Construction Camp at chainage 124 km | Construction Camp at chainage 170 km | Construction Camp at chainage 263 km |
| Indicative route | Bruce Highway | Bowen Developmental Road/ Strathalbyn Road | Bowen Developmental Road | Bowen Developmental Road | Suttor Developmental Road/ Stratford Road |

**Construction traffic generation**

Table 14-15 provides a summary of the estimated total number of construction vehicles that will be required during construction of the NGBR Project. Table 14-15 shows that peak construction traffic is expected to occur in months nine and 10 of the construction schedule.

**Table 14-15 Estimated monthly construction vehicles (return trips)**

| Month | Material supply vehicles | Service vehicles | FIFO workforce vehicles | DIDO workforce vehicles | Total |
|---|---|---|---|---|---|
| 3 | 0 | 40 | 7 | 140 | 187 |
| 4 | 0 | 260 | 44 | 880 | 1,184 |
| 5 | 0 | 400 | 68 | 1,360 | 1,828 |
| 6 | 8,532 | 400 | 68 | 1,360 | 10,360 |
| 7 | 22,126 | 400 | 68 | 1,360 | 23,954 |
| 8 | 23,024 | 400 | 68 | 1,360 | 24,852 |
| 9 | 23,954 | 400 | 68 | 1,360 | **25,782** |
| 10 | 23,954 | 400 | 68 | 1,360 | **25,782** |
| 11 | 17,597 | 400 | 68 | 1,360 | 19,425 |
| 12 | 17,744 | 400 | 68 | 1,360 | 19,572 |
| 13 | 20,329 | 400 | 68 | 1,360 | 22,157 |

| Month | Material supply vehicles | Service vehicles | FIFO workforce vehicles | DIDO workforce vehicles | Total |
|---|---|---|---|---|---|
| 14 | 21,694 | 400 | 68 | 1,360 | 23,522 |
| 15 | 24,006 | 400 | 68 | 1,360 | 25,834 |
| 16 | 23,137 | 400 | 68 | 1,360 | 24,965 |
| 17 | 20,827 | 400 | 68 | 1,360 | 22,655 |
| 18 | 20,699 | 400 | 68 | 1,360 | 22,527 |
| 19 | 20,691 | 400 | 68 | 1,360 | 22,519 |
| 20 | 20,653 | 320 | 56 | 1,120 | 22,149 |
| 21 | 13,759 | 320 | 56 | 1,120 | 15,255 |
| 22 | 2,315 | 280 | 49 | 980 | 3,624 |
| 23 | 0 | 160 | 28 | 560 | 748 |
| 24 | 0 | 80 | 14 | 280 | 374 |

**Estimated construction traffic at key roads within study area**

Indicative routes for all four construction vehicle types were used to identify the potential construction vehicle demand at the approach roads to the study intersections.

It should be noted that the periods of highest construction traffic volumes on key roads within the study area will vary according to the construction activities and location of works being undertaken during any given month. The estimated monthly construction traffic volumes for each key road within the study area are provided in Table 14-16. The highlighted cells in the table show the critical months (highest estimated construction traffic), which vary at each of the key roads.

**Table 14-16 Estimated monthly construction traffic on key roads within the study area (single trips)**

| Month | A - Bruce Highway | B - Glenore Road | C - Strathalbyn Road | D - Bowen Developmental Road (near chainage 120 km) | E - Bowen Developmental Road (near chainage 170 km) | F - Suttor Developmental Road | G -Stratford Road | H - Gregory Developmental Road |
|---|---|---|---|---|---|---|---|---|
| 3 | 0 | 0 | 0 | 166 | 208 | 0 | 0 | 0 |
| 4 | 166 | 0 | 208 | 664 | 832 | 498 | 498 | 0 |
| 5 | 664 | 0 | 832 | 664 | 832 | 664 | 664 | 0 |
| 6 | 664 | 0 | 832 | 664 | 5,472 | 664 | 664 | 0 |
| 7 | 2,014 | 20,148 | 2,182 | 2,014 | 6,822 | 2,072 | 2,072 | 58 |
| 8 | 2,014 | 20,148 | 2,182 | 2,014 | 6,822 | 2,085 | 2,085 | 71 |
| 9 | 2,014 | 20,148 | 2,182 | 2,014 | 8,682 | 2,085 | 2,085 | 71 |
| 10 | 2,014 | 20,148 | 2,182 | 2,014 | 8,682 | 2,085 | 2,085 | 71 |
| 11 | 2,014 | 20,148 | 2,182 | 2,014 | 8,682 | 2,027 | 2,027 | 13 |
| 12 | 2,014 | 20,148 | 2,182 | 2,063 | 8,731 | 2,027 | 2,027 | 13 |
| 13 | 2,014 | 20,148 | 2,182 | 2,070 | 8,738 | 2,018 | 2,018 | 1,688 |
| 14 | 2,014 | 22,888 | 2,182 | 2,071 | 8,739 | 2,014 | 2,014 | 1,684 |
| 15 | 2,046 | 22,920 | 2,214 | 2,022 | 13,320 | 2,014 | 2,014 | 1,684 |
| 16 | 2,046 | 22,920 | 2,214 | 2,021 | 13,319 | 2,014 | 2,014 | 1,684 |
| 17 | 2,048 | 22,922 | 2,216 | 2,022 | 8,680 | 2,014 | 2,014 | 1,684 |

| Month | A - Bruce Highway | B - Glenore Road | C - Strathalbyn Road | D - Bowen Developmental Road (near chainage 120 km) | E - Bowen Developmental Road (near chainage 170 km) | F - Suttor Developmental Road | G -Stratford Road | H - Gregory Developmental Road |
|---|---|---|---|---|---|---|---|---|
| 18 | 2,024 | 22,898 | 2,192 | 2,014 | 8,672 | 2,014 | 2,014 | 1,684 |
| 19 | 2,022 | 22,896 | 2,190 | 2,014 | 8,672 | 2,014 | 2,014 | 1,684 |
| 20 | 2,014 | 22,888 | 2,182 | 2,014 | 8,672 | 1,350 | 1,350 | 1,684 |
| 21 | 664 | 22,888 | 832 | 664 | 5,462 | 0 | 0 | 0 |
| 22 | 664 | 0 | 832 | 498 | 5,254 | 0 | 0 | 0 |
| 23 | 664 | 0 | 832 | 0 | 0 | 0 | 0 | 0 |
| 24 | 332 | 0 | 416 | 0 | 0 | 0 | 0 | 0 |

Note: Darks cell represent months with highest estimated traffic volume for each approach road

### 14.4.2 Operation

An overview of the indicative operational workforce traffic generation is provided in Table 14-17. The number of operations staff peaks in 2026 with 369 full-time equivalents.

**Table 14-17 Annual operation workforce 2016 to 2026**

| Operation workforce profile | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tonnage (mtpa) | 4 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 100 |
| Full-time equivalent | 66 | 103 | 141 | 173 | 209 | 254 | 315 | 327 | 350 | 361 | 369 |

The number of train drivers required during operation will vary with the number of train consists in operation and frequency of train cycles. It is anticipated the majority of the crew will be based out of Bowen, with overnight accommodation provided at the mine camps for changes in shift. A small number of drivers will be based at the yards and provisioning facilities.

The train crew numbers are estimated based on train consist numbers, cycle times and tonnage profile.

