BROWN

Carmichael Coal Mine and Rail Project

Road Impact Assessment

adani™

Prepared for Adani Mining Pty Ltd

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Transport Division

Smart Consulting

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1 Introduction and Context

1.1 Overview

Brown Consulting have prepared the following report on behalf of Adani Report Mining Pty Ltd for the Carmichael Coal Project.

Adani Mining Pty Ltd (Adani, the Proponent), commenced an Environmental Impact Statement (EIS) process for the Carmichael Coal Mine and Rail Project (the Project) in 2010. On 26 November 2010, the Queensland (Qld) Office of the Coordinator General declared the Project a 'significant project' and the Project was referred to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (referral No. 2010/5736). The Project was assessed to be a controlled action on the 6 January 2011 under section 75 and section 87 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The controlling provisions for the Project include:

- World Heritage properties (sections 12 & 15A)
- National Heritage places (sections 15B & 15C)
- Wetlands (Ramsar) (sections 16 & 17B)
- Listed threatened species and communities (sections 18 & 18A)
- Listed migratory species (sections 20 & 20A)
- The Great Barrier Reef Marine Park (GBRMP) (sections 24B & 24C).

The Qld Government's EIS process has been accredited for the assessment under Part 8 of the EPBC Act in accordance with the bilateral agreement between the Commonwealth of Australia and the State of Queensland.

The Proponent prepared an EIS in accordance with the Terms of Reference (ToR) issued by the Qld Coordinator-General in May 2011 (Qld Government, 2011). The EIS process is managed under section 26(1) (a) of the *State Development and Public Works Act 1971* (SDPWO Act), which is administered by the Qld Government's Department of State Development, Infrastructure and Planning (DSDIP).

The EIS, submitted in December 2012, assessed the environmental, social and economic impacts associated with developing a 60 million tonne (product) per annum (Mtpa) thermal coal mine in the northern Galilee Basin, approximately 160 kilometres (km) north-west of Clermont, Central Queensland, Australia. Coal from the Project will be transported by rail to the existing Goonyella and Newlands rail systems, operated by Aurizon Operations Limited (Aurizon). The coal will be exported via the Port of Hay Point and the Point of Abbot Point over the 60 year (90 years in the EIS) mine life.

Project components are as follows:

- The Project (Mine): a greenfield coal mine over EPC 1690 and the eastern portion of EPC 1080, which includes both open cut and underground mining, on mine infrastructure and associated mine processing facilities (the Mine) and the Mine (offsite) infrastructure including a workers accommodation village and associated facilities, a permanent airport site, an industrial area and water supply infrastructure
- The Project (Rail): a greenfield rail line connecting to mine to the existing Goonyella and Newlands rail systems to provide for the export of coal via the Port of Hay Point (Dudgeon Point expansion) and the Port of Abbot Point, respectively including:
  - Rail (west): a 120 kilometre (km) dual gauge portion running west from the Mine site east to Diamond Creek
  - Rail (east): a 69 km narrow gauge portion running east from Diamond Creek connecting to the Goonyella rail system south of Moranbah.
  - Quarries: The use of five (5) local quarries to extract quarry materials for construction and operational purposes.

The Project (Mine) site is located along the Moray - Carmichael Road, refer Figure 1.1 below. The nearest regional towns to the Project are Clermont, located to the south, and Moranbah to the east, refer Figure 1.2 below.

The contents of this report has drawn on various existing information and data resources, including reports developed for the Environmental Impact Statement (EIS).

This report provides information on the expected traffic generated by the full development and also outlines the assessment of the adjoining traffic network. The report is consistent with the requirements of Queensland Transport and Main Roads' (DTMR's) *Guidelines for Assessment of Road Impacts of Development (GARID)*.

It is understood that this report will be used as an input into the Supplementary Environmental Impact Statement (SEIS) for the project.

Figure 1.1: Locality Plan - Carmichael Coal Mine and Rail Project

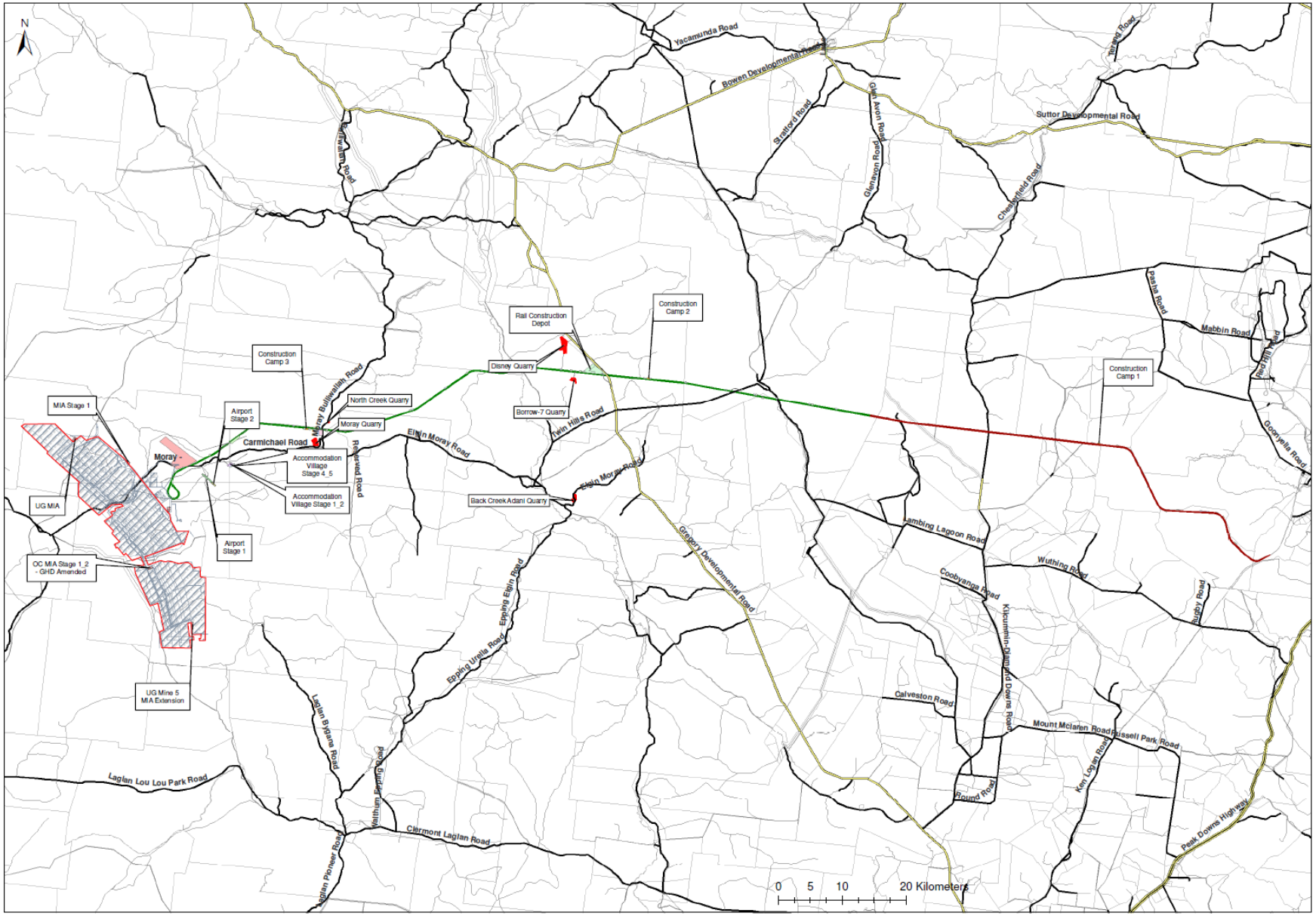
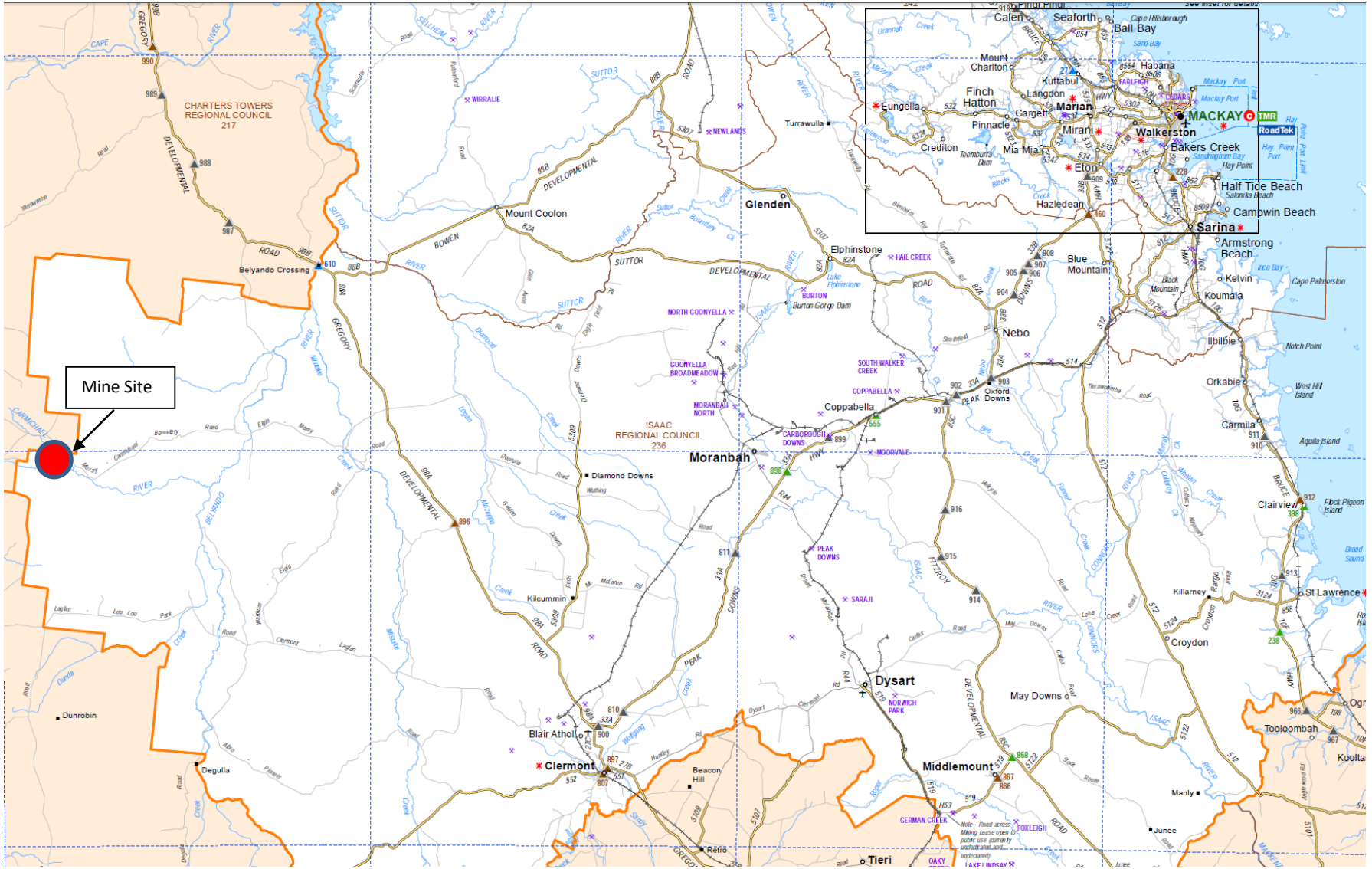


Figure 1.1.2: Regional Context - Carmichael Coal Mine and Rail Project (Map courtesy of Qld DTMR)



1.2 Key Assumptions and Development Principles

During the construction (establishment) and operational phases it is understood that the Carmichael Coal project will function as defined below. This information is further expanded in Section 3 (Development Traffic), particularly in relation to the resultant traffic generation anticipated from the development consistent with the key assumptions and principles defined below.

1.2.1 Construction Phase

- Construction is expected to occur effectively 24 hours per day, 7 days per week – 363 days per year
- It is expected that a significant proportion of the workforce will operate on a fly in, fly out (FIFO) basis. FIFO activity will initially be from the existing Airport at Doongmabulla and later the proposed Airport site to be located adjacent to the mine site. Some FIFO will also be via Moranbah for rail construction in the eastern sections (eg. Camp 1). FIFO will be a key requirement for working on the project. This is primarily due to the large distances that would be required to be travelled by workers to / from the various work sites and the potential risk (road safety) that this long distance travel may have on each worker either before or after each shift.
- Generally workforce access to each site will be via bus / coach for all locations – the primary route for the majority of local movements will be the Moray - Carmichael Road.
- Consumables for the mining construction will be sourced locally, wherever possible, so as to support the surrounding community, eg. Clermont, Moranbah and Emerald. While it is not expected that all materials for the Project will be able to be sourced in the local area, consideration will be given to the transport requirements of materials with an aim to minimise both heavy and oversize vehicle traffic generation on the road network. Other key source locations will include Mackay and Townsville and to a lesser extent, for particular equipment and components, either Brisbane and / or Rockhampton.
- Maintenance of mine equipment, and not construction equipment, will primarily be undertaken on-site at the Mine Infrastructure Area and / or in the Off-Lease Industrial Area. Maintenance of equipment for the rail and quarries will occur on-site and not at the Mine Infrastructure Area.
- The FIFO workers will be housed in camp locations consistent with their role in the construction work, eg. rail construction workers will be located at the rail camps whereas those workers related to the mine will be located at the mine camp.

Section 3 of this report provides a breakdown of the proposed construction arrangements including a summary breakdown of the anticipated materials associated with the construction phase.

1.2.2 Operations Phase

- An open cut and underground coal mine producing approximately 60Mtpa at the peak
- Anticipated mine lifespan of 60 years
- Coal produced will be railed via the Project (Rail) line and connect with the existing rail line located west of Moranbah with a final connection on to the Abbot Point or Hay Point Coal Terminals
- Mining will be performed by utilising a truck and excavator method of mining
- Coal to be crushed, washed and screened on site prior to haulage
- Operations are expected to occur effectively 24 hours per day, 7 days per week - a 363 days per year operation
- It is expected that a significant proportion of the workforce will operate on a fly in, fly out (FIFO) basis. FIFO activity will initially be from the existing Airport at Doongmabulla and later the proposed Airport site to be located adjacent to the mine site. FIFO will be a key requirement for working on the project. This is primarily due to the large distances that would be required to be travelled by workers to / from the various work sites and the potential risk (road safety) that this long distance travel may have on each worker either before or after each shift.
- Workforce access to the Project site will be via bus / coach for all locations – the primary route for the majority of local movements will be the Moray - Carmichael Road.
- Consumables for the mining operations will be sourced locally, wherever possible, so as to support the surrounding community, eg. Clermont, Moranbah and Emerald. While it is not expected that all materials for the

Project will be able to be sourced in the local area, consideration will be given to the transport requirements of materials with an aim to minimise both heavy and oversize vehicle traffic generation on the road network. Other key source locations will include Mackay and Townsville and to a lesser extent, for particular equipment and components, either Brisbane and / or Rockhampton.

- Maintenance of equipment is expected to primarily be undertaken on-site at the Mine Infrastructure Area and / or in the Off-Lease Industrial Area. Do note also that the Borrow 7 quarry is anticipated to be in operation for the life of the mine. Any maintenance of equipment associated with the Borrow 7 quarry will be undertaken on the quarry site. Maintenance of trains and related activities will be undertaken at the maintenance facility on Moray Downs.
- The FIFO workers will be housed in the Mine Workers Accommodation Village during the operational phase.

Section 3 of this report provides a breakdown of the proposed operational phase arrangements including a summary breakdown of the anticipated materials associated with the operational phase.

1.3 References and Data Sources

For the purposes of this assessment various references and data sources were utilised as inputs into the development of this project report. The key inputs are defined below and are also detailed in Appendix A: References:

- EIS, Volume 1, Chapter 8 Cumulative Impacts
- EIS, Volume 2, Chapter 6 Water Resources
- EIS, Volume 2, Chapter 9 Noise and Vibration
- EIS, Volume 2, Chapter 11 Transport
- EIS, Volume 2, Chapter 12 Hazard and Risk
- EIS, Volume 3, Chapter 6 Water Resources
- EIS, Volume 3, Chapter 9 Noise and Vibration
- EIS, Volume 3, Chapter 11 Transport
- EIS, Volume 3, Chapter 12 Hazard and Risk
- EIS, Volume 4, AG Rail Transport Assessment
- EIS, Volume 4, W Mine Transport Assessment
- Report for Carmichael Coal Mine and Rail Project, Land Use, 20 September 2012
- Adani Rail/Mining Camp, Transport Statement – Mine Camp, prepared for Adani Mining Pty Ltd, October 2012
- Adani Rail/Mining Camp, Transport Statement – Camp 1, prepared for Adani Mining Pty Ltd, October 2012
- Adani Rail/Mining Camp, Transport Statement – Camp 2, prepared for Adani Mining Pty Ltd, November 2012
- Adani Rail/Mining Camp, Transport Statement – Camp 3, prepared for Adani Mining Pty Ltd, October 2012
- Carmichael Coal Mine Project, Back Creek Quarry Proposal, Traffic Engineering Report, TTM, April 2013
- Carmichael Coal Mine Project, Borrow 7 Quarry Proposal, Traffic Engineering Report, TTM, April 2013
- Carmichael Coal Mine Project, Disney Quarry Proposal, Traffic Engineering Report, TTM, April 2013
- Carmichael Coal Mine Project, Moray Pit Quarry Proposal, Traffic Engineering Report, TTM, April 2013
- Carmichael Coal Mine Project, North Creek Quarry Proposal, Traffic Engineering Report, TTM, April 2013
- Carmichael Mine Road Upgrade Detailed Design, Adani Mining Pty Ltd, Parsons Brinckerhoff, Detailed Design Report, 8 February 2013

2 Existing Transport Network

The Project's Rail corridor will traverse one state-controlled road, namely the Gregory Developmental Road, and also a number of other public local roads. The local roads are under the jurisdiction of the Isaac Regional Council (IRC). The Project (Mine) site itself will primarily impact the Moray – Carmichael Road. An outline of the features associated with the key routes is presented in the following sections. Please note that further material is available from the EIS Volumes 2 and 3, Section 11 Transport.

2.1 State Controlled Road Network

The state controlled road (SCR) network will provide the major longer distance access function for the project for construction materials and equipment and to also support the operational phases of the project into the future. The SCR network links the project to the coast at Mackay and Townsville and also further afield to Brisbane and Rockhampton. Each of these locations are anticipated to provide inputs to the project either during the construction or operational phase or both.

Figures 2.1 and 2.2 below provide an overall plan of the roads within the two DTMR regions that the Project is anticipated to impact; these are maps for the Mackay / Whitsunday Region and Northern Region. These roads show the roads that are controlled by DTMR and those that are under the jurisdiction of the various Regional Councils, eg. Isaac Regional Council. The key SCR network roads that are anticipated to be impacted include the Peak Downs Highway, Gregory Developmental Road and Flinders Highway.

The traffic count and crash data that is presented in the following sections is the latest data (received July 2013) and it has been acquired from DTMR or from other reports as defined by each of the references.