## 14.5 Potential impacts and mitigation measures

Construction and operation of the NGBR Project has the potential to impact the existing transport network that will be utilised for transporting material and personnel, including:

- Key roads
- Key intersections
- Public and active transport
- Proposed infrastructure
- Rail infrastructure
- Air infrastructure
- Port infrastructure.

Construction and operation of the NGBR Project will require direct interaction and potential modification of existing transport infrastructure, including the road network (State and locally controlled), stock route network and rail network. As such, during detailed design and prior to commencement of construction, further consultation will be required with affected infrastructure owners and associated regulatory agencies to inform the following:

Road Impact Assessment (RIA)

Australian Level Crossing Assessment Model (ALCAM)

Pavement Impact Assessment (PIA)

Road Use Management Plan (RUMP).

These reports will identify vulnerable existing infrastructure such as pavements, intersections, bridges and structures and their ability to withstand the expected increase in traffic volumes and types of loads (oversize/indivisible) to be generated during construction of the NGBR Project. Findings from these reports will inform crossing treatment arrangements, impact management practices and the need for Infrastructure Agreements to be made between Adani and the infrastructure owners. Where required, Infrastructure Agreements will include relevant aspects pertaining to construction and operation phases of the NGBR Project, including authorities, responsibilities and commercial aspects for the respective parties.

### 14.5.1 Construction

The impact of construction traffic was examined on the approach roads of the study intersections. A LOS approach was used to determine the performance of these approach roads. The performance of the road was examined “with” and “without” construction traffic in peak construction year (i.e. 2015) to understand the impacts of the potential construction vehicles on the key roads.

In order to establish the AADT for year 2015, a compound growth rate of three per cent per annum was applied to the 2012 AADT.

The findings of the LOS analysis for the year 2015 are provided in Table 14-18. Table 14-18 indicates that construction traffic will increase the daily traffic volumes on all approach roads, with some anticipated to experience increases of over five per cent (i.e. Strathalbyn Road, Gregory Developmental Road, Stratford Road, Suttor Developmental Road, Bowen Developmental Road and Glenore Road). However, due to the relatively low background traffic volumes on these roads it is expected that these approach roads will operate at LOS C or better, which is acceptable.

**Table 14-18 Impact of construction traffic on key roads – 2015**

| Approach Road | Background traffic (AADT 2012) | Background traffic (AADT 2015) | Construction traffic (2015) | Total traffic (2015) | Per cent increase | LOS-without construction traffic (2015) | LOS-with construction traffic (2015) |
|---|---|---|---|---|---|---|---|
| Bruce Highway | 3592 | 3925 | 79 | 4,005 | 2% | LOS C | LOS C |
| Glenore Road | 29 | 32 | 764 | 796 | 2411% | LOS A | LOS A |
| Strathalbyn Road | 1216 | 1329 | 89 | 1,418 | 7% | LOS A | LOS A |
| Bowen Developmental Road (near chainage 120 km) | 1386 | 1515 | 80 | 1,595 | 5% | LOS A | LOS A |
| Bowen Developmental Road (near chainage 170 km) | 335 | 366 | 459 | 825 | 125% | LOS A | LOS A |
| Suttor Developmental Road | 29 | 32 | 81 | 112 | 255% | LOS A | LOS A |
| Stratford Road | 29 | 32 | 81 | 112 | 255% | LOS A | LOS A |
| Gregory Developmental Road | 710 | 776 | 56 | 832 | 7% | LOS A | LOS A |

The NGBR Project will require the construction of crossings where the final rail corridor intersects with public roads, stock routes, road reserves and occupational crossings. The method for constructing crossings at public roads will typically require lane closures resulting in minor delays to traffic flows. However, these delays are anticipated to be minimal given the generally low volumes of daily traffic in the study area. To mitigate any potential impacts associated construction of the crossings, site specific Traffic Management Plans will be developed in consultation with the Isaac Regional Council (IRC), Whitsunday Regional Council (WRC) and DTMR, and implemented during construction (refer Table 14-19). Consideration of adequate sight and emergency stopping distances will be included in any traffic management measures. Occupational crossing treatments proposed are subject to ongoing consultation with landholders, as outlined in Volume 2 Appendix B Public consultation.

The construction of grade-separated crossings along the NGBR alignment is unlikely to cause any significant delays to traffic travelling across the existing road network. Any impact on the road network during the construction of the proposed grade-separated crossings will be short-term and managed through the provision of site specific Traffic Management Plans highlighting specific treatments and staged works. Additionally, any impact on the vulnerable bridge structures will also be managed through the provision of site specific Traffic Management Plans. These will be developed in consultation with DTMR, WRC and IRC during detailed design of the NGBR Project. Proposed treatments of crossings are provided in Table 14-5 and Table 14-6.

**Public and active transport**

The number and frequency of school bus services within the study area are low due to the relatively low population density located along the final rail corridor. No public transport routes have been specifically identified within the study area, although it can be assumed that long-distance buses may travel through the study area and use SCR or local roads in the region. During detailed design, Adani will communicate with bus operators and the public to promote awareness of the impact and management of construction and operation activities. Existing bus services and routes are therefore unlikely to be impacted during construction.

There is currently no existing pedestrian or cyclist infrastructure along any key roads due to the rural setting, long distances from surrounding communities, the high speed environment of the road network and the low pedestrian and cyclist volumes.

**Key Intersections**

The treatment types at key intersections have been assessed in accordance with the Road Planning and Design Manual, 2$^{nd}$ edition, (RPDM) (DTMR 2013). The assessment of intersection treatment types is based on peak hour vehicular demand to ascertain conservative mitigation measures. The RPDM intersection treatment types that were considered are as follows:

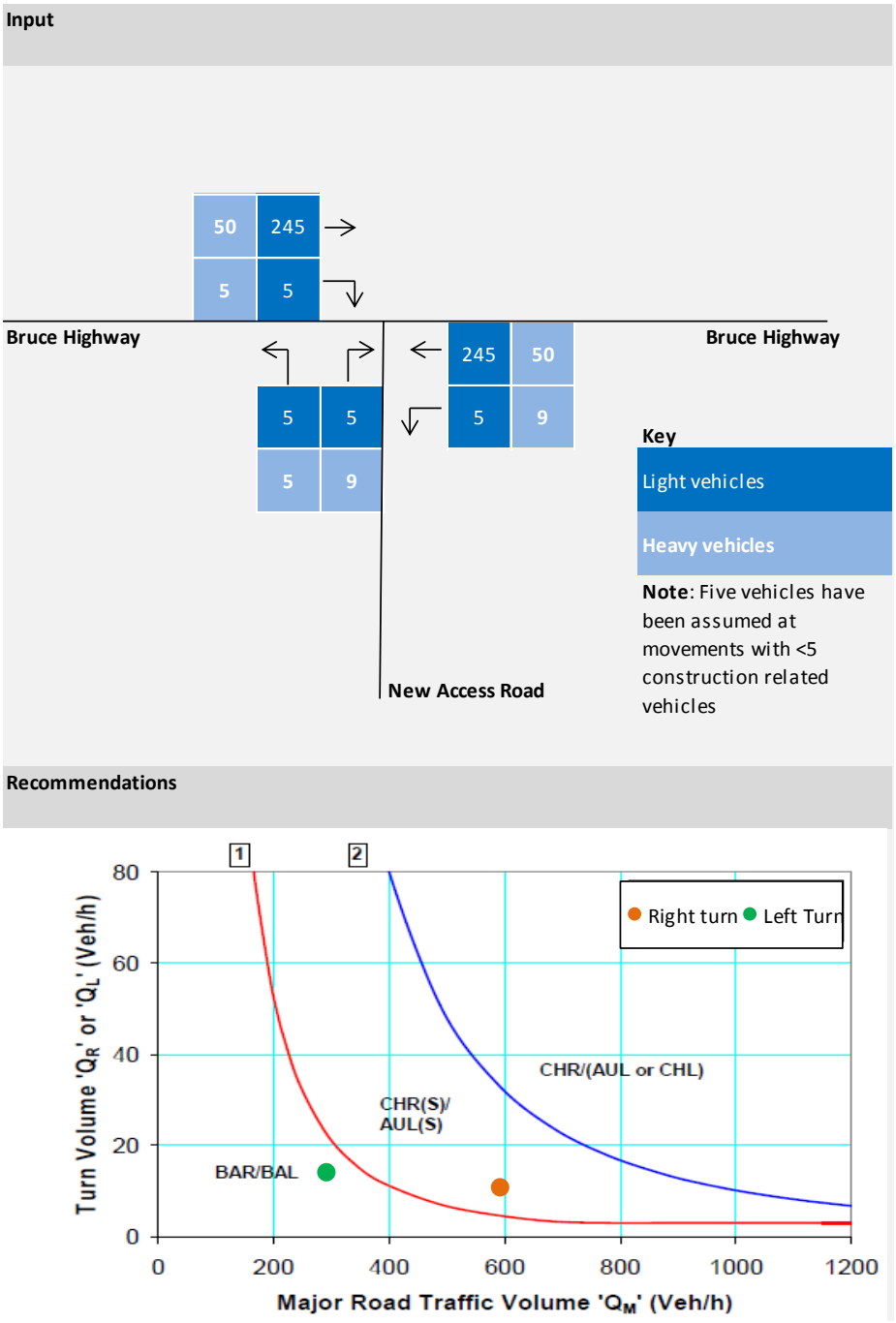
- Basic intersections (Type BA). These intersections are designed to be as compact (and inexpensive) as possible. They are most appropriately used where the volume of turning and traffic is low. The Type BA comprises the following treatments:
  - Basic right turn treatment (BAR) on major road
  - Basic left turn treatment (BAL) on the major and/or minor roads
- Intersections with auxiliary lanes (Type AU). Type AU intersections comprise short lengths of auxiliary lane to improve safety, especially on high speed roads. Such layouts allow traffic to bypass a vehicle waiting to turn right, or a lane for left turning traffic, or both. The AU intersections comprise the following treatments:

  - Auxiliary right turn treatment (AUR) on the major road
  - Auxiliary left turn treatment (AUL) on the major road and/or minor roads
- Channelised intersections (Type CH). A channelised intersection is one where conflicting vehicle travel paths are separated by raised, depressed, or painted medians and/or islands. Auxiliary lanes are often used in conjunction with channelisation. The CH intersections comprises the following treatments:
  - Channelised right turn treatment (CHR) on the major road
  - Channelised left turn treatment (CHL) on the major road and/or minor roads.

### Bruce Highway / New Access Road

As per the RPDM criteria, CHR short-lane/ AUL short-lane treatments will be undertaken at the Bruce Highway / New Access Road intersection (refer to Figure 14-7). This type of treatment reduces the potential operational and safety risks associated with larger construction vehicles, particularly on an intersection with a SCR (i.e. Bruce Highway).

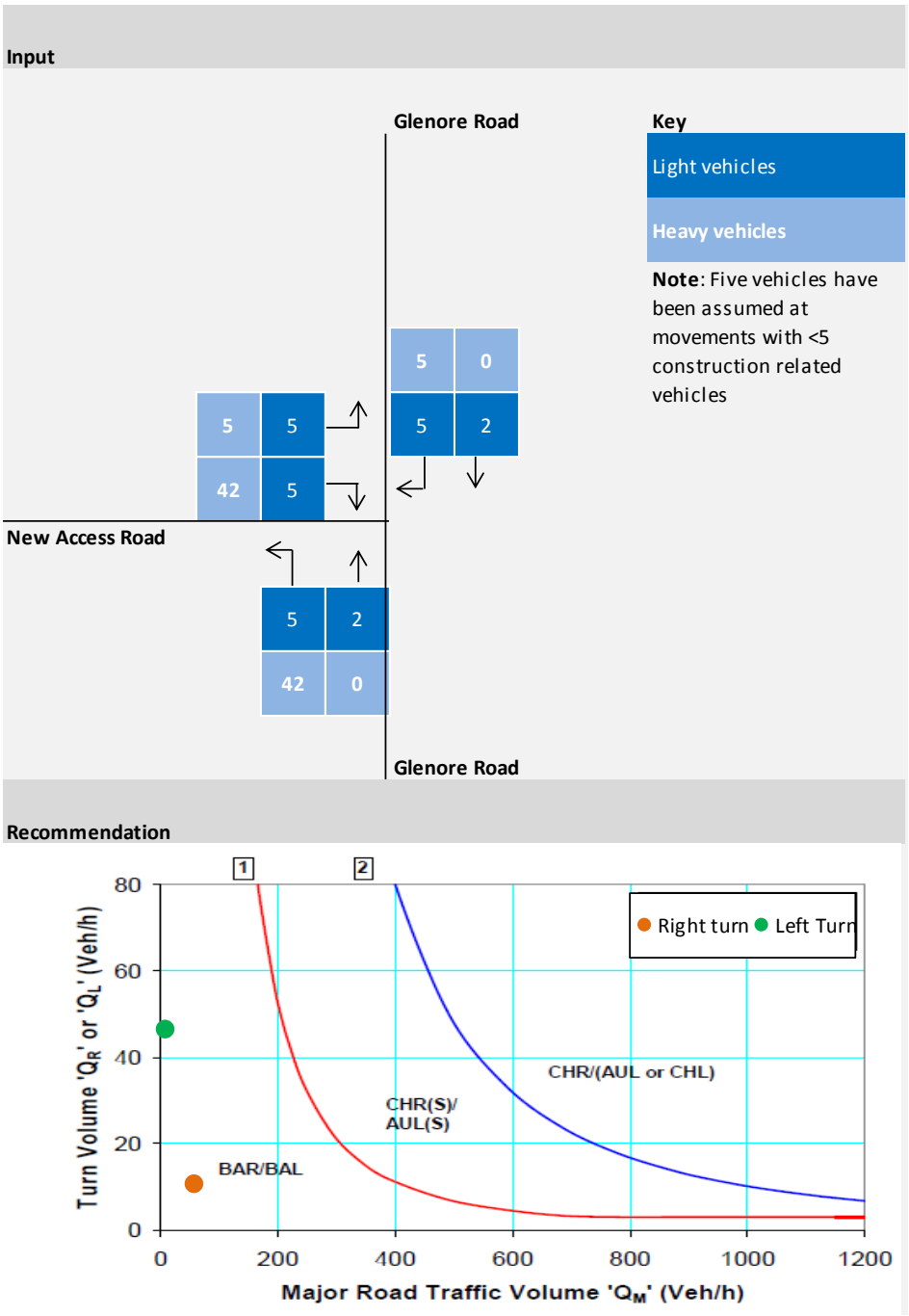
**Figure 14-7 Bruce Highway/New Access Road treatment findings**



### Glenore Road / New Access Road intersection

As per the RPDM criteria, BAL/BAR treatments will be undertaken at the Glenore Road / New Access Road intersection due to low traffic volumes (refer Figure 14-8). The NGBR Project will provide a priority controlled intersection permitting all the turning movements (except U-turns) at the intersection.