Figure 2.1: Mackay/ Whitsunday Region - DTMR

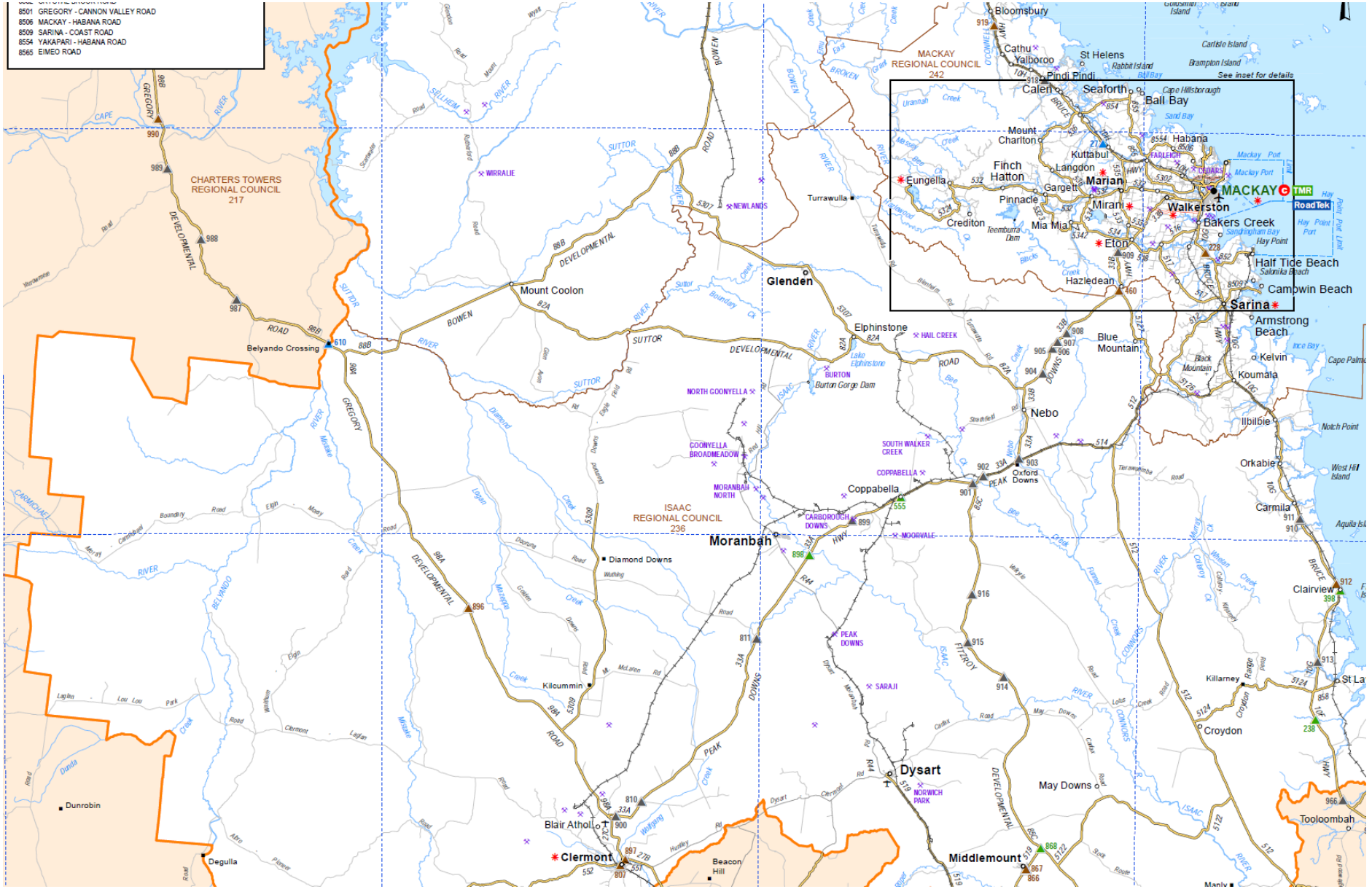
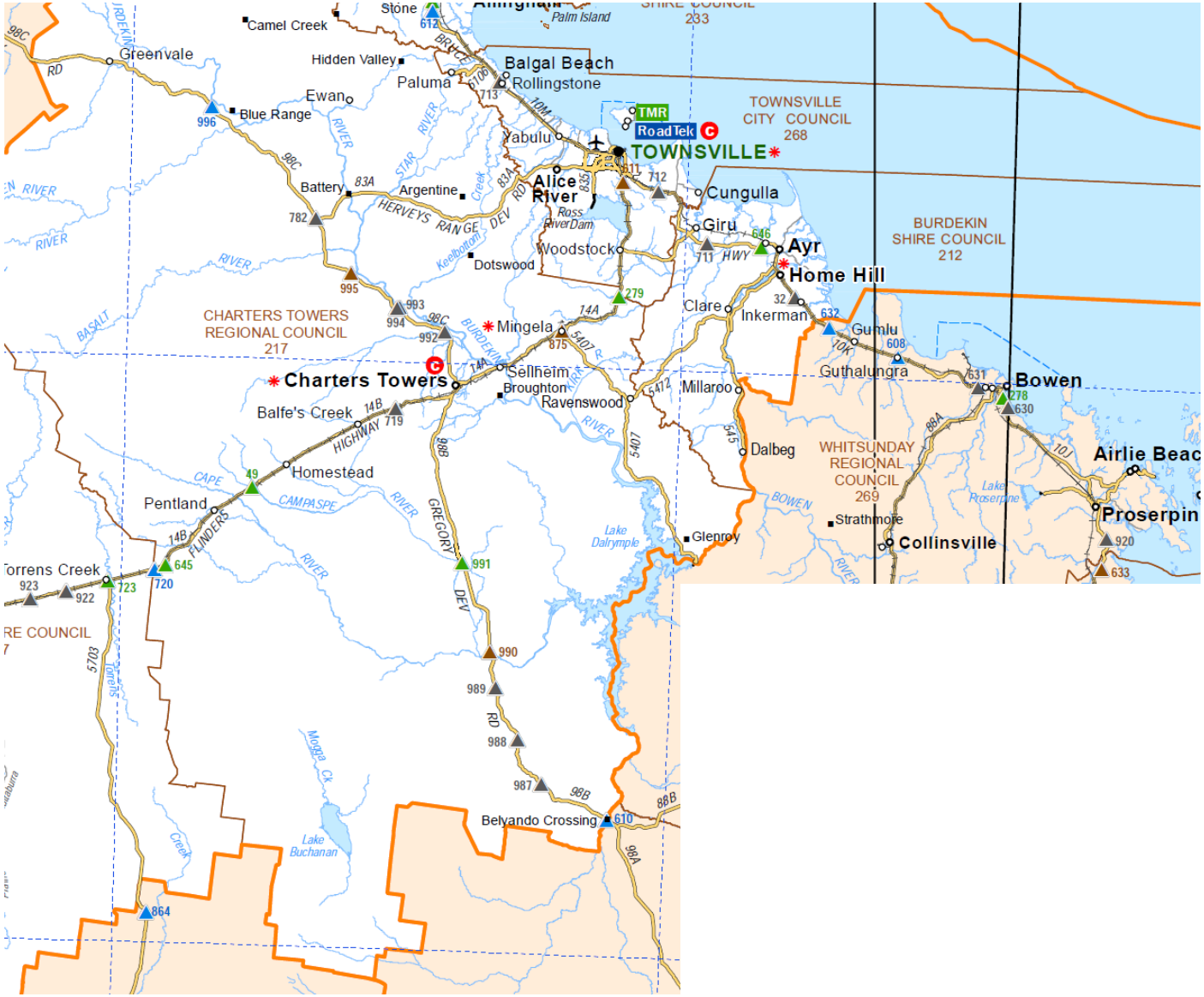


Figure 2.2: Northern Region - DTMR



2.1.1 Peak Downs Highway (33A, 33B)

The Peak Downs Highway (DTMR designation 33A and 33B) links Mackay to the hinterland and western regions, including the townships of Moranbah and Clermont and also to the Gregory Developmental Road. The Peak Downs Highway alignment travels through undulating terrain for a distance of approximately 265km with over 1.2km of its length traversing relatively steep grades of greater than 5% to the south of Eton (on the south-western border of Mackay). The Peak Downs Highway has a generally good quality sealed pavement over its entire length and is used heavily by the mining industry to access the Bowen Basin mining activity located around Moranbah, Nebo, Dysart, Clermont and Middlemount.

The 2012 daily traffic volume (AADT) ranges from a low of 726vpd (including 28% Heavy Vehicles) to 4,234vpd (including 15.8% Heavy Vehicles) between Clermont to Nebo the volume then increases east of Nebo towards Eton to about 4,888vpd (including 17.8% Heavy Vehicles) (DTMR: 2013). The traffic growth rates range from 7% pa near Clermont, and up to 15% pa around Coppabella, with the average growth rate at around 9% pa across the link over the past 10 years (DTMR: 2013).

Crash data from DTMR, for a five year period from 2005 to 2009 for the Peak Downs Highway, between the Gregory Developmental Road and Bruce Highway (about 270km in length), is presented below in Table 2.1.

Table 2.1: Crash History – Peak Downs Highway - between the Gregory Developmental Road and Bruce Highway (2005-2009)

Year	Non-Injury	Injury	Fatal	Total
2005	27	34	2	63
2006	22	32	3	57
2007	24	25	2	51
2008	28	40	2	70
2009	23	37	4	64
Total	124	168	13	305

(DTMR: 2013)

Figures 2.3 and 2.4 illustrate typical conditions for the Peak Downs Highway.

Figure 2.3: Peak Downs Highway

(Google: 2013)

Figure 2.4: Peak Downs Highway/ Goonyella Road Intersection (looking westbound)

2.1.2 Gregory Developmental Road (98A, 98B)

The Gregory Developmental Road (GDR) (DTMR designation 98A and 98B) runs in an approximate north-south direction and is approximately 350km in length. The road links Charters Towers in the north with Clermont to the south. The GDR intersects with the Flinders Highway at a priority controlled T-intersection immediately south-west of Charters Towers, and ends at a priority controlled T-intersection with the Peak Downs Highway about 15km north of Clermont. The GDR is sealed across its length but to differing standards, eg. single lane seal versus full two lane seal. Given it provides a north-south connection between the Galilee Basin and Townsville and Charters Towers, and like the Peak Downs Highway, it is heavily trafficked by heavy vehicle movements.

The 2012 daily traffic volume (AADT) is estimated to be 450vpd between Belyando Crossing and the Peak Downs Highway (DTMR: 2013) including a heavy vehicle proportion of 28% (DTMR: 2013). The traffic growth rate over the past 10 years on the link is around 8 – 9% pa (DTMR: 2013).

Crash data from DTMR, for a five year period from 2005 to 2009, for the Gregory Developmental Road between the Peak Downs Highway and Flinders Highway (about 370km in length), is presented below in Table 2.2.

Table 2.2: Crash History – Gregory Developmental Road (2005-2009)

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

(DTMR: 2013)

Figures 2.5 and 2.6 illustrate the typical conditions for the Gregory Development Road.

Figure 2.5: Gregory Developmental Road (looking south at intersection with Twin Hills Road)

(Cardno: 2012)

Figure 2.6: Gregory Developmental Road/ Elgin Road Intersection (looking southbound)

(TTM: 2013)

2.1.3 Flinders Highway (14A)

The Flinders Highway (DTMR designation 14A) runs in an approximate east-west direction and is approximately 780km in length. The highway connects Townsville on the coast to Cloncurry in the west (intersects about 11km east of Cloncurry with the Landsborough Highway). The Flinders Highway intersects with the Gregory Developmental Road at a priority controlled T-intersection south-west of Charters Towers. This intersection is about 140km south-west of Townsville. The Flinders Highway is fully sealed and like the other major routes in the area is heavily trafficked by heavy vehicle movements supporting the mining activity in north-west Queensland.

The 2012 daily traffic volume (AADT) is generally about 2,325vpd between Charters Towers and the south-western outskirts of Townsville (DTMR: 2013). The volume further increases as the route moves within the urban area of Townsville. The percentage of heavy vehicles also changes over the length of the route from Charters Towers and Townsville with a range of 20.2% to 40.7% (DTMR: 2013). The traffic growth rate over the past 10 years on the link is around 4% pa (DTMR: 2013).

Crash data from DTMR, for a five year period from 2005 to 2009, for the section of the Flinders Highway situated between Queenton and Wulguru (about 126 km in length), is presented below in Table 2.3.

Figure 2.7 illustrates the intersection with the Gregory Development Road.

Figure 2.7: Gregory Developmental Road/ Flinders Highway Intersection (looking westbound)

(Google: 2013)

Table 2.3: Crash History – Flinders Highway (2005-2009)

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

(DTMR: 2013)

2.1.4 Kilcummin-Diamond Downs Road (5309)

Kilcummin-Diamond Downs Road (DTMR designation 5309) runs in an approximate north-south alignment. The Kilcummin Diamond Downs Road is a state-controlled road which turns into an IRC local controlled road in the vicinity of the Project (Rail), namely Eaglefield Road. Continuing south from the intersection with Eaglefield Road, the Kilcummin-Diamond Downs Road intersects with the Gregory Developmental Road at a priority controlled T-intersection located to the north of Miclere. The turn-off to Kilcummin-Diamond Downs Road is about 28km north of the intersection of the Peak Downs Highway with the Gregory Developmental Road.

The 2012 daily traffic volume (AADT) is estimated to be about 74vpd along the Kilcummin-Diamond Downs Road including a heavy vehicle proportion of about 23% (DTMR:2013). The traffic growth rate over the past 10 years on the link is around 2% pa (DTMR: 2013).

Traffic crash data from DTMR indicates that there was one crash over the five year period (2005 – 2009) and this crash occurred about 2.5km north of the proposed access point to the Rail Camp 1. It involved one vehicle veering off on a straight unsealed section of the road (DTMR: 2013).

2.2 Local Road Network

The IRC has jurisdiction of the local council roads within the area of interest for this project. The key features of the three main local roads are outlined below.

2.2.1 Moray - Carmichael Road

Moray - Carmichael Road will be the primary access to the Mine and other supporting infrastructure located west of the Gregory Developmental Road. The road runs in an approximate east-west alignment and is approximately 115km in length. The road forms a priority controlled T-intersection with Moray - Bulliwallah Road at its eastern end and forms a priority controlled T-intersection with Ulcanbah Road at its western end. Moray -Carmichael Road traverses the Project (Mine) site.

This route is of particular importance because it will provide the road access to the mine site. The route is unsealed and is only trafficable in dry conditions. It is understood that Adani is in discussions with the IRC regarding the long term maintenance and development of the Moray - Carmichael Road from its intersection with the Gregory Development Road to where it intersects with the western boundary of EPC 1690. The Moray - Carmichael Road will be progressively upgraded in accordance with the agreement deed with Council (GHD: 2012).

The current Moray – Carmichael Road runs through the mine site and will continue to do so. It is understood Adani have committed to maintaining public access to the road through the mine site at all times. The alignment of the road may move from time to time to accommodate mining activity, however it will continue to be open to the public

and meet the required engineering standard. Adani will also be working with landholders along the route and the IRC to realign the road in places to provide a better alignment to safely accommodate mining traffic (GHD: 2012).

The 2012 daily traffic volume (AADT) range for Moray – Carmichael Road is 14 to 56vpd (including about 54% heavy vehicles) (Cardno: 2012) (TTM: 2013). A conservative value of 20vpd has been utilised as the baseline for the purposes of the assessment.

Traffic crash data indicates that there has been no crashes recorded along this section of road (Cardno: 2012).

Figure 2.8 illustrates the typical road condition on the Moray - Carmichael Road.

Figure 2.8: Moray – Carmichael Road

(PB: 2013)

2.2.2 Moray - Bulliwallah Road

Moray - Bulliwallah Road runs north from the intersection of the Elgin - Moray and Moray - Carmichael Roads. The route is unsealed and is only trafficable in dry conditions.

The 2012 daily traffic volume (AADT) for Moray – Bulliwallah Road is 10vpd (including about 15% heavy vehicles) (Cardno: 2012) (TTM: 2013).

Traffic crash data indicates that there has been no crashes recorded along this section of road (Cardno: 2012).

2.2.3 Elgin - Moray Road

Elgin - Moray Road runs in an approximate north-south alignment. The road intersects Eppin Elgin Road via a priority controlled T-intersection at its southern end and forms a priority controlled T-intersection with Moray – Carmichael Road at its northern end.

The 2012 daily traffic volume (AADT) for Elgin – Moray Road is 61vpd (TTM: 2013). This volume is understood to have been obtained from the IRC. There is also understood to be no data available for the proportion of heavy vehicles for this road. Notwithstanding, the volume of 61vpd is considered high relative to the Moray – Carmichael Road and may not be representative of a long term average on the road link.

It is understood that no traffic crash data is available for this road link. Notwithstanding, it is expected that the number of crashes would be relatively low and likely be consistent with the surrounding road network, eg. Moray - Carmichael Road and Moray – Bulliwallah Road each of which have had no crashes over the recorded 5 year period.

2.3 Multi-Combination Vehicles and Higher Mass Limits

2.3.1 Introduction and definitions

Heavy vehicles, including multi-combination vehicles such as B-Doubles, are expected to be an integral element within the freight and logistics chain for the development of the project. Given this context the relevant requirements for MCV's needs to be considered. Outlined below is a brief discussion on some of the key definitions and constraints regarding the use of these vehicle types across the road network.

A B-Double is defined as a combination consisting of a prime mover towing two semi-trailers. The prime mover and the two trailers are combined by two fifth wheel (turntable) assemblies. The double articulation is the main distinguishing feature of a B-Double.

A B-Double can have an overall length of 26 metres or less. Allowable axle group spacings and additional operating conditions are provided in *Queensland Transport Guideline for Multi-combination Vehicles in Queensland (Road Trains, B-doubles, B-triples, AB-triples) (Form Number 1)*. A maximum Gross Combination Mass (GCM) of 62.5 tonnes without Road Friendly Suspension (RFS), and a maximum GCM of 68 tonnes with RFS when operating under *Queensland Transport Performance Guidelines for Higher Mass Limits for Vehicles with Road Friendly Suspensions (Form Number 10)*.

A Road Train is defined as a combination, other than a B-Double, consisting of a rigid vehicle (which may be a prime mover) towing two or more trailers. A converter dolly supporting a semi-trailer is counted as one trailer. There are two groups of road trains in Queensland; Type 1 Road Trains and Type 2 Road Trains.

A Conventional Type 1 Road Train operates at an overall length of 36.5 metres or less. Allowable axle group spacings are provided in *Queensland Transport Guideline for Multicombination Vehicles in Queensland (Road Trains, B-doubles, B-triples, AB-triples) (Form Number 1)*. A maximum GCM of 82.5 tonnes without RFS, and a maximum GCM of 90.5 tonnes with RFS when operating under *Queensland Transport Performance Guidelines for Higher Mass Limits for Vehicles with Road Friendly Suspensions (Form Number 10)*.

Conventional Type 1 Road Trains are also referred to as 'Double Road Trains' or 'A-Double Road Trains' in other Australian States and Territories. A B-Triple is an innovative Type 1 Road Train that operates at an overall length of 36.5 metres or less.

A Conventional Type 2 Road Train operates at an overall length of more than 36.5 metres, but not more than 53.5 metres. Allowable axle group spacings are provided in Queensland Transport Guideline for Multi-combination Vehicles in Queensland (Road Trains, B-doubles, B-triples, AB-triples) Form Number 1. A maximum GCM of 122.5 tonnes without RFS, and a maximum GCM of 135.5 tonnes with RFS when operating under *Queensland Transport Performance Guidelines for Higher Mass Limits for Vehicles with Road Friendly Suspensions (Form Number 10).* Conventional Type 2 Road Trains are also referred to as 'Triple Road Trains' or 'A-Triple Road Trains' in other Australian States and Territories. An AB-Triple that operates at an overall length of 44 metres or less is an innovative Type 2 Road Train.

Figures 2.9 to 2.13 illustrate the relevant MCV Routes for this project.

The key points of relevance to the Carmichael Coal Mine and Rail project are:

- Type 1 and 2 road train routes exist between Clermont and Townsville via the Gregory Developmental Road and the Flinders Highway to the Port of Townsville.
- B-Doubles (23m and 25m) can operate on all of the state controlled network sections that would likely be utilised by the project during the construction and operations phases
- Road train routes are unavailable in SEQ from Brisbane to Toowoomba; this restricts the use of the Warrego Highway from Brisbane to Toowoomba for these vehicle types. Type 1 routes commence west of Toowoomba then out to Roma and north to Emerald and Clermont.

- The Peak Downs Highway is a Type 1 Road train route from Hazeldean (west of Eton near Mackay) to the intersection with the Gregory Developmental Road north of Clermont.
- The Capricorn Highway is a Type 1 Road train route from Rockhampton to Emerald.

2.3.2 Higher Mass Limits

From August 2010 changes to the higher mass limits policy now allow operators to apply for additional higher mass limits access on routes that are not already approved as a road train or B-double route as previously required (Figures 2.14 to 2.18 illustrate the HML routes). When operating at higher mass limits, operators must ensure that the higher mass limit route is approved for their particular vehicle combination, in particular:

- Road trains operating at higher mass limit weights can only operate on approved road train routes as per the multi-combination approved routes with any conditions being applied to the route having to be adhered to.
- B-doubles operating at higher mass limit weights can only operate on approved road train and B-double routes as per the multi-combination approved routes with any conditions being applied to the route having to be adhered to.

Queensland has a policy that allows vehicles fitted with road-friendly suspension to carry more freight on routes that are capable of accepting higher masses. Higher mass limits (HML) were first introduced to Queensland on 2 July 1999. Initially, the scheme was limited to the former national highway system and connecting 23m and 25m B-double routes within a radial distance of 500m. In December 2002, the Queensland Government introduced a policy framework that allowed extensions based upon agreement from the road asset owner.

The Intelligent Access Program (IAP) is now available for vehicles operating at higher mass limits. This national program provides heavy vehicles with improved access to the Australian road network in return for monitoring compliance with specific access conditions. This is done by installing vehicle telematics in participating vehicles which includes a combination of global positioning systems, in-vehicle sensors, and additional communication technology. Enrolment in IAP is a mandatory requirement for HML.

2.3.3 Expansion of the higher mass limits network

- The Queensland and Commonwealth Governments have entered into a Bilateral Infrastructure Agreement (BIFA) in accordance with the AusLink program. The agreement encourages a staged rollout of extensions to the existing higher-mass-limit network in conjunction with additional responsibilities for road transport operators.
- On 1 October 2006, the Queensland Government expanded the number of higher-mass-limit approved routes to meet its obligations under the Australian Government's AusLink program.
- Queensland's current policy for requesting extensions will still apply while Bilateral Infrastructure Agreement obligations for both the Queensland Government and road freight industry are met. Higher-mass-limit routes are approved only after an agreement to use the road has been obtained from the road owner, and the proposal has been endorsed by the Department of Transport and Main Roads.

The key points of relevance to the Carmichael Coal Mine and Rail project are:

- The Federal Highway network is approved for use by Higher Mass Limit (HML) vehicles.
- The Gregory Developmental Road and Peak Downs Highway are not approved for HML vehicles. Should these routes be required to be used by HML a separate application is required for these routes. This will go through to DTMR for their review and is subject to their approval.
- The Flinders Highway from Townsville to Charters Towers is approved for HML vehicles.