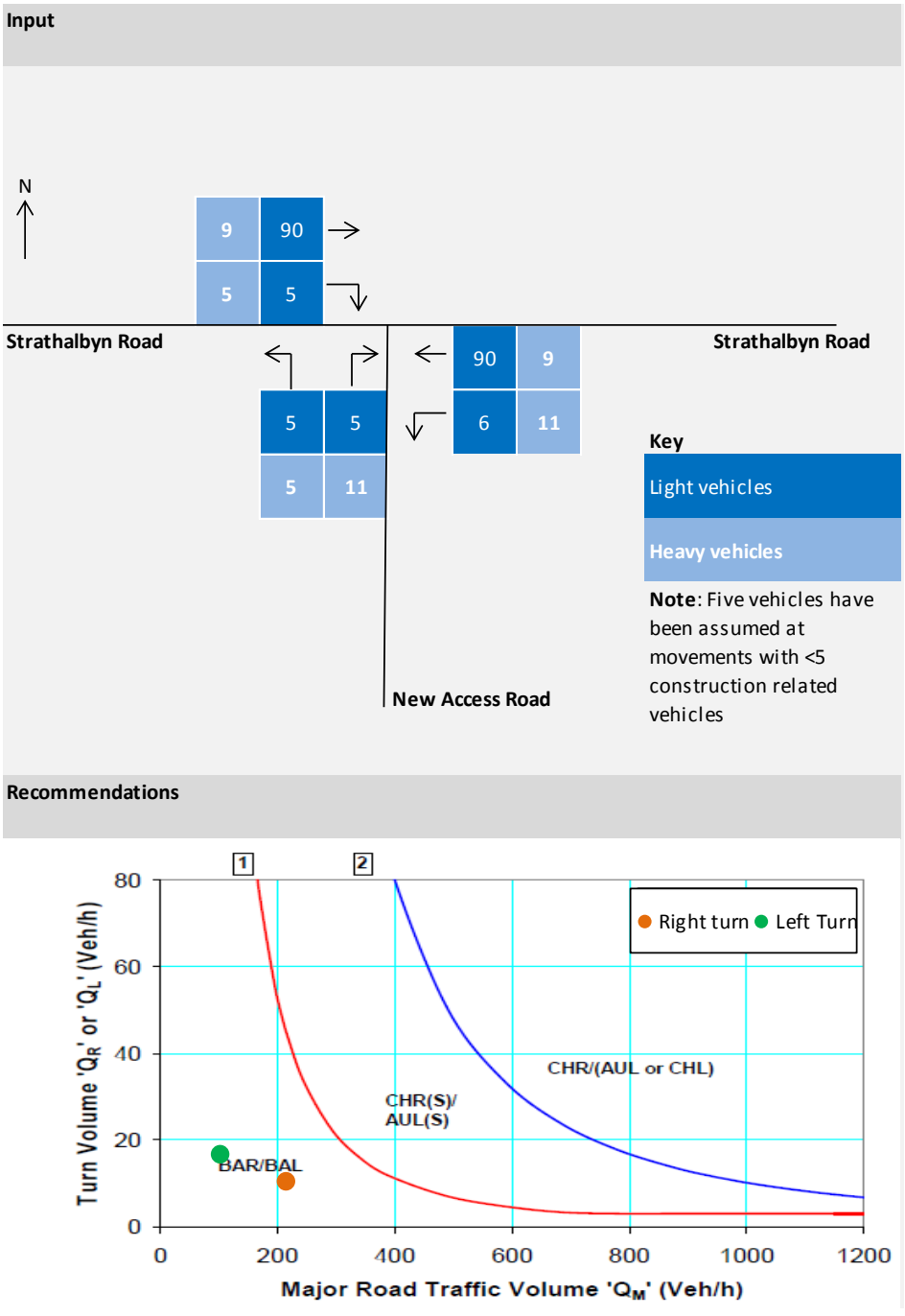
**Figure 14-8 Glenore Road/New Access Road treatment findings**



### Strathalbyn Road / New Access Road intersection

As per the RPDM criteria, BAL/BAR treatments will be undertaken at the Strathalbyn Road / New Access Road intersection due to the low traffic volumes (refer Figure 14-9). The NGBR Project will provide a priority controlled intersection permitting all the turning movements (except U-turns) at the intersection.

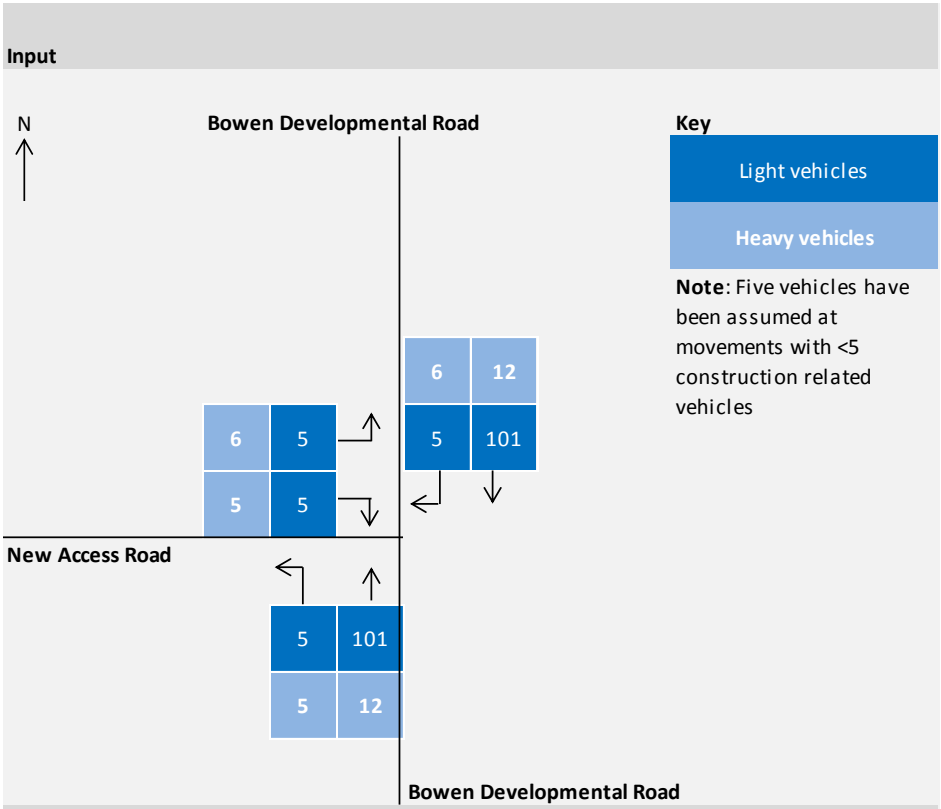
**Figure 14-9 Strathalbyn Road/New Access Road treatment findings**



**Bowen Developmental Road / New Access Road intersection (near chainage 120 km)**

As per the RPDM criteria, BAL/BAR treatments are proposed at the Bowen Developmental Road / New Access Road intersection due to the low volumes (refer Figure 14-10). However, due to the nature and size of construction vehicles (such as 35 m B-Triple Trucks), a higher standard CHR(S)/AUL(S) treatment will be installed at this intersection. Such a treatment reduces the potential operational and safety risks associated with larger construction vehicles, particularly on an intersection with a SCR (i.e. Bowen Developmental Road). The NGBR Project will provide a priority controlled intersection permitting all turning movements (except U-turns) at the intersection.