Figure 2.9: Multi-Combination Routes in Queensland – Section 3

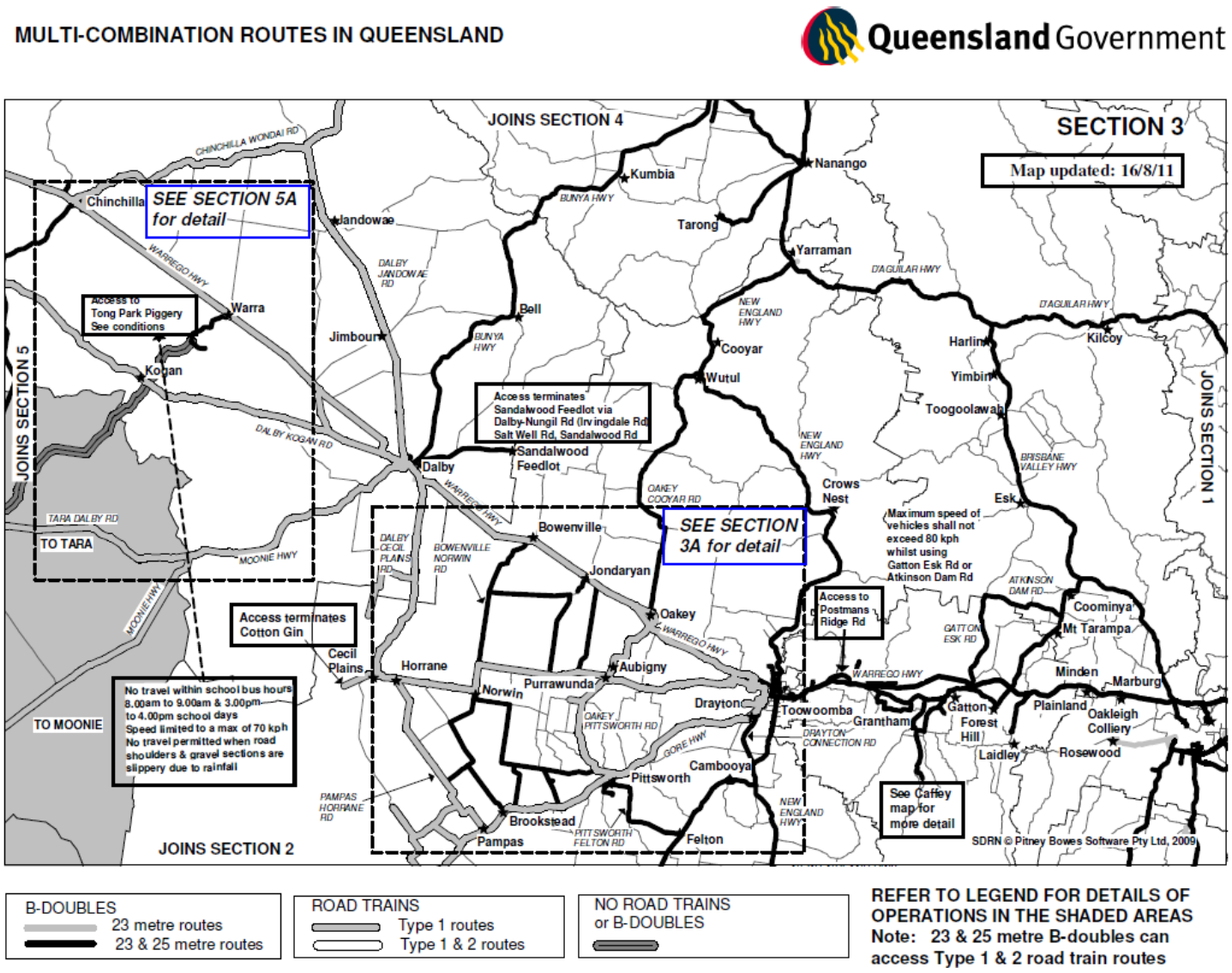


Figure 2.10: Multi-Combination Routes in Queensland – Section 5

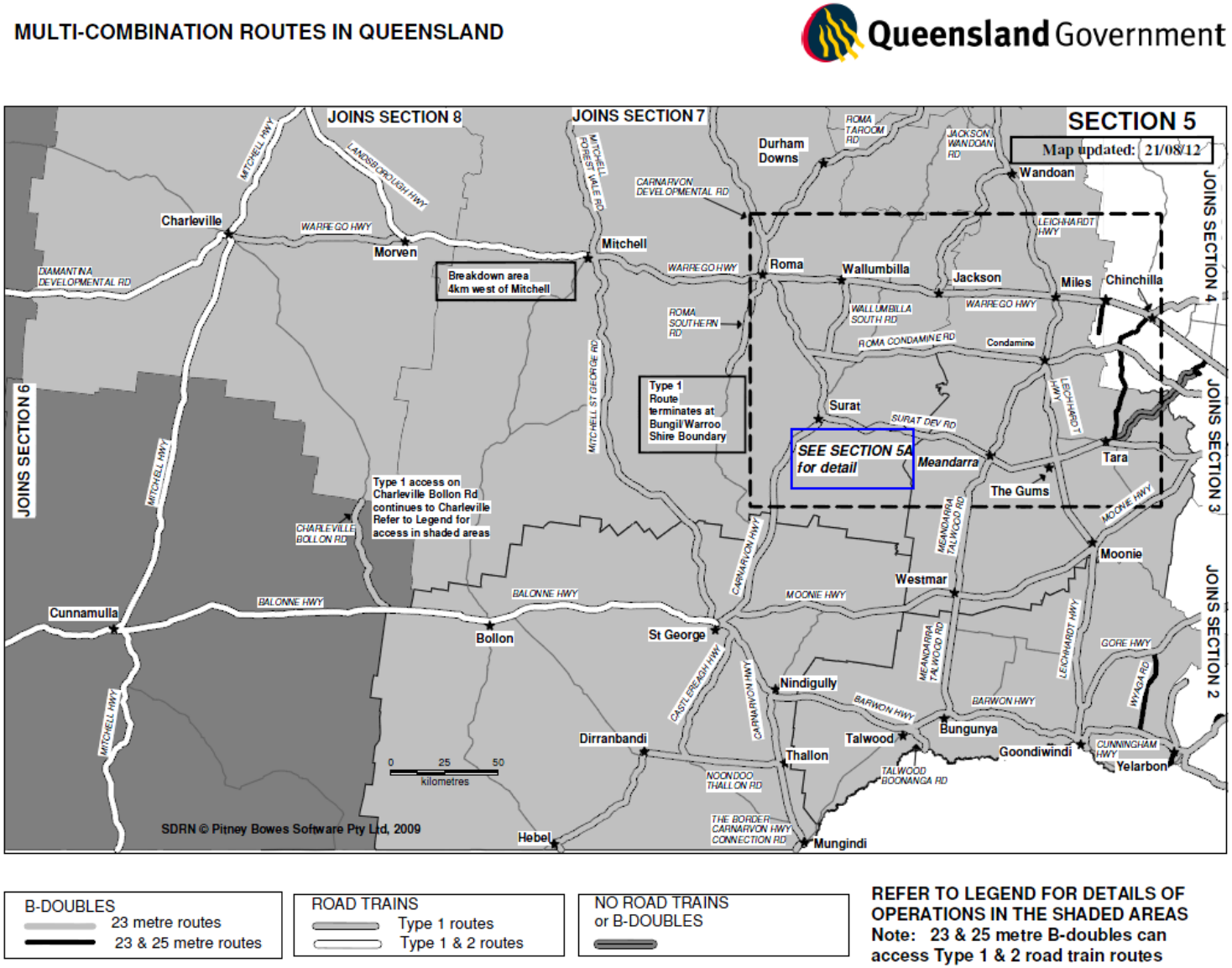


Figure 2.11: Multi-Combination Routes in Queensland – Section 8

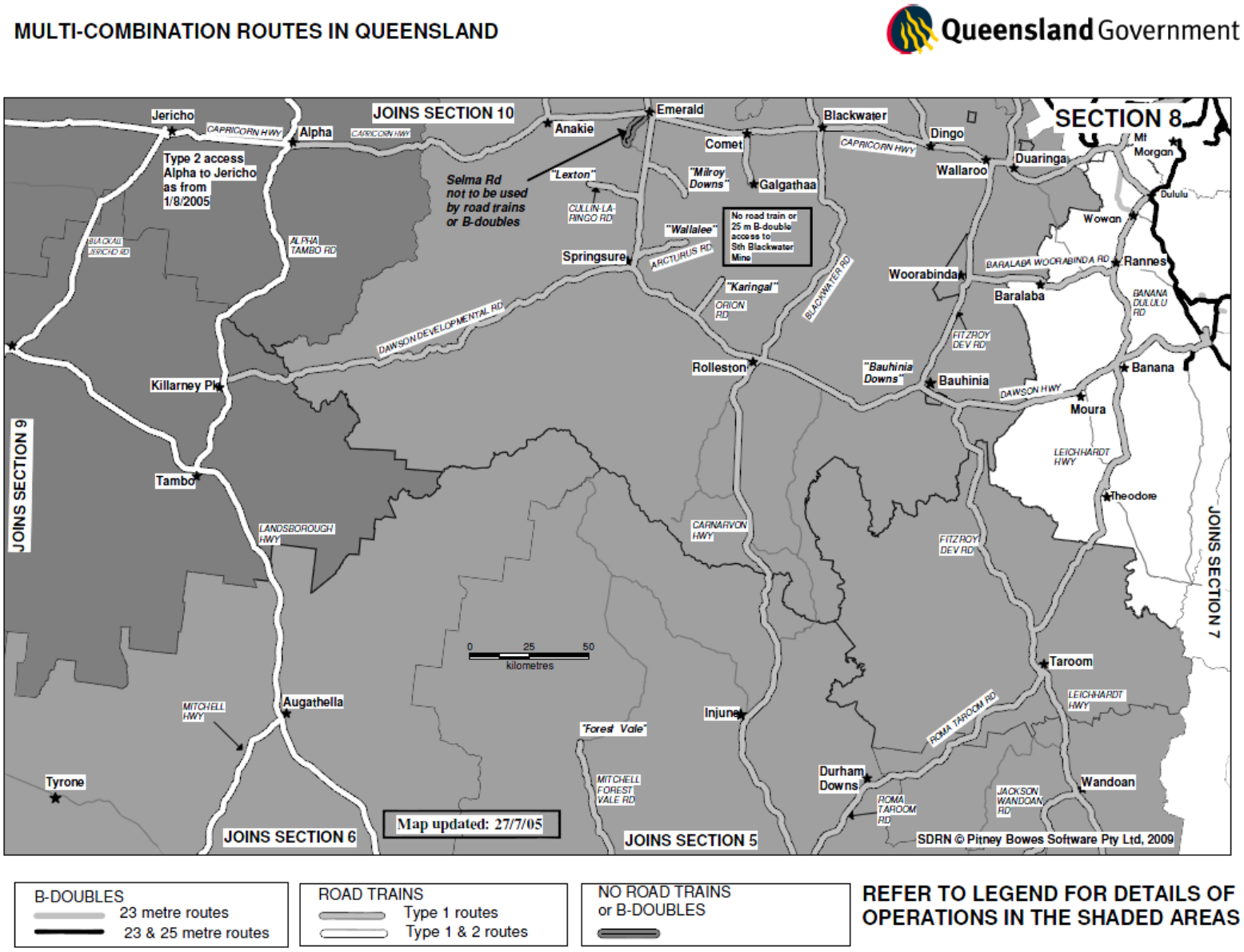


Figure 2.12: Multi-Combination Routes in Queensland – Section 10

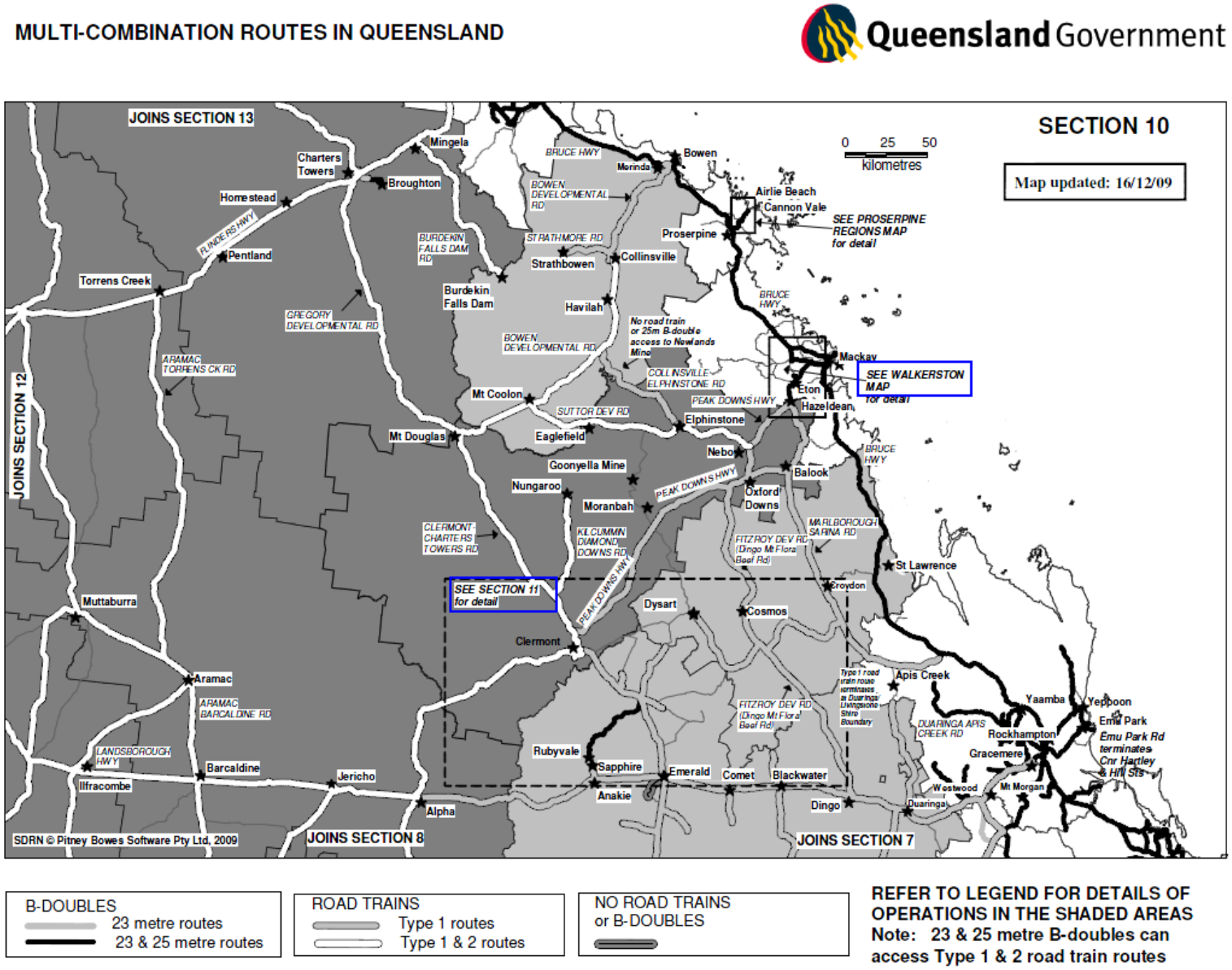


Figure 2.13: Multi-Combination Routes in Queensland – Section 13

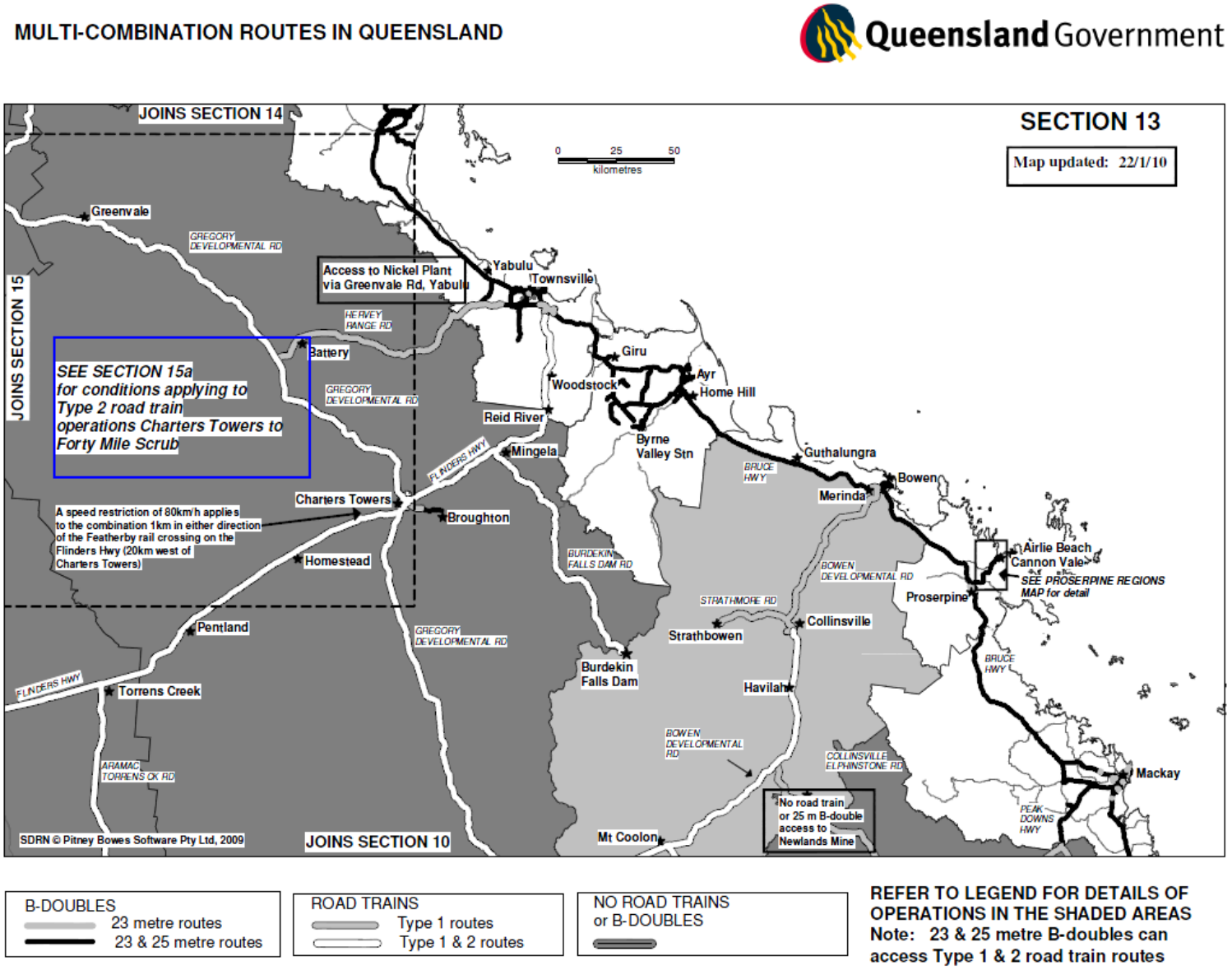
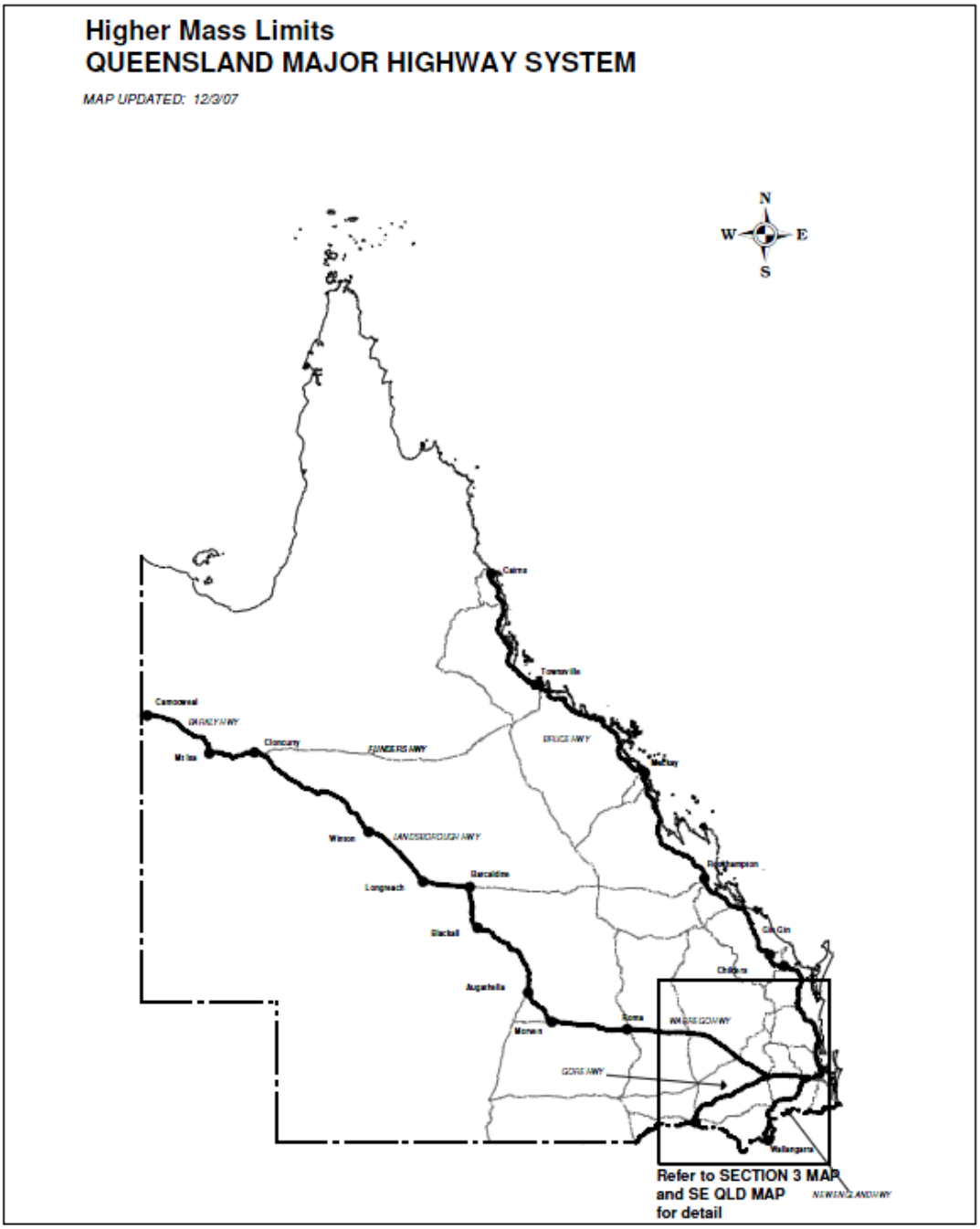


Figure 2.14: Higher Mass Limits – Queensland's Major Highway System

APPROVED ROUTES FOR HIGHER MASS LIMITS
FOR VEHICLES WITH ROAD FRIENDLY SUSPENSIONS

Queensland Government



Major Highway System

Additional roads approved for Higher Mass Limits

Figure 2.15: Approved Routes for Higher Mass Limits for Vehicles with Road Friendly Suspensions

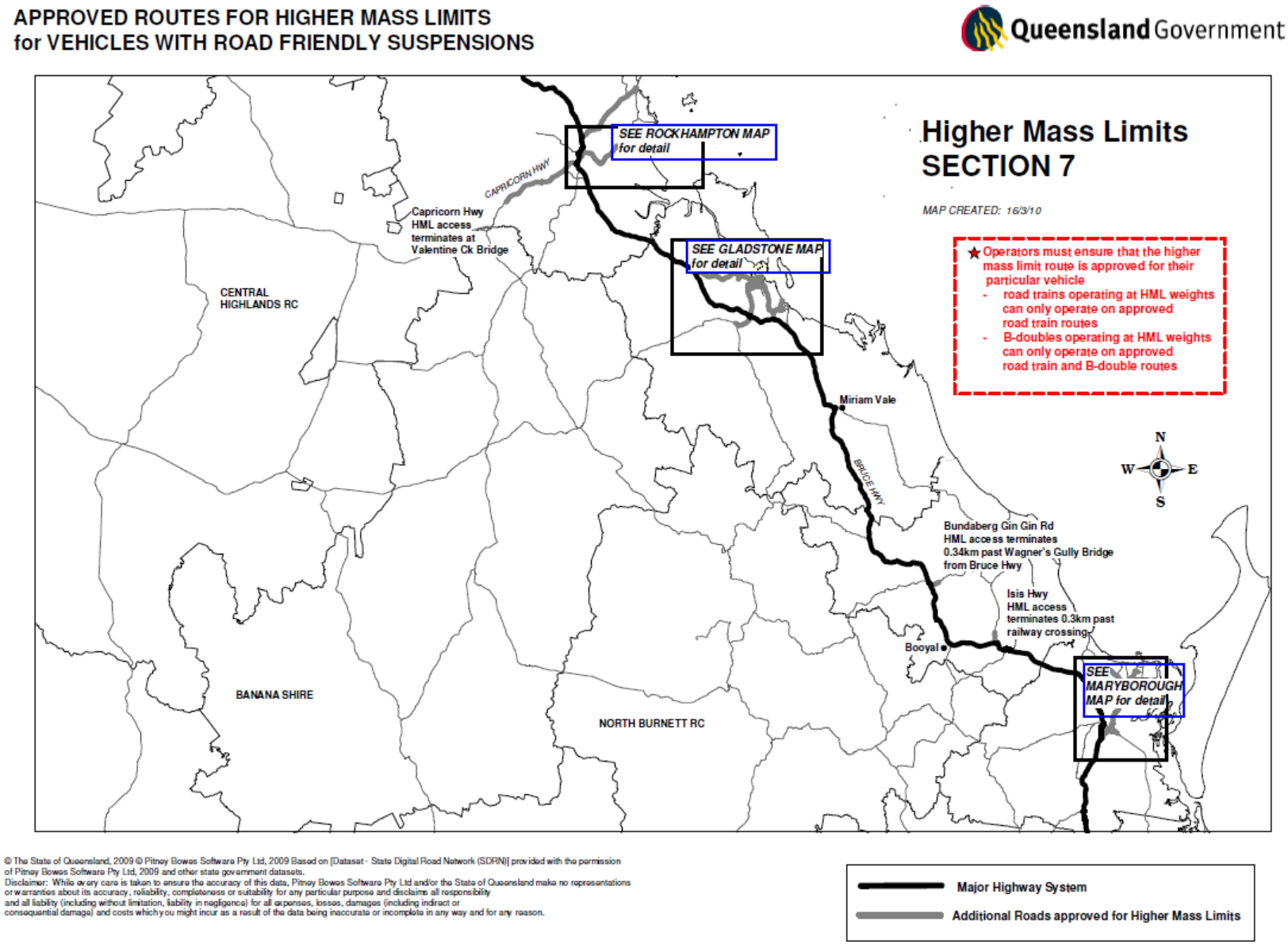


Figure 2.16: Approve Routes for Higher Mass Limits for Vehicles with Road Friendly Suspensions

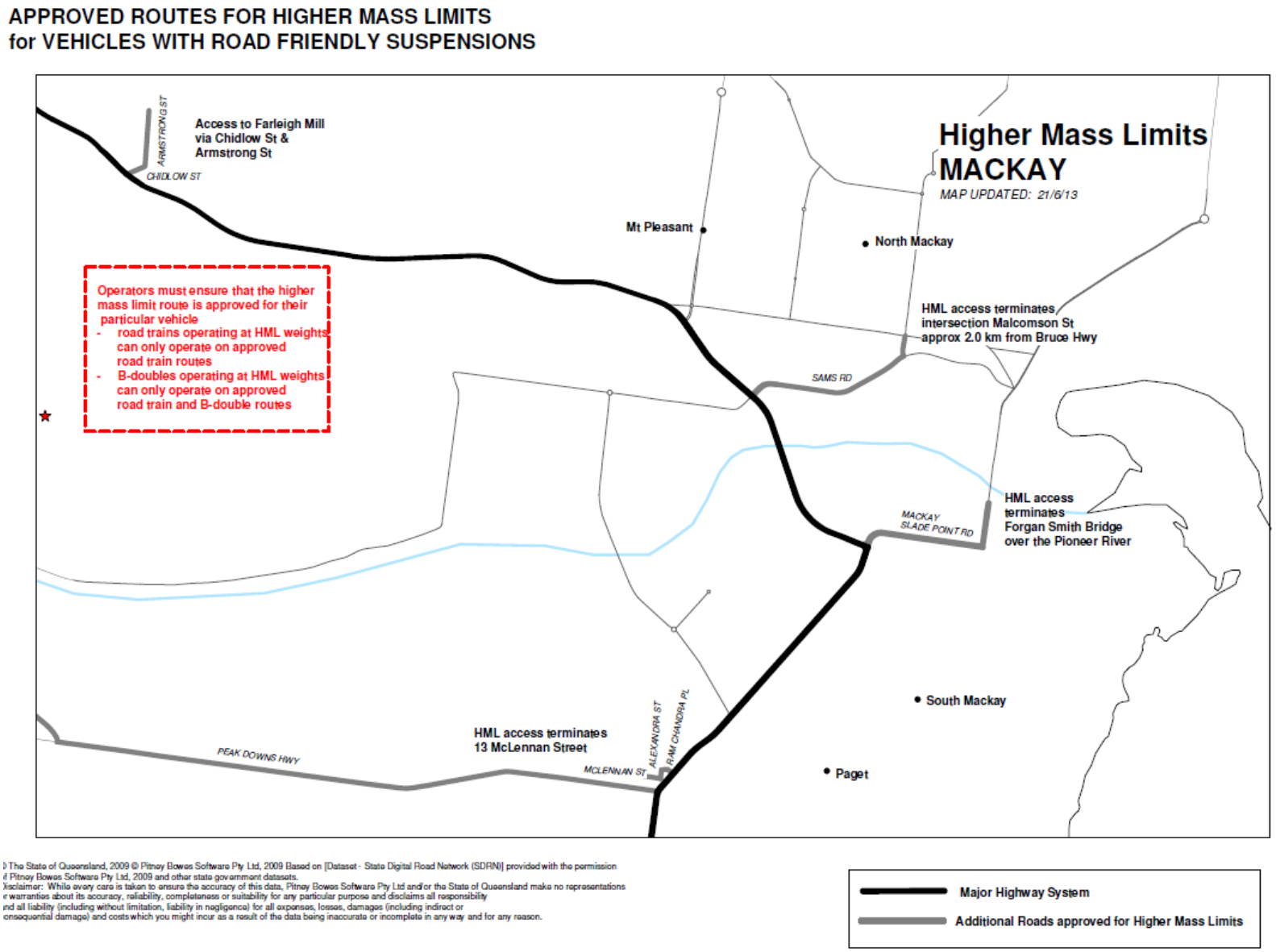


Figure 2.17: Approve Routes for Higher Mass Limits for Vehicles with Road Friendly Suspensions Section 10

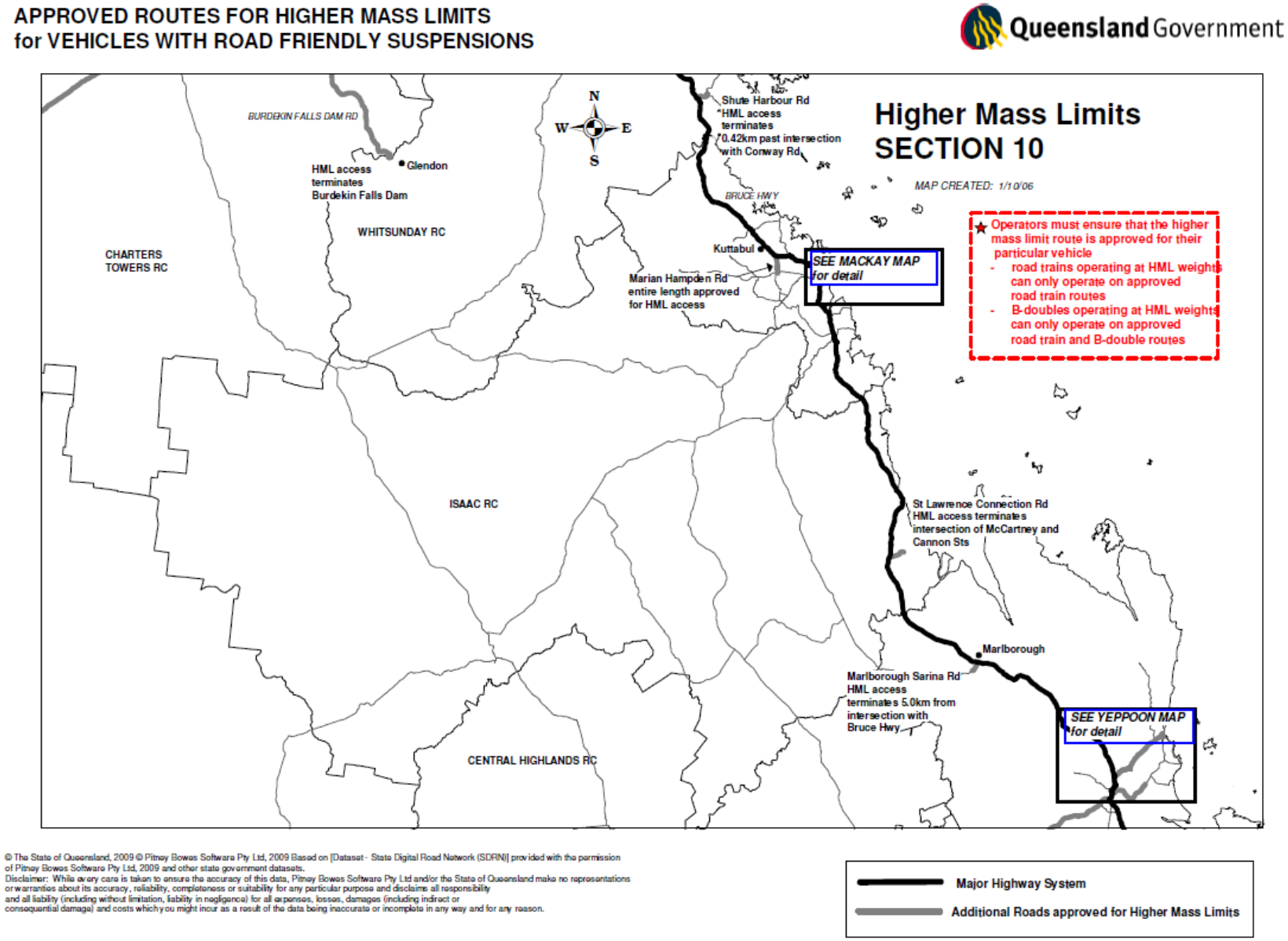
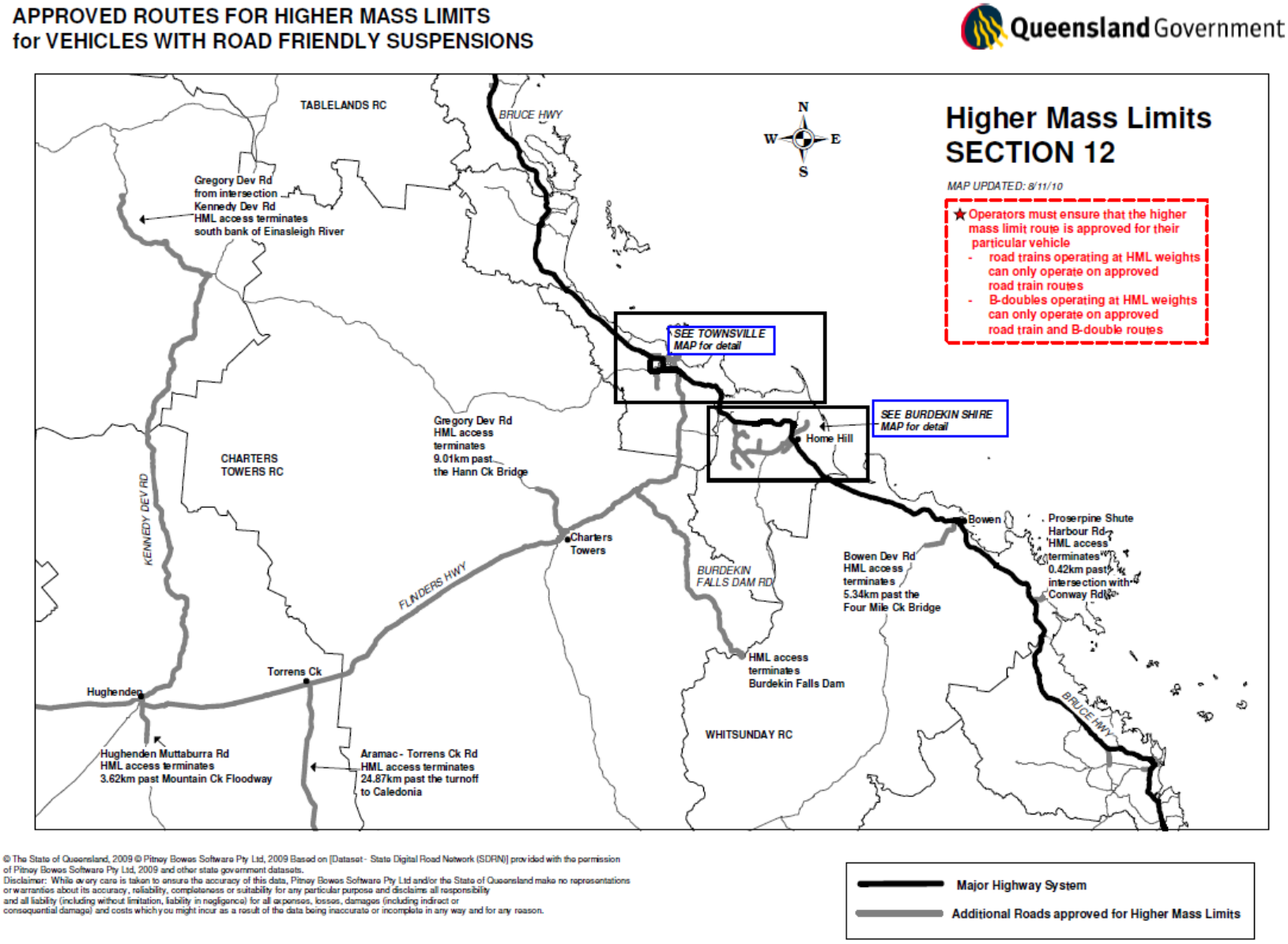


Figure 2.18: Approve Routes for Higher Mass Limits for Vehicles with Road Friendly Suspensions Section 12



2.4 Public Transport Services

There are no public transport (bus) services within the surrounding communities that support day-to-day travel within each of the local communities apart from the local School Bus Route services.

The school bus route services provide an opportunity for access to the local schools within the region (primary and high schools). Services link to Charters Towers, Clermont, Moranbah, Nebo and Eton (near Mackay). These routes traverse various sections of the Gregory Developmental Road and Peak Downs Highway. Figures 2.19 to 2.28 illustrate the relevant school bus routes. The school bus services occur during the morning period (6am – 8am) and in the afternoon (3 – 5pm). There is therefore the potential for school bus routes and services to overlap and interact with the proposed mine and rail transport movements for the Carmichael Mine and Rail sites over both the construction and operational life of the mine. Given this, it is recommended that all road users relating to the Carmichael project be made aware of the school bus routes as part of an operational plan (Road Use Management Plan (RUMP)) for both the construction and operational phases for the project.

Figure 2.19: Gemini Mountains to Clermont State School – School Bus Route

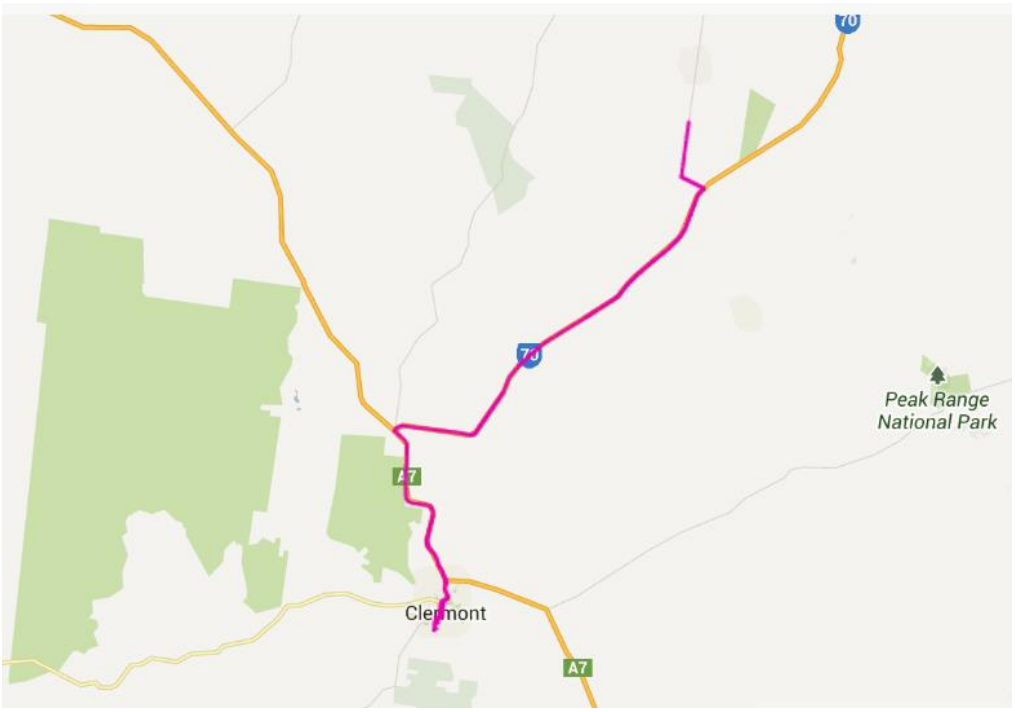


Figure 2.20: Mingela to Richmond Hill State School and Charters Towers State High School - School Bus Route

Figure 2.21: Mount Leyshon to Charters Towers State High School - School Bus Route

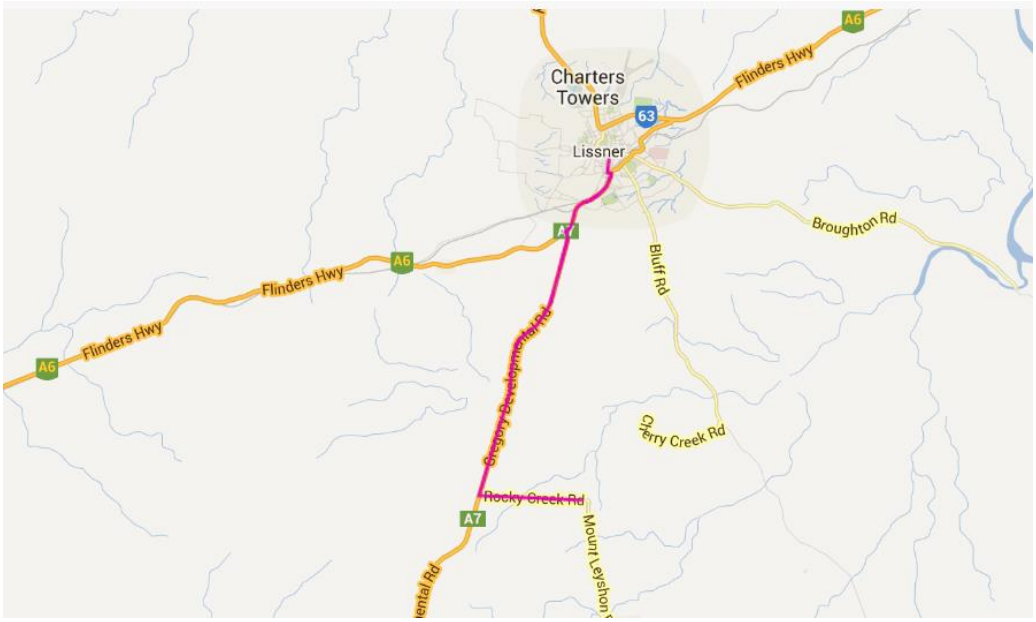


Figure 2.22: Coppabella to Moranbah State High School - School Bus Route

Figure 2.23: Villafranca to Moranbah State School - School Bus Route

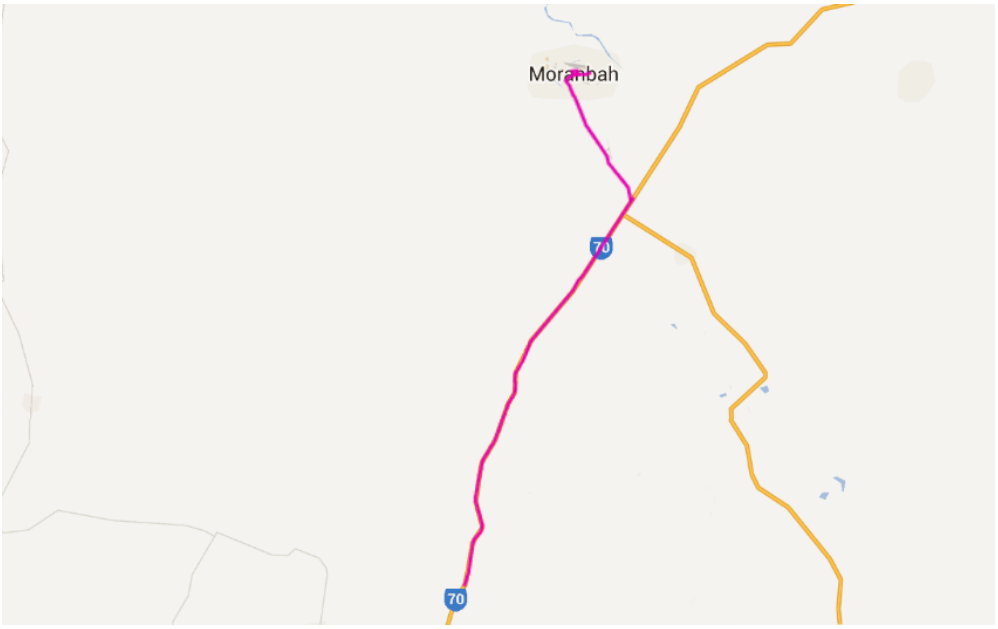


Figure 2.24: Nebo to Mirani State High School - School Bus Route

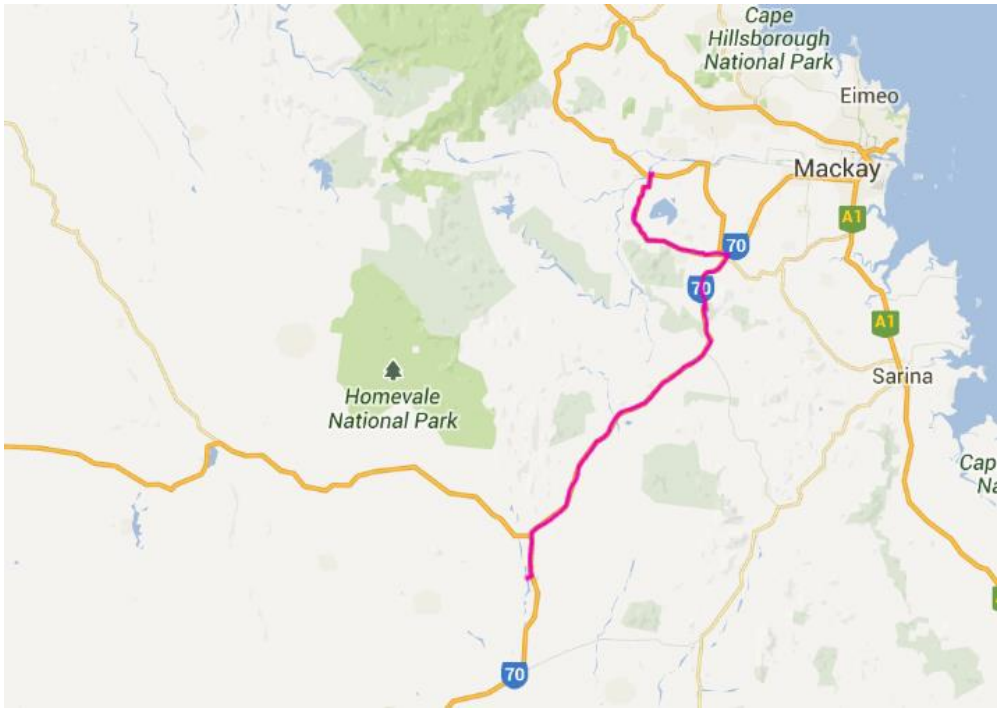


Figure 2.25: South Nebo to Nebo State School - School Bus Route

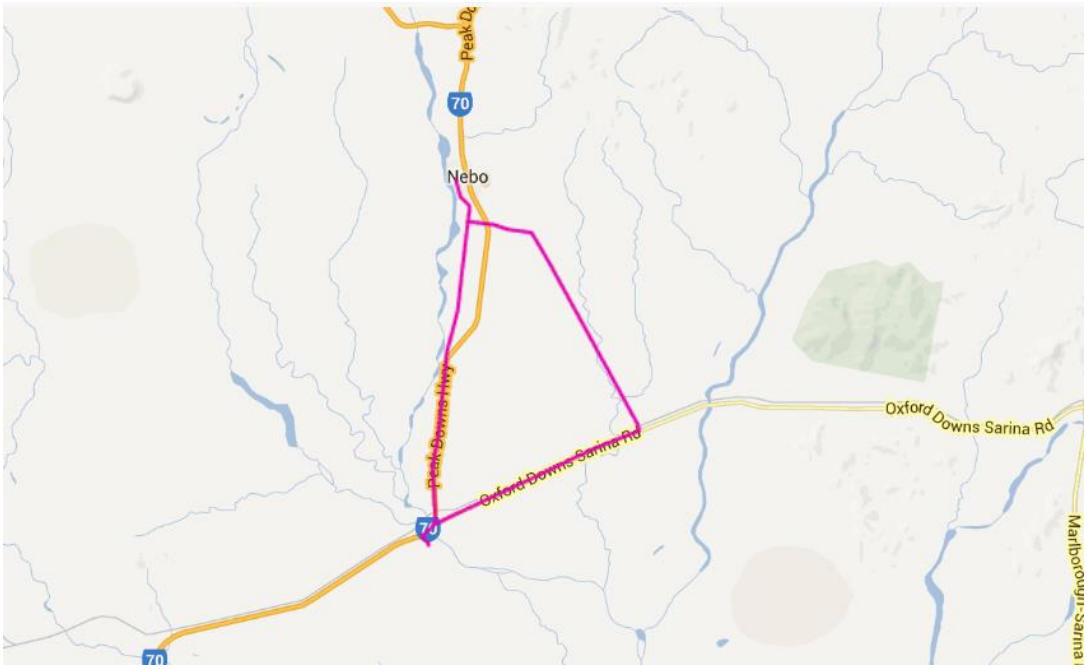


Figure 2.26: Eton to Mirani State High School - School Bus Route

Figure 2.27: Cut Creek and Eton to Mirani State High School- School Bus Route

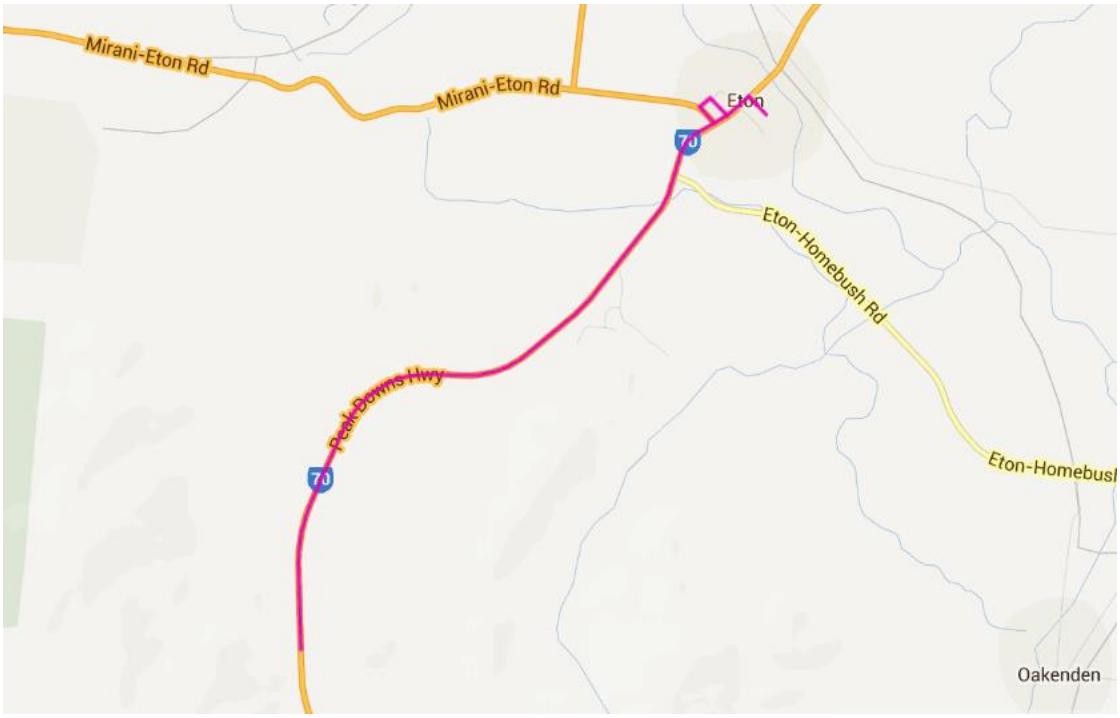
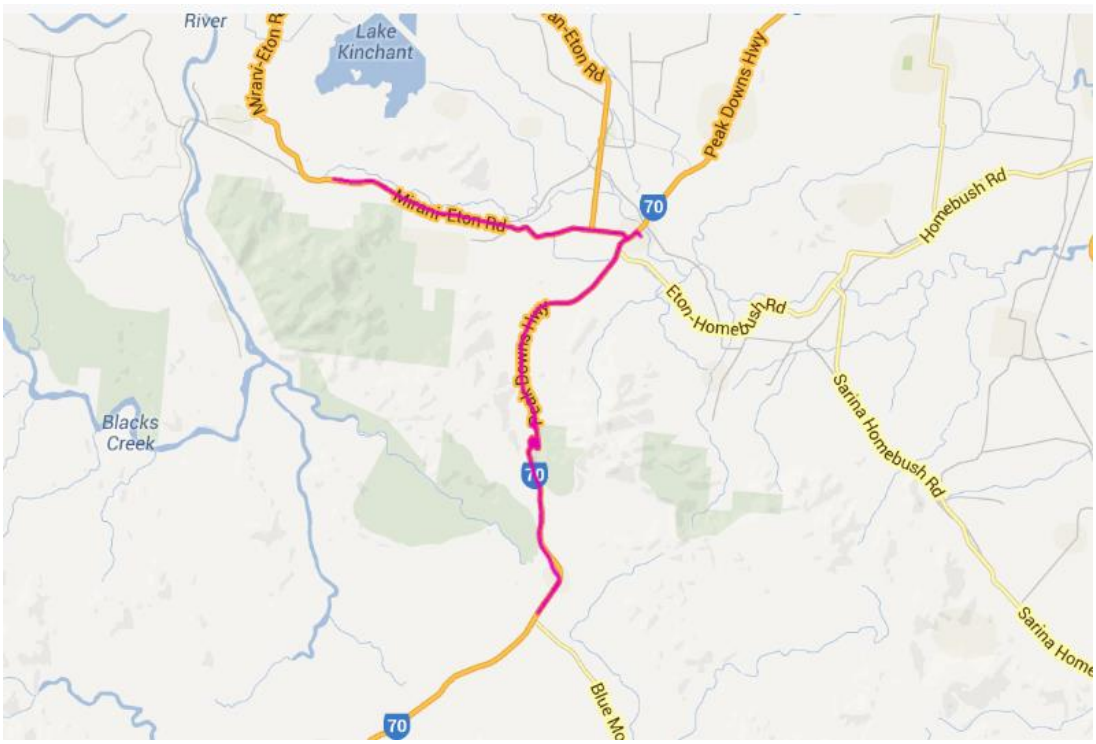


Figure 2.28: Cut Creek and Brightley to Eton State School - School Bus Route



3 Development Traffic

3.1 Introduction

The following section outlines the proposed construction and operational phase traffic generation demands. This information has been utilised in the development of the subsequent traffic network assessment section (Section 4) of this report.