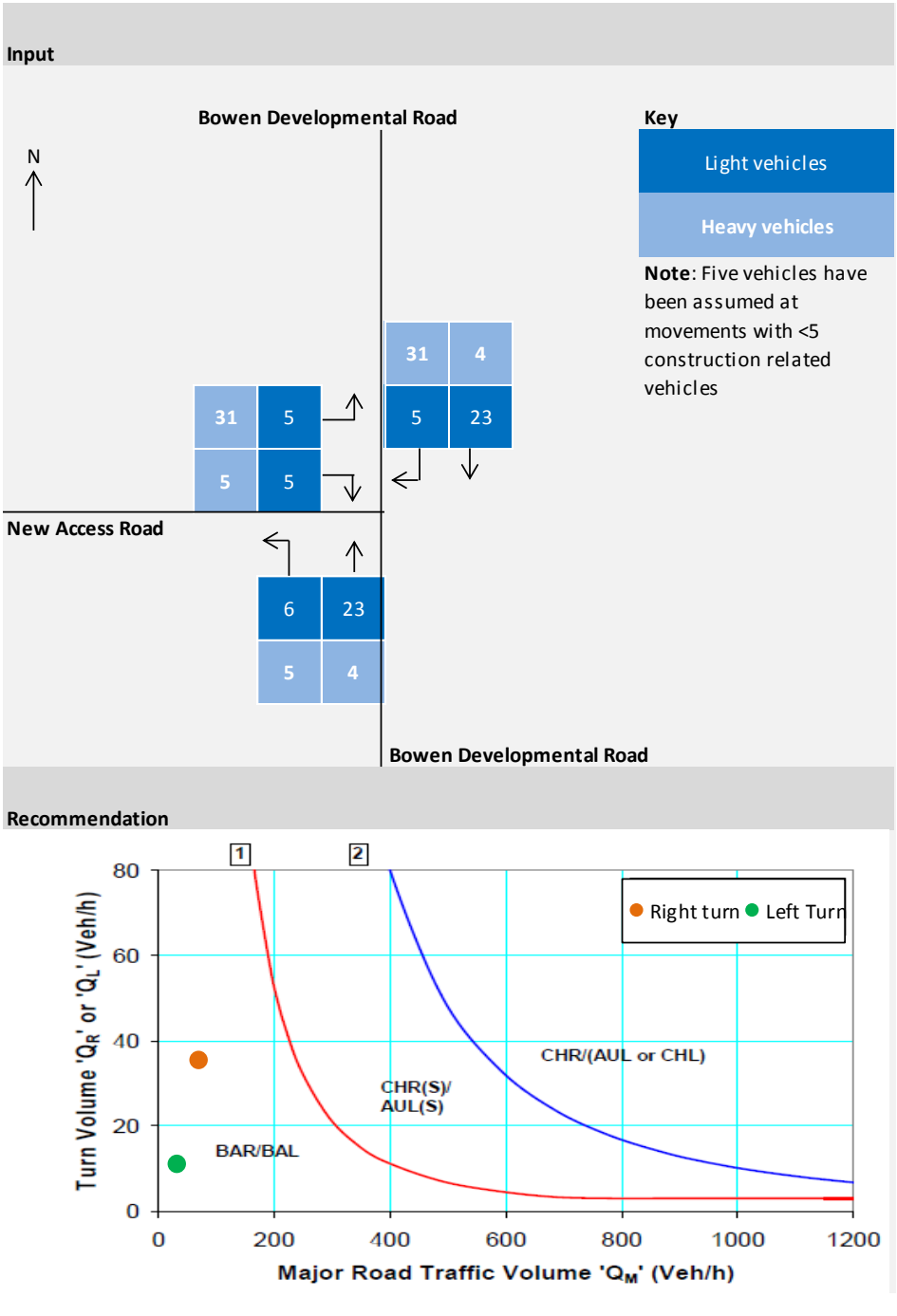
**Figure 14-10 Bowen Developmental Road/New Access Road treatment findings**



### Bowen Developmental Road / New Access Road (near chainage 170 km)

As per the RPDM criteria, BAL/BAR treatments are proposed at the Bowen Developmental Road / New Access Road intersection due to the low volumes (refer Figure 14-11). However, due to the nature and size of construction vehicles (such as 35 m B-Triple Trucks), a higher standard CHR(S)/AUL(S) treatment will be installed at this intersection. Such a treatment reduces the potential operational and safety risks associated with larger construction vehicles, particularly on an intersection with a SCR (i.e. Bowen Developmental Road). The NGBR Project will provide a priority controlled intersection permitting all turning movements (except U-turns) at the intersection.

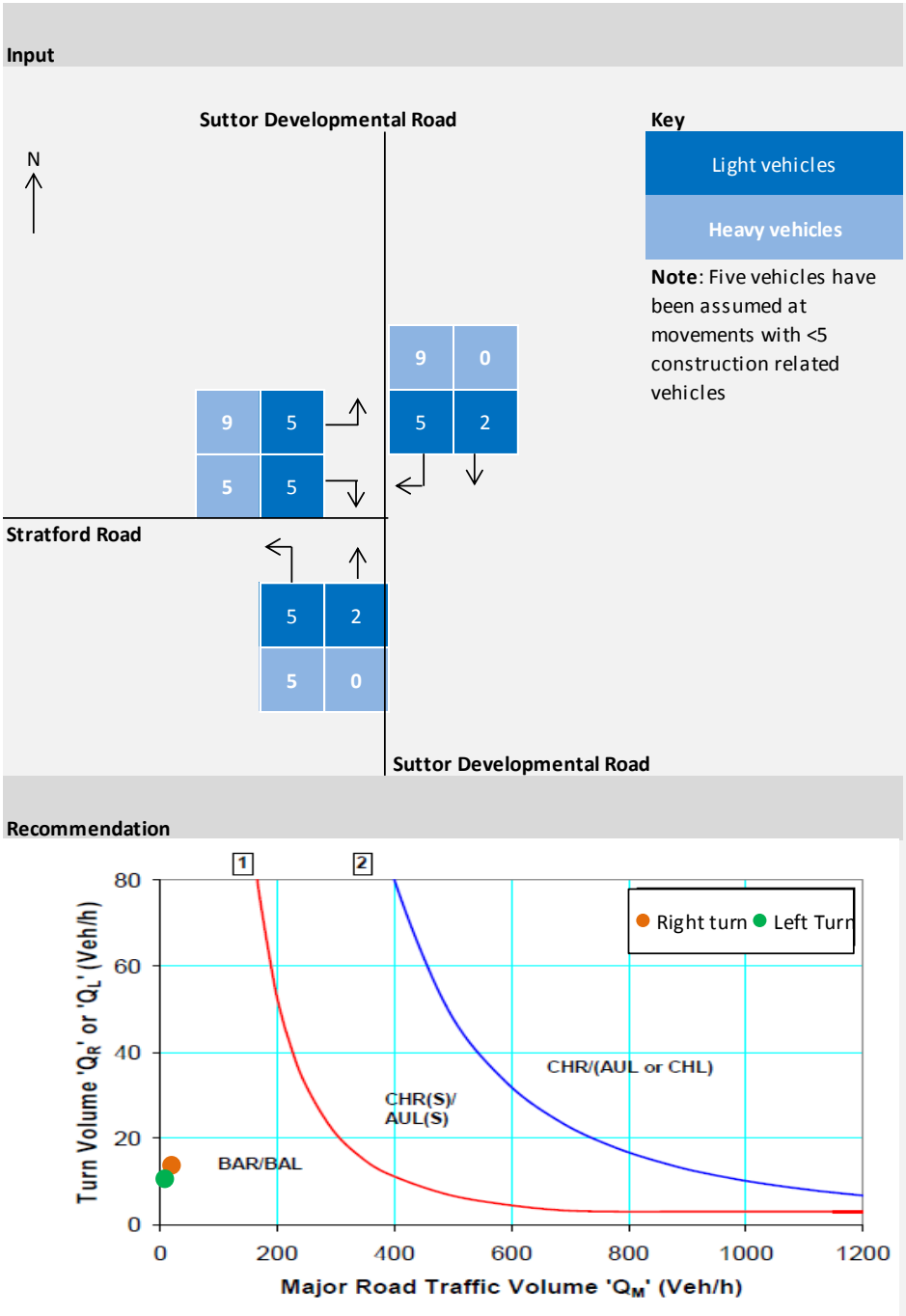
**Figure 14-11 Bowen Developmental Road/New Access Road treatment findings**



### Existing Suttor Developmental Road / Stratford Road intersection

As per the RPDM criteria, BAL/BAR treatments are proposed at this intersection due to the low volumes (refer Figure 14-12). However, due to the nature and size of construction vehicles (such as 35 m B-Triple Trucks), the existing Suttor Developmental Road / Stratford Road intersection will be upgraded to a higher standard CHR(S)/AUL(S). This type of treatment reduces the potential operational and safety risks associated with larger construction vehicles, particularly on an intersection with a SCR (i.e. Suttor Developmental Road). The NGBR Project will provide a priority controlled intersection permitting all turning movements (except U-turns) at the intersection.

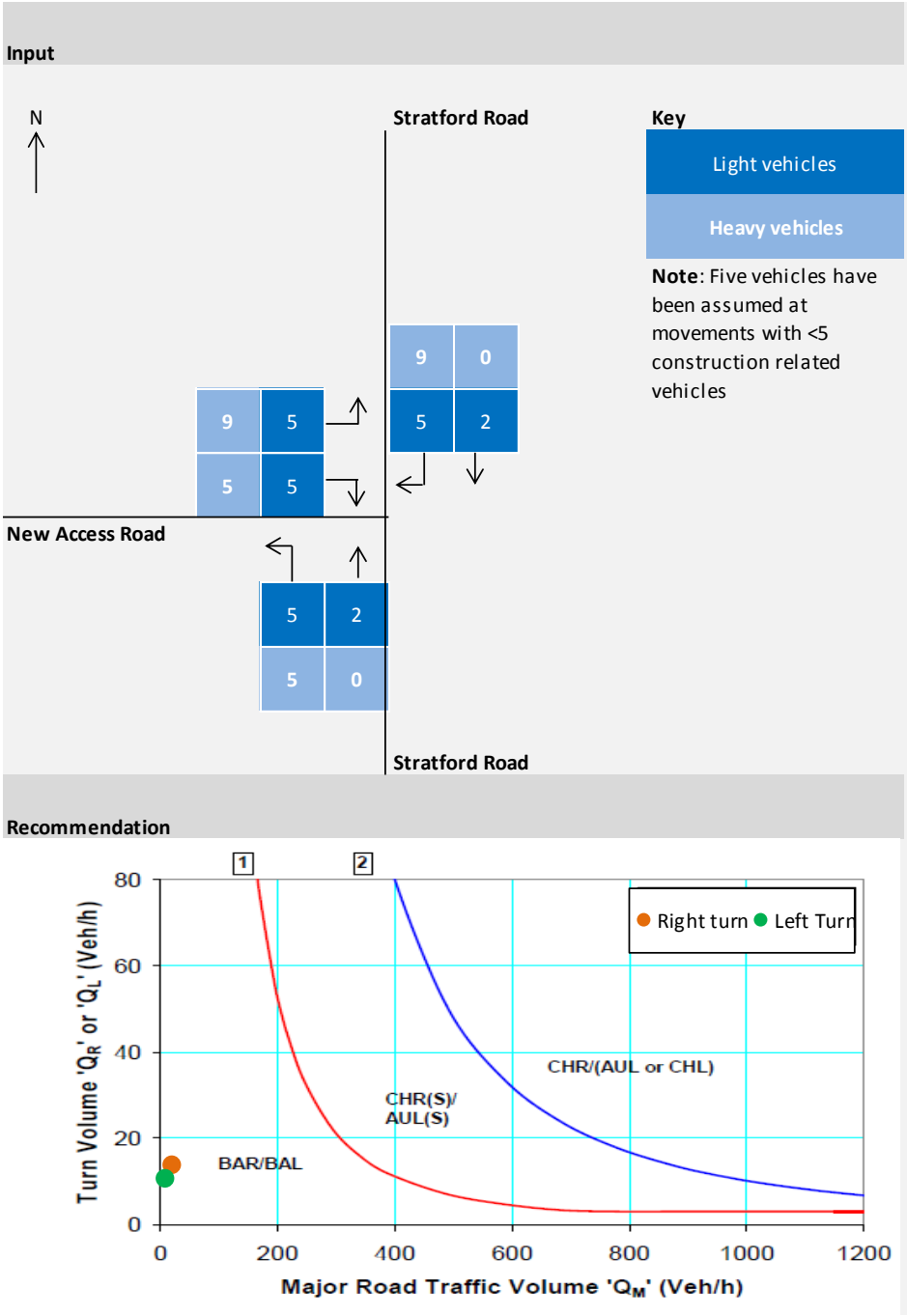
**Figure 14-12 Suttor Developmental Road/Stratford Road treatment findings**



### Stratford Road / New Access Road intersection

As per the RPDM criteria, BAL/BAR treatments will be constructed at the Stratford Road / New Access Road intersection due to low traffic volumes (refer Figure 14-13). The NGBR Project will provide a priority controlled intersection permitting all turning movements (except U-turns) at the intersection.