In summary, the project's construction phase is expected to occur over a 3 year period from April 2014 to the March 2017. Operations are also anticipated to commence in parallel with the construction works from 2015 onwards.

Each of the estimated movement categories associated with the construction and operational phases are outlined below. Appendix B also includes particular details in relation to the mine construction and operations activities and how these relate to transport movements across the road network.

3.2 Construction Phase

The anticipated sequence of activity associated with the construction phase is outlined below. It is defined as rail and mine due to the differing location and demands anticipated with each aspect of the proposed development during the construction phase.

The quarry operations and rail camps will function for the period of construction from 2014 to 2016.

3.2.1 Rail and quarries

- Rail construction sequenced over 27 months, just over a 2 year period
  - Sleepers from Townsville via Gregory Developmental Road to laydown area in 2015
  - Rail from Mackay via Peak Downs Highway and Gregory Developmental Road to laydown area in 2015
  - Ballast from Borrow 7 quarry using the rail access corridor generally in 2015
  - Girders from Mackay via Peak Downs Highway and Gregory Developmental Road to laydown area generally in 2015
  - Culverts from Mackay via Peak Downs Highway and Gregory Developmental Road to laydown area in 2014 and 2015
  - Concrete Batching Plant movements from the Off-Site Industrial Area, near the Mine site, via the rail maintenance access road also with possibly some movements from Clermont via the Gregory Developmental Road to the laydown area in 2014 and 2015
  - Earthworks, capping and bulk fill hauled within the rail access corridor from the Borrow 7 quarry in 2014 and 2015
- Quarries
  - Five quarries will be utilised for materials during construction, namely Moray, North Creek, Back Creek, Borrow 7 and Disney quarries
  - The majority of the anticipated quarry movements will utilise the dedicated rail maintenance access road to support the construction work sites
  - Ballast and earthworks (bulkfill and capping) will be sourced from the Borrow 7 quarry located just west of the Gregory Developmental Road. These quarry movements will be via the dedicated rail maintenance access road and as such these haulage movements will not be on the local or state controlled road networks.

Table 3.1 below outlines the summary inputs arising on the road network due to the rail construction works.

Table 3.1: Rail construction key transport movements - Summary

Year	Rail construction materials		
	Rail (25m), Girders, Culverts From Mackay to the Laydowns Area via the Peak Downs Highway and the Gregory Developmental Road (B-Doubles and Extendable Trailers) (Total two way volume per day)	Batching Plant Concrete From Clermont via the Gregory Developmental Road to the Laydown Area (Concrete Trucks) (Total two way volume per day)	Rail Sleepers From Townsville via the Flinders Highway and the Gregory Developmental Road to the Laydown Area (B-Doubles) (Total two way volume per day)
2014	4	1	1
2015	8	1	6

Note: The above values are average daily total two-way traffic volumes that are estimated to be required to support the rail construction.

3.2.2 Mine

The mine construction is staggered over various years with some Stages overlapping with subsequent Stages. This parallel nature for construction has been included in the assessment process.

- Stage 1 - 2013 & early 2014: Existing Site Operations - 12 months; not construction rather preparation / planning investigations
- Stage 2 – 2014: Bridge, Road, Airport & Camp Construction and Quarry Development - 6 months
- Stage 3 – late 2014 – late 2016: Bulk Earthworks & Fixed Infrastructure - 24 months
- Stage 4 – early 2015 – early 2016: Level I Mining Plant & Equipment - 12 months
- Stage 5 – early 2016 – early 2017: Level II (Ultra-class) Mining Plant & Equipment - 12 months

See also Appendix B for detailed information regarding the anticipated transport movements for the mine construction phase.

3.3 Operations Phase

The operations phase is anticipated to commence from 2015 onwards. The operations phase will be running in parallel with the construction works for a period of about 2 years, including 2015 and 2016.

3.3.1 Rail and quarries

- During the operations phase there are anticipated to be negligible transport movements associated with the operations element for rail once the rail network is operational. These movements will be related to a maintenance function. Those movements that are required will also primarily occur on the dedicated rail maintenance access road. The movements will be to and from the locations subject to maintenance at any one time
- The only quarry that will remain in use post-construction will be the Borrow 7 quarry. These movements will also utilise the dedicated rail maintenance access road. The movements will be to and from the locations subject to maintenance at any one time.

3.3.2 Mine

- The operational phase will involve a ramp-up in operations for the various elements of infrastructure consistent with mine output ramping up to the 60Mtpa level.
- The coal will be hauled from the Project (Mine) via the rail line and as such the road impacts associated with the development during the operational phase will primarily be limited to movements associated with access to / from the airport for the FIFO workforce (using buses) and movements associated with deliveries to support the day-to-day operation of the Project (Mine) and Project (off-site infrastructure) including the workers accommodation village.

See also Appendix B for detailed information regarding the anticipated transport movements for the mine operations phase.

3.4 Estimated Development Volumes

The estimated daily traffic volumes arising from the anticipated traffic demands during each of the horizon years are presented below in Figures 3.1 to 3.5. These volumes represent the cumulative effects from the Project. It is anticipated that 2015 will be the peak year for the expected impacts from the development. The impact of the rail development activity will be between 2014 and 2015 only. From 2015 the total impacts reduce to those primarily associated with the operational phase rather than the combined construction and operational effects. The development volume results indicate that the two most consistently highly trafficked links will be the section of the Gregory Developmental Road from the Peak Downs Highway to the Carmichael – Elgin Road intersection and also the Carmichael – Elgin Road itself. The development is anticipated to result in a peak contribution in 2015 of up to 260 vehicles per day at the worst location along the Carmichael – Elgin Road with the Gregory Developmental Road worst case location being 226 vehicles per day also in 2015. Section 4 of this report provides more detail in terms of the traffic assessment of the development.

Figure 3.1: 2014 Estimated Daily Development Traffic Volumes (vehicles per day, total two-way) – Total of Mine and Rail Projects

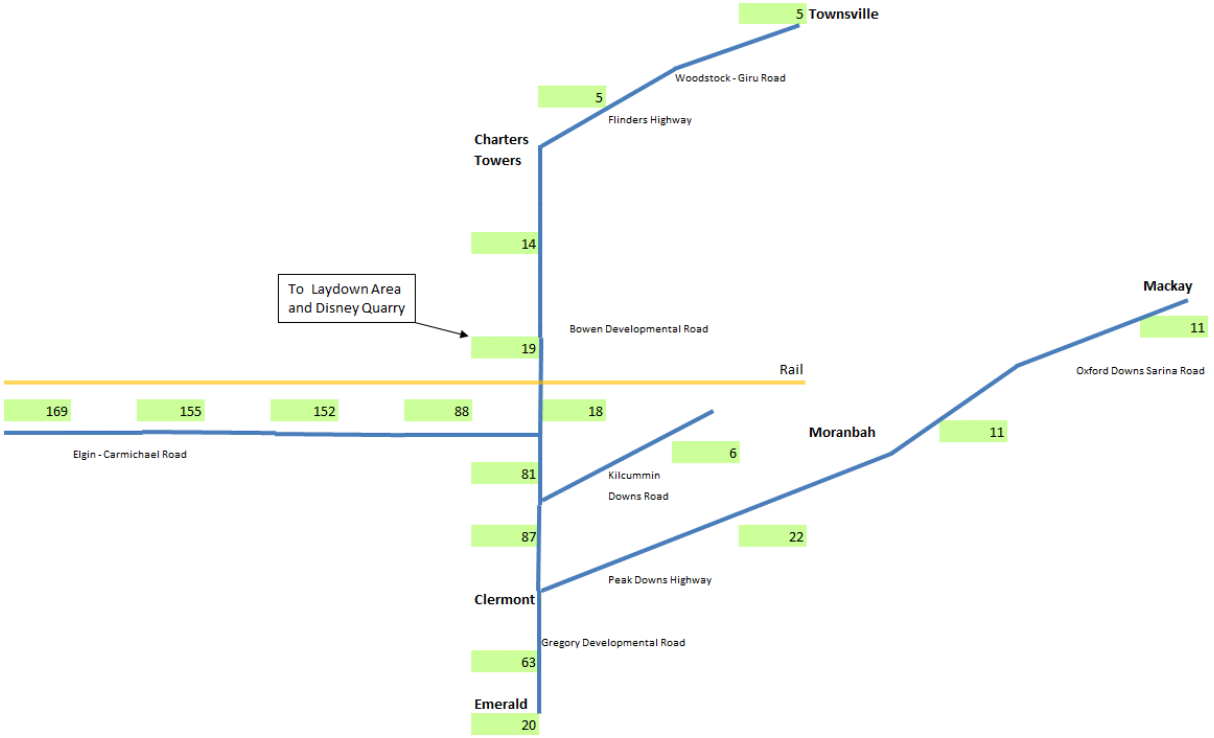


Figure 3.2: 2015 Estimated Daily Development Traffic Volumes (vehicles per day, total two-way) – Total of Mine and Rail Projects

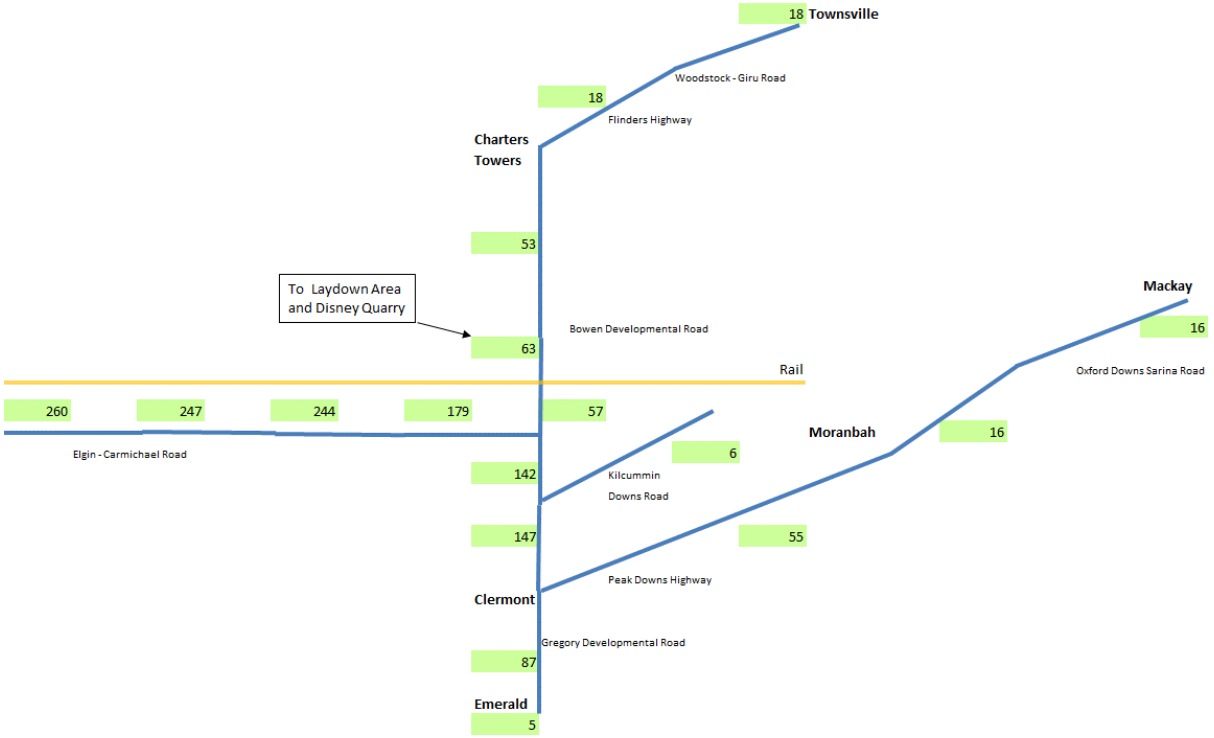


Figure 3.3: 2016 Estimated Daily Development Traffic Volumes (vehicles per day, total two-way) – Total of Mine and Rail Projects

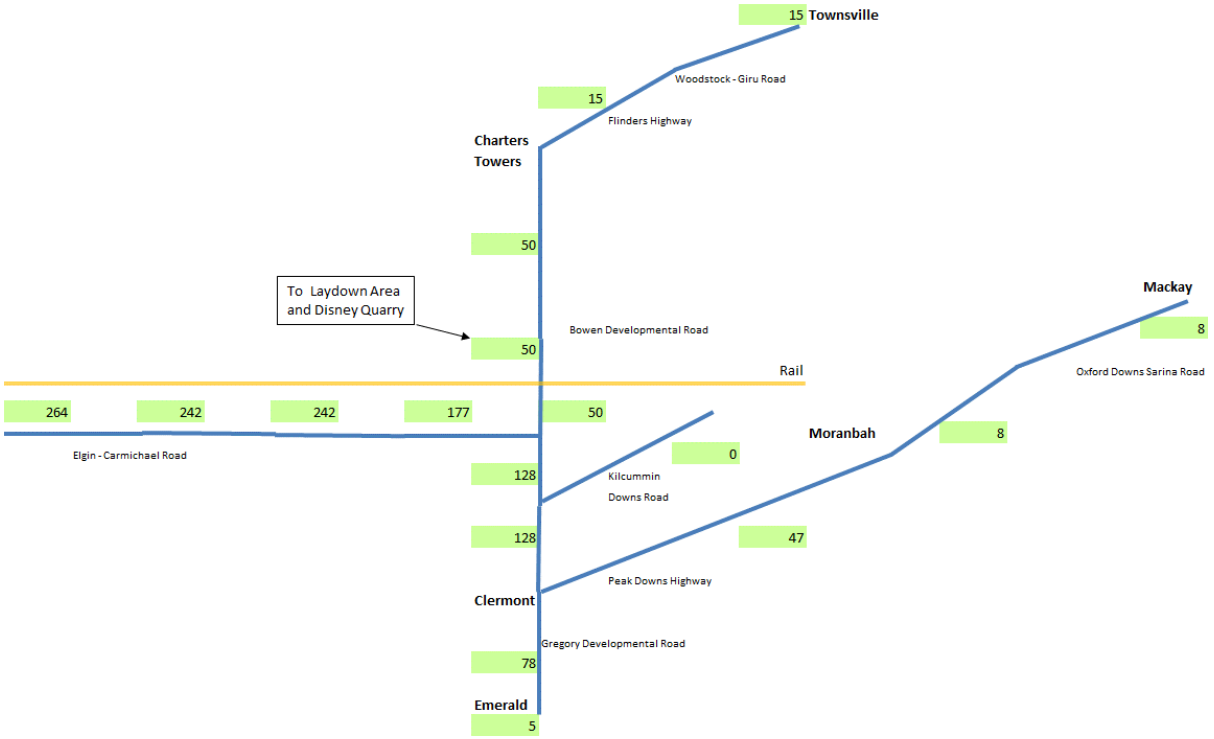


Figure 3.4: 2017 Estimated Daily Development Traffic Volumes (vehicles per day, total two-way) – Total of Mine and Rail Projects

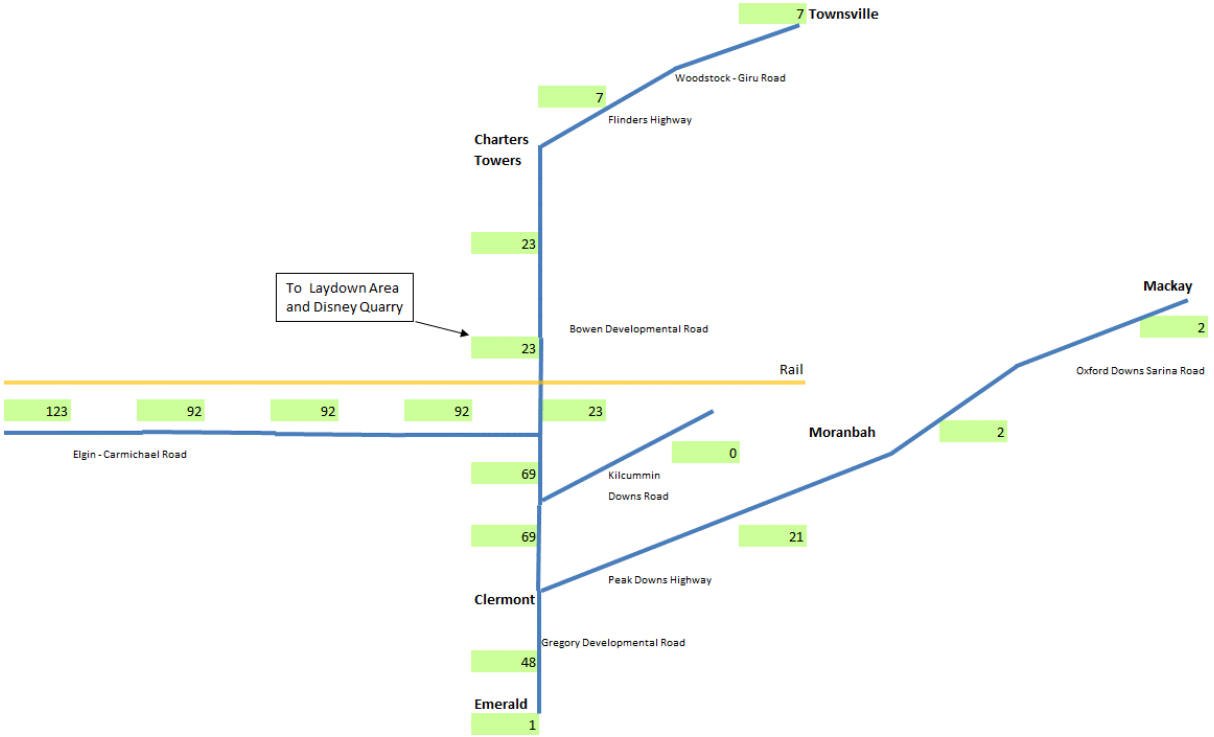


Figure 3.5: 2024 Estimated Daily Development Traffic Volumes (vehicles per day, total two-way) – Total of Mine and Rail Projects

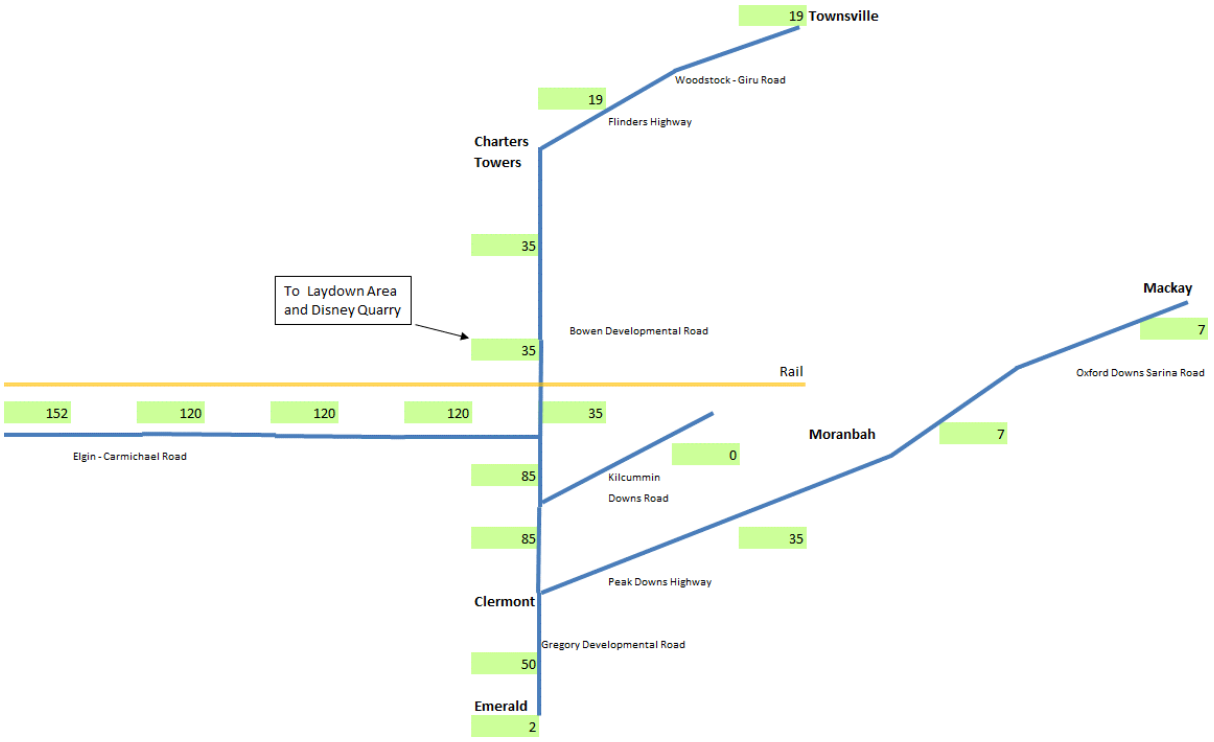


Figure 3.6 shows the 2014 development traffic volumes associated with the mining activities only. Figure 3.7 shows the 2014 development traffic for the rail associated traffic volumes only. The mine and rail development traffic volumes in Figure 3.6 and Figure 3.7 combine to the total 2014 development traffic volumes that are shown in Figure 3.1.

Figure 3.6 Estimated 2014 Daily Development Traffic Volumes for Mine Activity Only (vehicles per day, total two-way volumes)

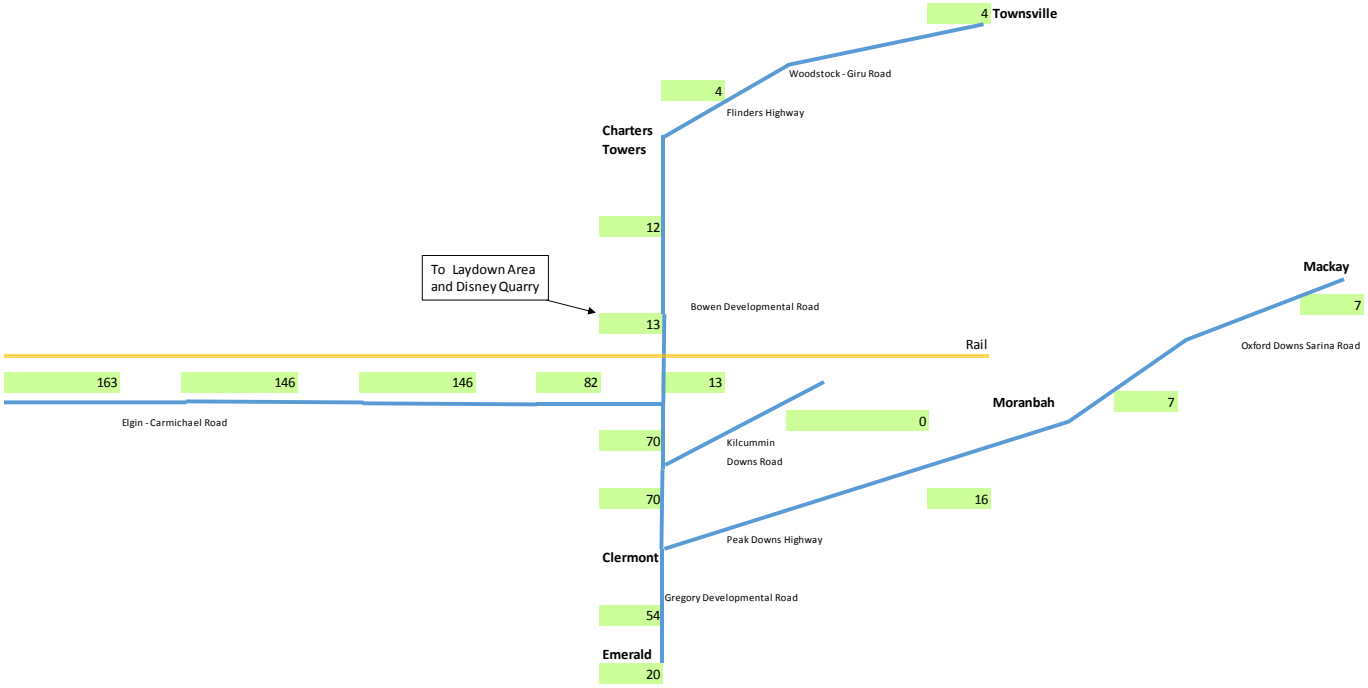


Figure 3.7 Estimated 2014 Daily Development Traffic Volumes for Rail Activity Only (vehicles per day, total two-way volumes)

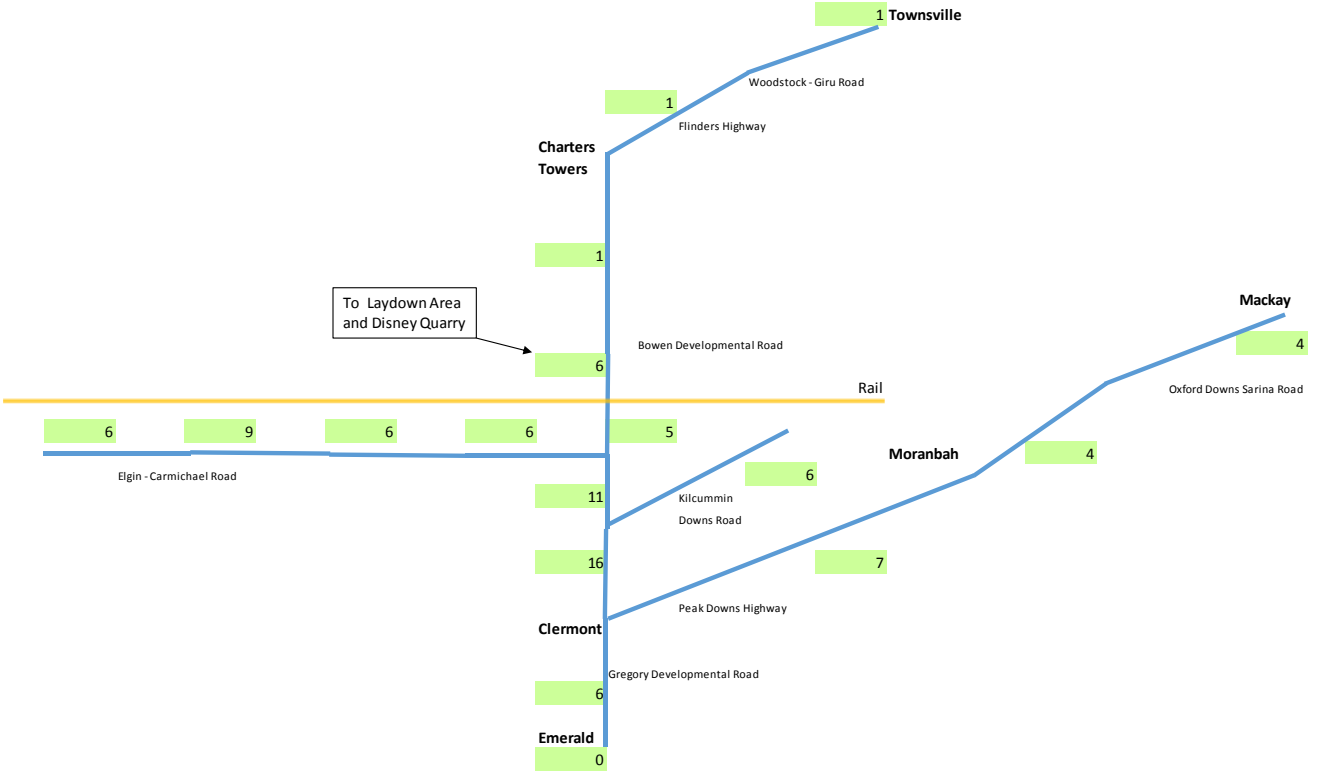


Figure 3.8 shows the 2015 development traffic volumes associated with the mining activities only. Figure 3.9 shows the 2015 development traffic volumes for the rail activities only. Figure 3.2 is the summation of the total 2015 development traffic volumes for both the mine and rail associated traffic volumes.

From 2016, the rail activities cease, so that all of the development traffic volumes are then associated with the mine activity only.

Figure 3.8: Estimated 2015 Daily Development Traffic Volumes for Mine Activity Only (vehicles per day, total two-way volumes)

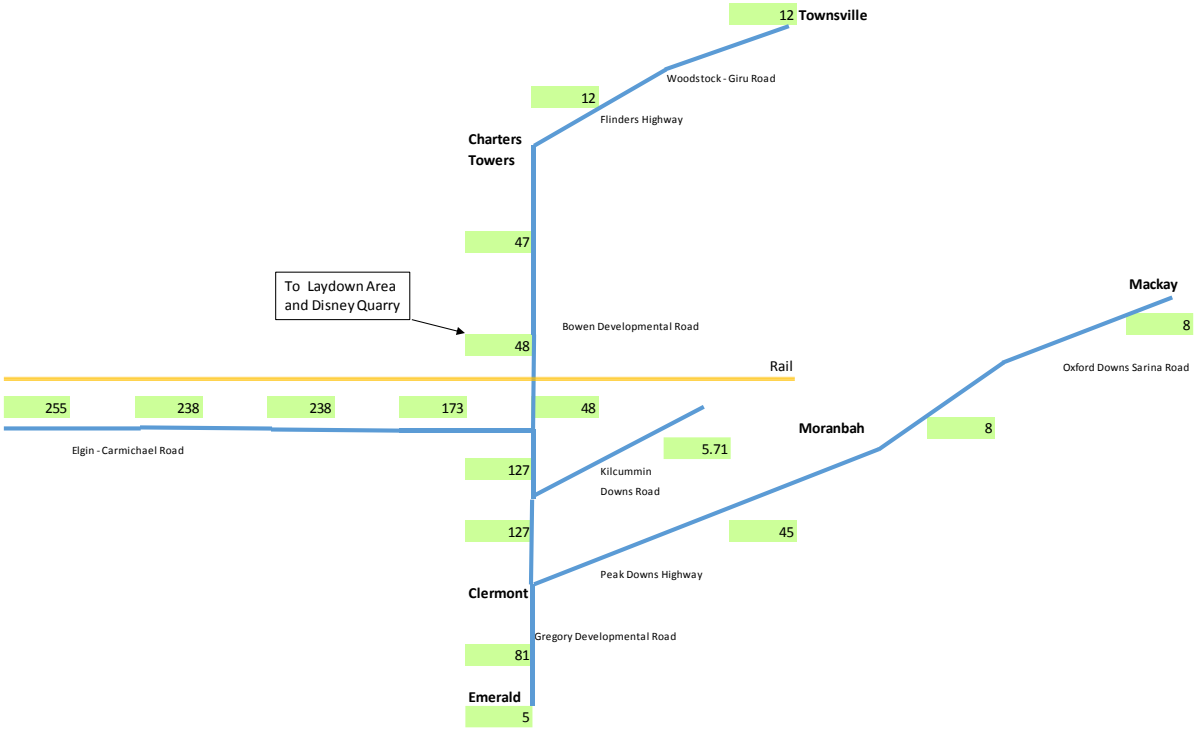
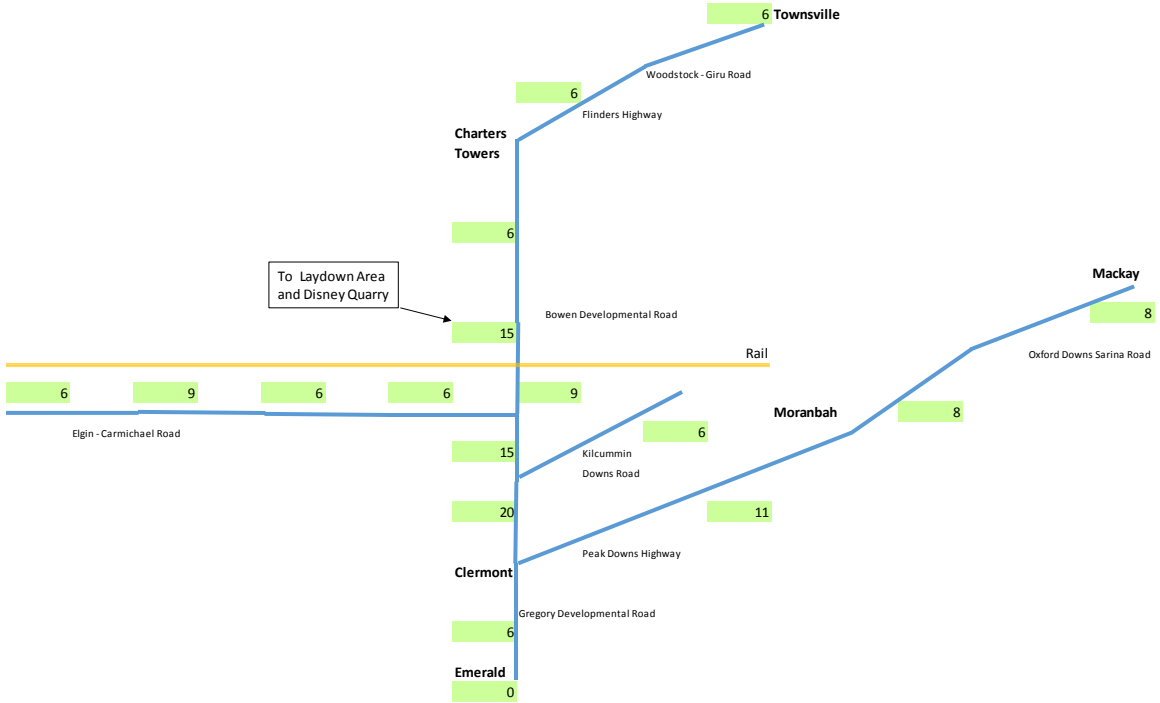


Figure 3.9: Estimated 2015 Daily Development Traffic Volumes for Rail Activity Only (vehicles per day, total two-way volumes



4 Traffic Network Assessment

4.1 Introduction

An assessment of the combined mine and rail aspects of the project, including the construction and operational effects, has been undertaken. The results of this assessment are outlined below in the following sections.

The context for the assessment is also defined below:

- The future design horizon year for the purposes of the network assessment will be 2024, ie. 10 years from the base year of 2014; this is consistent with GARID.
- The following background traffic growth rates have been adopted for the future design year traffic network analyses:
  - State controlled roads – 7% pa over the design horizon year. This has been chosen as it is consistent with other planning and assessment work that has been undertaken to-date for the project and is considered a reasonable estimate given the regional nature of the road network.
  - Local (Council) roads – 7% pa over the 10 year design horizon, eg. Carmichael – Elgin Road
  - The use of a 7% pa growth rate across the network is considered reasonable given existing growth rates in some locations are slightly higher (8 – 10% pa) and some lower (up to 2 % pa), this is especially the case on the lower order roads. The 7% pa background growth allows for the potential impact of other developments but it is also a reasonably conservative growth rate when the existing network growth rates within the region due to the surrounding mining activities are considered.
- The assessment has been based on a combination of an intersection performance based assessment and link based assessment process as consistent with *AustRoads Guidelines*.

4.2 Intersection Assessments

The intersections of interest to this project are considered below, namely:

- Gregory Developmental Road / Carmichael Elgin Road intersection
- Gregory Developmental Road / Kilcummin Downs Road intersection
- Gregory Developmental Road / Peak Downs Highway

These intersections have been considered due to the greater than 5% trigger for assessment consistent with DTMR's GARID process. These are the only intersections that are projected to experience a greater than 5% increase in traffic volume arising from the Project. Please also see Section 4.3 below for further detail in relation to the trigger point assessment.

The intersections of the Gregory Developmental Road / Flinders Highway and Peak Downs Highway / Goonyella Road have not been considered in the assessment even with a greater than 5% exceedance. This is because they only exceed the greater than 5% trigger for a short period of time, ie. during the combined construction and operational phases in 2015 and 2016. The impact on each intersection does not extend over the full ten year horizon beyond 2016. This is considered reasonable given that each intersection already has provision for full width for heavy vehicle turns, including right and left turn lanes, and also full intersection lighting.