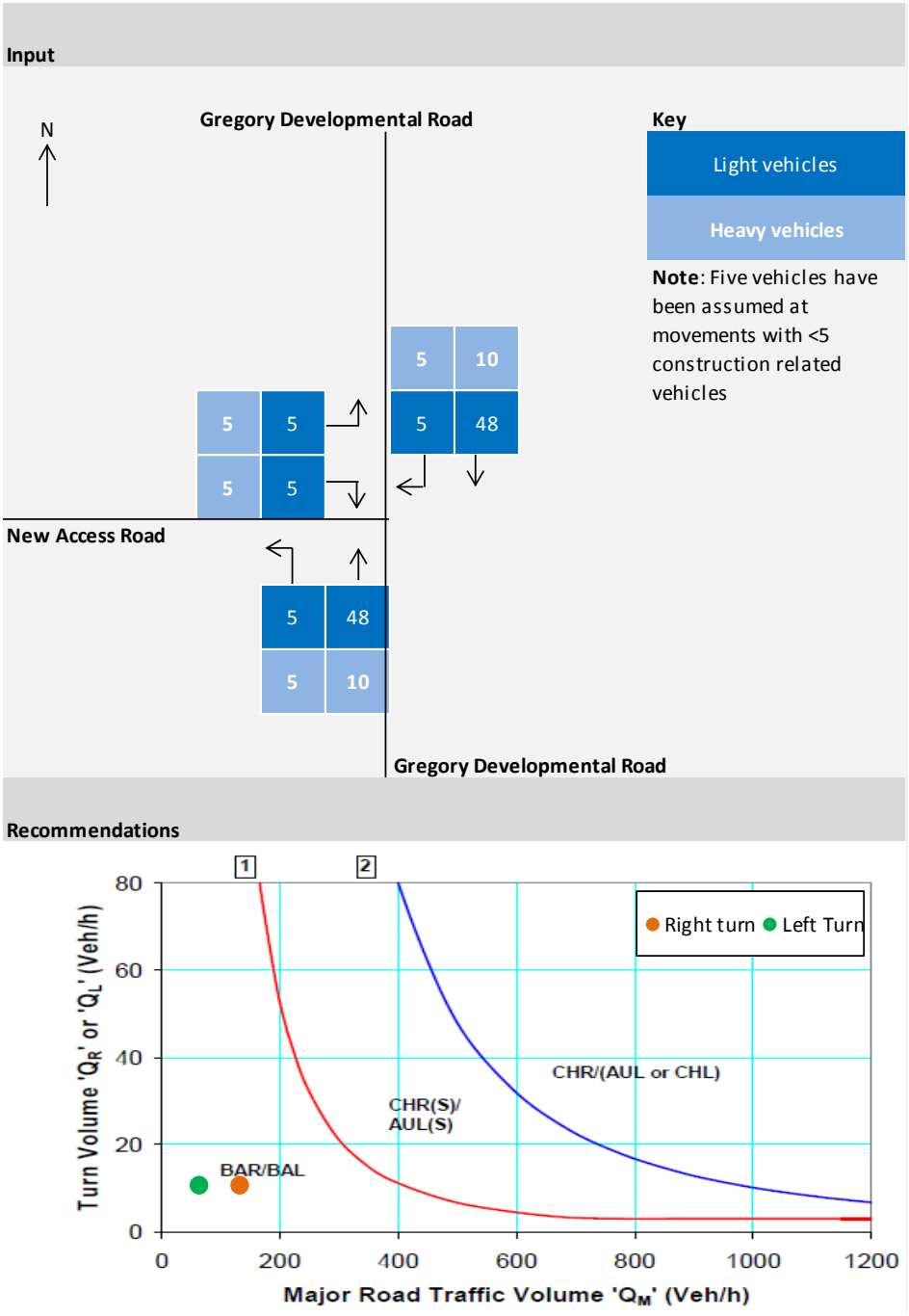
**Figure 14-13 Stratford Road/New Access Road treatment findings**



### Gregory Developmental Road / New Access Road intersection

As per the RPDM criteria, BAL/BAR treatments are proposed at the Gregory Developmental Road / New Access Road intersection due to low traffic volumes (refer Figure 14-14). However, due to the nature and size of construction vehicles (such as 35 m B-Triple Trucks), the NGBR Project will construct a higher standard CHR(S)/AUL(S) treatment at this intersection. Such treatment reduces the potential operational and safety risks associated with larger construction vehicles, particularly on an intersection with a SCR (i.e. Gregory Developmental Road). The NGBR Project will provide a priority controlled intersection permitting all the turning movements (except U-turns) at the intersection.

**Figure 14-14 Gregory Developmental Road/New Access Road treatment findings**



**Proposed road transport infrastructure**

Upgrading of the Bruce Highway and improvement works on the Bowen Developmental Road are the only proposed transport infrastructure upgrades that will impact the NGBR Project. These works will improve capacity of roads to facilitate movement of construction materials and workforce to and from the final rail corridor.

**Rail transport network**

The NGBR Project final rail corridor will run adjacent to the western extent of the Newlands rail network. Interaction of the final rail corridor with the Newlands rail will be primarily confined to the northern portion of the NGBR project in the vicinity of Abbot Point. At chainage 6.75 km, the NGBR Project crosses the existing Abbot Point branch of the Newlands system, part of the Aurizon network. The proposed treatment for this crossing is for the NGBR Project to cross over the Abbot Point branch via a grade-separated crossing.

No passenger rail services operate within the immediate vicinity of the study area. At chainage 12.1 km, the NGBR Project crosses the existing North Coast Line, part of the Queensland Rail network. The proposed treatment for this crossing is for the NGBR Project to cross over the North Coast Line via a grade-separated crossing.

A refinement of the NGBR Project impacts on existing rail infrastructure, at proposed crossing locations, will be undertaken during detailed design, including assessment of current and proposed crossings in accordance with ALCAM. The final treatment at these crossings and any subsequent interfaces with the rail network will be subject to negotiation of Infrastructure Agreements between all relevant parties. These agreements will be developed through the development of the project and will outline infrastructure specific commitments, design and management requirements to be implemented during construction and operation of the NGBR Project.

**Air transport facilities**

A large proportion of the construction workforce will be sourced from areas outside the local area. It is anticipated that approximately 80 per cent of the workforce (1,360 persons at peak) will be flown in to the nearest airports, Proserpine/Whitsunday and Moranbah airports, and then transported to the construction camps via buses at the commencement of each work roster.

Proserpine/Whitsunday Coast Airport is a domestic airport with two asphalt surface runways. Jetstar and Virgin Australia currently operate daily flights between Proserpine and Brisbane. Moranbah Airport has one runway with QantasLink and Skytrans currently operating between Moranbah and Brisbane, Cairns, Townsville and Sunshine Coast.

Given the existing level of service to these airports from a number of airlines, it is anticipated they have sufficient capacity to cater for the additional NGBR Project FIFO workforce either within existing flights or via additional chartered flights. Furthermore, Mackay Airport, Clermont Airport and Emerald Airport could also service the NGBR Project FIFO workforce should Proserpine/Whitsunday or Moranbah airport not have sufficient capacity.

It is not anticipated that upgrades will be required to any existing airport facilities to cater for the NGBR Project FIFO workforce.

**Sea transport facilities**

The Ports of Townsville and Abbot Point may provide facilities suitable for the import of construction materials, components and pre-assembled modules for construction of the NGBR Project. Expansion of the Ports of Townsville and Abbot Point are currently being proposed for

development. Such facilities will be beneficial to construction and operation activities associated with the NGBR Project. The NGBR project will directly facilitate additional throughput capacity at the proposed Terminal 0 and existing Terminal 1 coal export terminals at the Port of Abbot Point.

### 14.5.2 Operation

Operation of the NGBR Project will require a workforce of approximately 369 full-time equivalent staff from 2026 onwards (refer Table 14-17). The majority of this workforce will be accommodated at Bowen or the proposed Carmichael Project (Mine) accommodation camp. The size of the operational workforce required at any time will vary depending on the number of trains in operation. It is expected that 10 train crew members per train will be required. Up to 15 crew members per train may be necessary where trains are few in the early phase of operation. It is anticipated that the majority of the operational workforce will be based out of Bowen, with overnight accommodation provided at the mine camp for changes in shift. A small number of drivers will be based at the rolling stock maintenance yard and provisioning facilities. Cycle times show that crews working loaded trains will work a 12 hour shift, with change-overs occurring at the mine-end and port-end respectively.

Due to the relatively small number of operational workforce, and the current capacity of the existing road network (LOS B and better), operation traffic is anticipated to have a minimal impact on the performance of key roads and key road intersections within the study area.

Maintenance activities throughout operation will include routine rolling stock maintenance and track maintenance as well as major periodic maintenance and emergency response. As the NGBR Project includes a maintenance access road along the length of the final rail corridor, maintenance vehicles are anticipated to have minimal impact on the existing road network during maintenance activities.

## 14.6 Summary of mitigation measures

A summary of the mitigation and management measures that will be implemented during construction and operation of the NGBR Project are provided in Table 14-19.

**Table 14-19 Mitigation measures and timings related to construction and operation activities**

| Timing | Mitigation measure |
|---|---|
| Detailed Design | Infrastructure agreements will be developed prior to construction commencing. The agreements will be developed through the development of the project and will outline infrastructure specific management requirements to be implemented during construction and operation n of the NGBR Project |
| Detailed design | A Road Use Management Plan (RUMP) will be developed in conjunction with the construction contractor and submitted to DTMR/ local Council prior to construction commencing on site. The RUMP will be developed in consultation with DTMR, WRC and IRC to determine the specific requirements of the RUMP and identify appropriate mitigation measures to address the relative increase in traffic levels on affected road sections of the SCR network. A RUMP will be required by DTMR/Council prior to granting a Works Permit to haul material and equipment.<br>The RUMP will identify appropriate protection objectives and associated implementation strategies as well as monitoring, auditing, reporting and corrective actions to be adopted should an undesirable level of impact be experienced. The RUMP will also include requirements by the Queensland Police Service in relation to the safe movement of over-sized/indivisible vehicles.<br>The RUMP will consider the construction and operational phases of the NGBR Project and will serve as the umbrella document for the construction Traffic Management Plan (TMP). To minimise and mitigate the impact of construction traffic on the external road network, the RUMP will include the following management measures:<br>• Installation of specific warning signs at local access roads to construction sites to warn existing road users of entering and exiting traffic<br>• Distribution of day warning notices to advise local road users of scheduled construction activities<br>• Advanced notice to road users of lane closures and advice on alternative routes<br>• Installation of appropriate traffic control and warning signs for areas identified where potential safety risk issues exist<br>• Measures for managing transportation of construction materials to maximise vehicle loads and therefore minimise the total number of vehicle movements<br>• Induction of truck and vehicle operators on the requirements of the TMP<br>• Measures for delivery of oversize loads on site<br>• Heavy vehicle routes for construction traffic accessing and exiting construction sites<br>• Site access roads will include adequate sight and emergency stopping distances when positioning roads<br>• Monitoring and tracking of haulage vehicles<br>• Worker transport including mobility impaired workers |
| Pre-construction | Traffic during construction will be managed through a detailed Traffic Management Plan (TMP). The TMP will address specific items of construction work and issues related to the safe and efficient movement of construction vehicles and haulage of material including the movement |

| Timing | Mitigation measure |
|---|---|
| | of site staff. A TMP will be required by DTMR/Council prior to granting a Works Permit to haul material and equipment. Consultation with DTMR, WRC and IRC will also be undertaken in relation to the specific requirements of the TMP. |
| Pre-construction | A Road Impact Assessment (RIA) will be prepared prior to construction commencing for all key roads and approaches to key intersections in the study area. The RIA will include detailed information on the construction and operation aspects of the NGBR Project (e.g. construction traffic vehicles, quantity of materials to be hauled, haulage routes, quarry locations, program, etc.). The RIA will confirm required road improvements to mitigate the impact of increased construction traffic and locations where a detailed Pavement Impact Assessment (PIA) is required. |
| Pre-construction | A Detailed Pavement Impact Assessment (PIA) will be prepared and submitted to DTMR/Council prior to construction commencing. The RIA will identify locations on the road network where a detailed pavement impact assessment is required. The detailed PIA will assess the impact of the construction traffic on the life of the affected road pavements and recommend remedial measures. The extent of the remedial measures and compensation will be discussed and agreed with DTMR/Council. |
| Pre-construction | Construction and operation of the NGBR Project will require direct interaction and potential modification of existing transport infrastructure, including the road network (State and locally controlled), stock route network and rail network. As such, prior to commencement of construction, further investigation and consultation will be undertaken with affected infrastructure owners and associated regulatory agencies regarding final crossing treatment arrangements, impact management practices to be employed and the development and execution of Infrastructure Agreement. This will be confirmed through additional investigations such as a Road Impact Assessment and conducting assessments of current and proposed level crossings in accordance with the ALCAM. |
| Construction | Temporary traffic management strategies and interface agreements will be developed during detailed design in consultation with DTMR, WRC and IRC for the duration of the construction works and will include consideration of the following:<br>• Construction of acceleration / deceleration lanes<br>• Construction of passing lanes to allow construction traffic and through traffic to safely manoeuvre and pass with minimal disruption. |
| Construction | Coaches used to transport FIFO workers will be compliant with the requirements of the *Disability Discrimination Act 1992*. |
| Construction | Adani will communicate with the public and operators of school buses and public transport to promote awareness of the impact and management of construction and operation activities. |
| Operation | Appropriate controls will be implemented and maintained to access roads during operations to facilitate any ongoing maintenance activities required within the corridor; strategies will include the incorporation of appropriate fencing, gating and signage |

## 14.7 Conclusion

Construction traffic associated with the NGBR Project, including heavy vehicle movements, will create short-term increases in traffic volumes on local and SCRs. However, due to the relatively low existing traffic volumes on these roads, the performance of all key roads is anticipated to operate satisfactorily at LOS C or better. Based on the nominal capacity of the road network, the additional construction traffic resulting from the project can be adequately accommodated at acceptable levels of service.

To minimise the potential impacts of the NGBR Project on key intersections, the following treatment, in accordance with the Road Planning and Design Manual, 2nd edition, will be considered further during detailed design:

- CHR(S)/AUL(S) treatments at the Bruce Highway / New Access Road intersection
- BAL/BAR treatments at the Glenore Road / New Access Road intersection as well as provide a priority controlled intersection permitting all the turning movements (except U-turns)
- BAL/BAR treatments at the Strathalbyn Road / New Access Road intersection due to the low traffic volumes as well as a priority controlled intersection permitting all turning movements (except U-turns)
- CHR(S)/AUL(S) treatments at both of the Bowen Developmental Road / New Access Road intersections (occurring in the proximity of chainage 120 km and 170 km) to accommodate heavy traffic. A priority controlled intersection permitting all turning movements (except U-turns) at the intersection will be included
- The existing Suttor Developmental Road / Stratford Road intersection will be upgraded to a higher standard CHR(S)/AUL(S) to accommodate heavy vehicle traffic. A priority controlled intersection permitting all turning movements (except U-turns) at the intersection will be included.
- BAL/BAR treatments will be constructed at the Stratford Road / New Access Road intersection due to low traffic volumes. A priority controlled intersection permitting all the turning movements (except U-turns) at the intersection will be included.
- CHR(S)/AUL(S) treatments at the Gregory Developmental Road / New Access Road intersection to accommodate heavy traffic. A priority controlled intersection permitting all the turning movements (except U-turns) at the intersection will be included.

Due to the relatively small number of operational workforce, and the currently capacity of the existing road network (LOS A), operation traffic is anticipated to have a minimal impact on the performance of key roads and key road intersections within the study area.