Please note that detailed intersection assessments are not required for this assessment. This is consistent with the uninterrupted flow characteristics of each location. DTMR's Road Planning and Design Manual (RPDM) states that "…it is unnecessary to flare intersection approaches or carry out an intersection analysis when the combinations of major road and minor road volumes are less than those in the table (Table 13.4)…" The anticipated development volumes are expected to effectively operate as an uninterrupted flow case due to the relatively low traffic volumes. Figure 4.1 is an extract from DTMR's Roads Planning and Design Manual, Chapter 13, and it indicates that detailed traffic assessments are not required for locations with traffic volumes within the thresholds as defined within Table 13.4. Notwithstanding the above each intersection has been reviewed from a safety perspective and commentary provided as to whether it is considered necessary to include separate lanes for left or right turning movements to mitigate any potential safety risks at each location.

Figure 4.1: Intersection Capacity – Uninterrupted Flow Conditions

Table 13.4 Intersection Capacity – Uninterrupted Flow Conditions

Major Road Types[1]	Major Road Flow (vph)[2]	Minor Road Flow (vph)[3]
Two-Lane	400	250
	500	200
	650	100
Four-Lane	1000	100
	1500	50
	2000	25

Notes

1. Major road is through road i.e. has priority
2. Major road design volumes include through and turning movements
3. Minor road design volumes include through and turning volumes

(Source: DTMR Roads Planning and Design Manual, Chapter 13, Table 13.4.)

4.2.1 Gregory Development Road/ Carmichael Elgin Road Intersection

Through an assessment of the intersection, and with consideration of the anticipated peak traffic volumes for the worst year of 2015, it can be seen that the peak hour volumes will likely not exceed 55 vehicles per hour on the major road with turning movements from the minor road likely not exceeding 6 vehicles per hour. This generally would translate into the need for DTMR's basic intersection form of BAR / BAL (see Figure 4.2 below). However, with consideration of traffic safety, particularly relating to the potential level of heavy vehicle usage, it is considered advisable to upgrade this location to DTMR's CHR(S) / AUL(S) arrangement. These works may be undertaken as part of the Carmichael – Elgin road upgrade works.

Figure 4.2 Turn Warrants for a design speed>=100km/h at Gregory Development Road / Carmichael Elgin Road Intersection

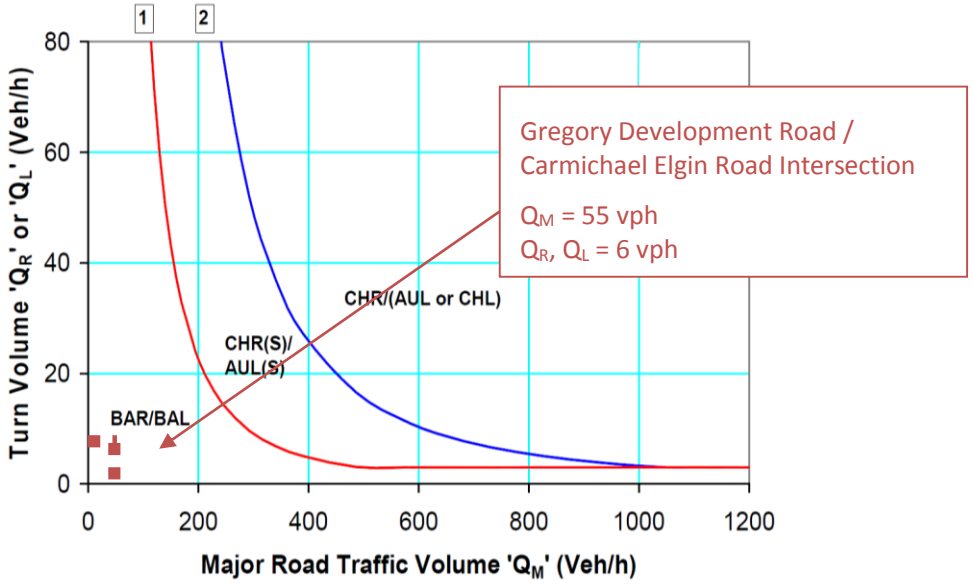


Figure 13.22 Warrants for Turn Treatments on Roads with a Design Speed ≥100km/h

4.2.2 Gregory Developmental Road / Kilcummin Downs Road intersection

Through an assessment of the intersection, and with consideration of the anticipated peak traffic volumes for the worst year of 2015, it can be seen that the peak hour volumes will likely not exceed 55 vehicles per hour on the major road with turning movements from the minor road likely not exceeding 3 vehicles per hour. This generally would translate into the need for the basic intersection form of BAR / BAL (see Figure 4.2 above). This intersection arrangement is considered adequate for this location because of the short period during which the intersection will experience higher than normal traffic volumes. This period coincides with the construction works and particularly the Rail Camp 1 site located along Kilcummin Downs Road. Given this context the existing basic intersection form BAR / BAL is considered adequate to support the development traffic volumes. Notwithstanding, from a traffic safety perspective it is recommended that "Trucks Turning" signs be installed at this intersection location for the duration of the construction works.

Figure 4.3 Turn Warrants for a design speed>=100km/h at Gregory Development Road / Kilcummin Downs Road Intersection

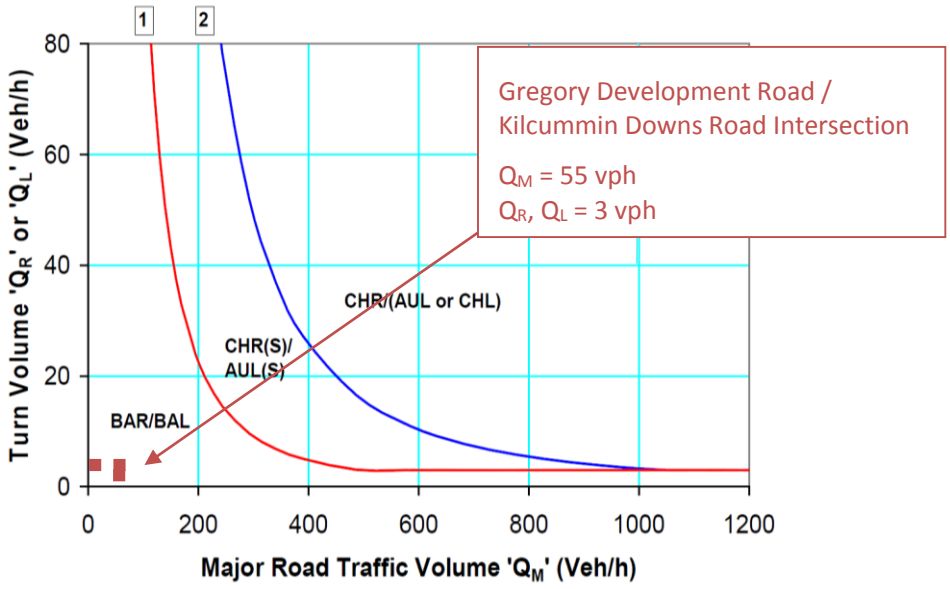


Figure 13.22 Warrants for Turn Treatments on Roads with a Design Speed ≥100km/h

4.2.3 Gregory Developmental Road / Peak Downs Highway

Through an assessment of the intersection, and with consideration of the anticipated peak traffic volumes for the worst year of 2015, it can be seen that the peak hour volumes will likely not exceed 55 vehicles per hour on the major road with turning movements from the minor road likely not exceeding 89 vehicles per hour. This generally would translate into the need for the basic intersection form of BAR / BAL (see Figure 4.2 above). However, the existing intersection arrangement already includes provision for both protected right and left turn movements as part of its existing arrangements and as such no intersection upgrading is required for this location.

Figure 4.4 Turn Warrants for a design speed>=100km/h at Gregory Development Road / Peak Downs Highway

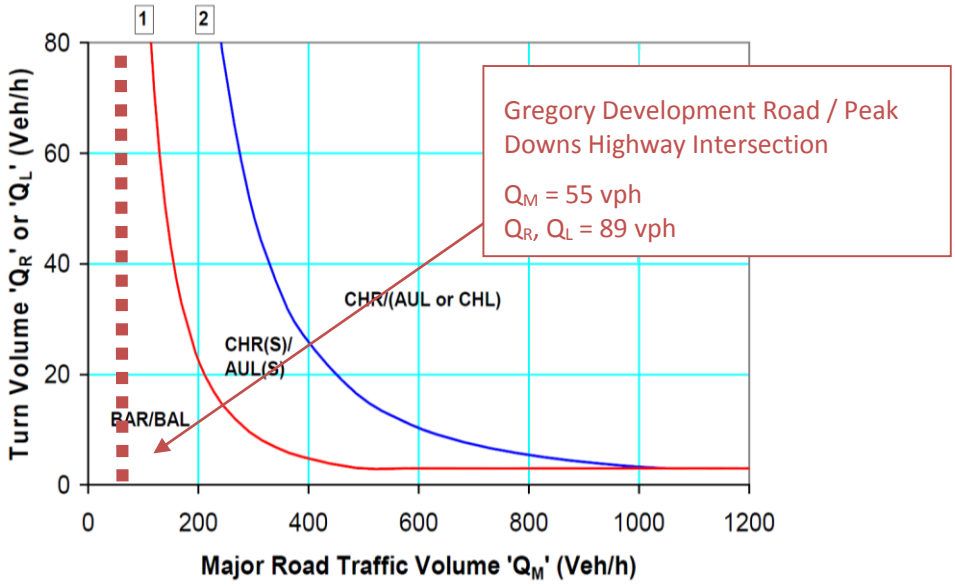


Figure 13.22 Warrants for Turn Treatments on Roads with a Design Speed ≥100km/h

4.3 Road link assessments

DTMR's greater than 5% increase in traffic volume trigger was used to determine which road links required an assessment. The links that were found to need to be assessed were:

- Gregory Developmental Road (Peak Downs Highway to Flinders Highway, Charters Towers)
- Carmichael – Elgin Road (Gregory Developmental Road to Mine Site)
- Kilcummin Downs Road (Gregory Developmental Road to Rail Camp 1 turnoff)
- Peak Downs Highway (Gregory Developmental Road to Goonyella Road, Moranbah)

Figure 4.5: 2015 Development Volumes (worst case over ten year design period) as a proportion of 2015 Background Traffic Volume (% increases shown)

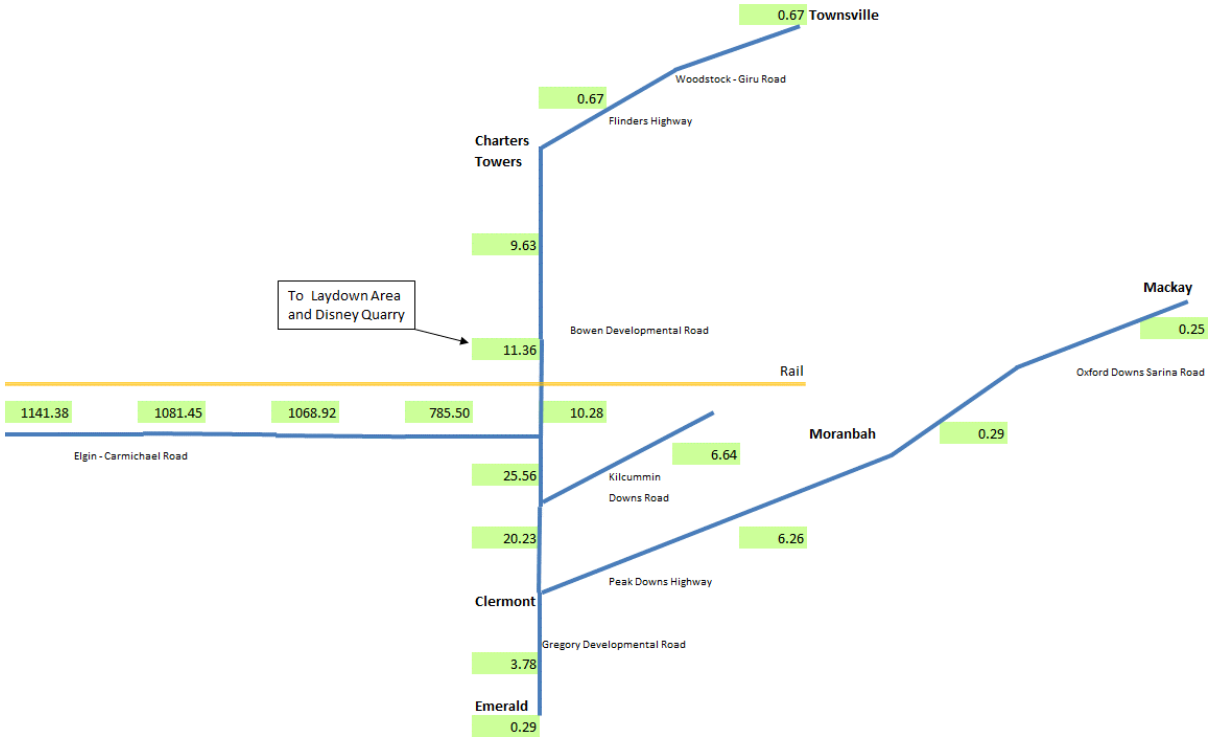
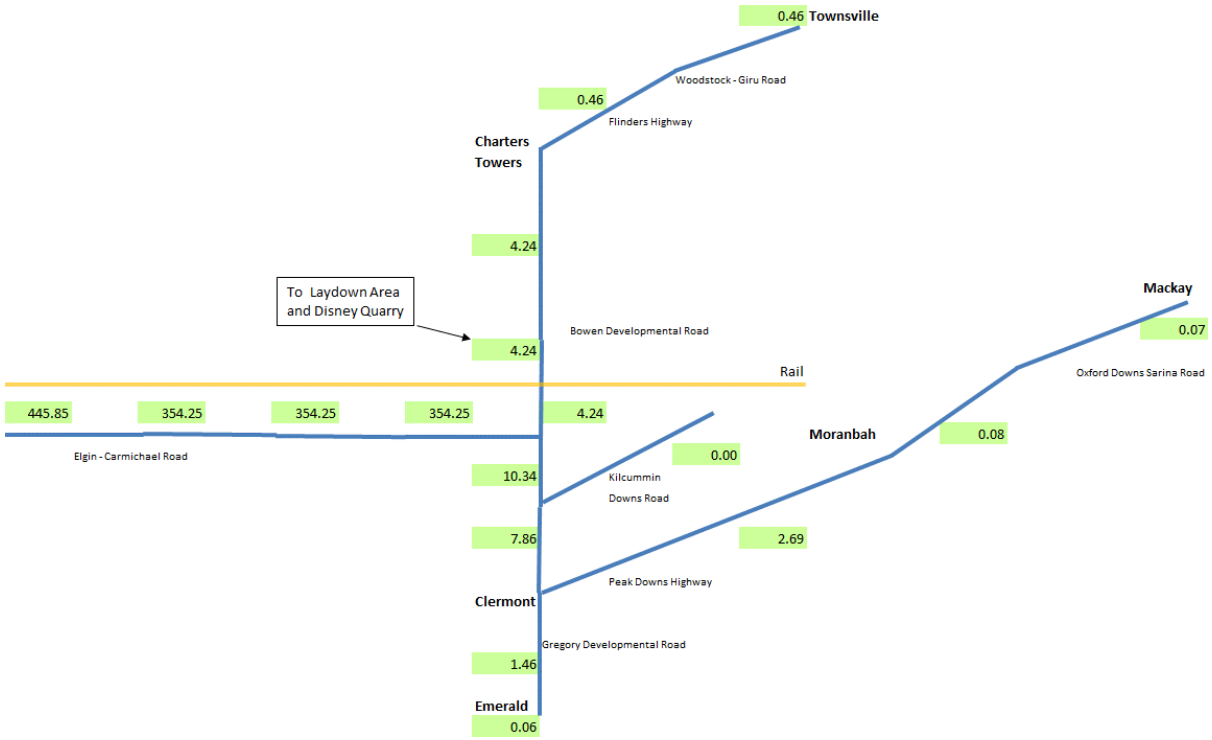


Figure 4.6: 2024 Development Volumes (ten year design period) as a proportion of 2024 Background Traffic Volume (% increases shown)



Based on the estimated traffic generated (refer Section 3) by the construction and operational phases estimates of the likely level of impact on the existing road network and its capacity has been undertaken. The results from these analyses are presented below in Table 4.1.

For the purposes of the analyses an estimate of the road capacity for the key impacted road links has been established as well as a comparison with the existing traffic volumes on each impacted road link. This has been undertaken for the worst case year of 2015 (combination of both construction and operational phases) and also for ten years into the future (2024) for the operational phase, consistent with GARID. The capacity calculations are based on the *Road Planning and Design Manual, Chapter 5, Traffic Parameters and Human Factors, August 2004*. The road type of relevance to this project is a rural two-lane, two-way road (refer Section 5.2.4.4). The roads of interest generally consist of the following cross-sections; rural road, single lane carriageway, generally narrow 1m shoulders, sealed and rural road, single lane carriageway, unsealed. These routes are generally within either flat or undulating terrain with limited steep grade sections.

The road capacity has been estimated based on the Road Planning and Design Manual, Chapter 5, Traffic Parameters and Human Factors, August 2004, Section 5.2.4.4 and Table 5.4. The capacity has been based on an assumed Level of Service (LOS) of C which equates to 800 veh/h total two-way or for the purposes of the assessment 8,000vpd (using a 10% peak to daily factor). For unsealed gravel sections this capacity may reduce to half of this capacity value (refer Capacity Reduction Factors, Section 5.2.4.2). This is only applicable to unsealed sections, this is particularly the case for the existing unsealed Moray – Carmichael Road; although do note for the purposes of the calculations it has been assumed the existing Moray - Carmichael Road will have been upgraded resulting in a higher capacity threshold value of 8,000 vehicles per day.

Table 4.1: Road link volume and capacity analyses (2015 and 2024), impacted road links

Road Link	Base traffic volume (vehicles per day, total two way) – "without the project"	Road Capacity (vehicles per day, total two way)	% used of available road capacity – "without the project", Base case	% used of available road capacity – "with the project" (worst case volume), With Development
Year 2015				
Gregory Developmental Road (Peak Downs Highway to Flinders Highway, Charters Towers)	554	8,000	6.9%	8.8%
Moray – Carmichael Road (Gregory Developmental Road to Mine Site)	23	8,000	0.3%	3.5%
Kilcummin Downs Road (Gregory Developmental Road to Rail Camp 1 turnoff)	86	8,000	1.1%	1.1%
Peak Downs Highway (Gregory Developmental Road to Goonyella Road, Moranbah)	886	8,000	11.1%	11.8%
Year 2024				
Gregory Developmental Road (Peak Downs Highway to Flinders Highway, Charters Towers)	903	8,000	11.3%	12.4%
Moray – Carmichael Road (Gregory Developmental Road to Mine Site)	37	8,000	0.5%	2.4%
Kilcummin Downs Road (Gregory Developmental Road to Rail Camp 1 turnoff)	140	8,000	1.8%	1.8%
Peak Downs Highway (Gregory Developmental Road to Goonyella Road, Moranbah)	1443	8,000	18.0%	18.5%

Based on the above assessment, and the Level of Service threshold levels linked to daily traffic volumes as per Table 4.2 below (see the green highlighted area in Table 4.2), it is expected that under the worst case 2015 development scenario and also the 2024 ten year design horizon the impacted network will continue to function at a Level of Service "A" across all impacted road links.

Table 4.2: Level of Service thresholds (rural roads, level terrain)

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

Source: AustRoads (1988) *Guide to Traffic Engineering Practice, Part 2: Roadway Capacity*, Table 3.9, from TRB Highway Capacity Manual (1985) Table 8.10.

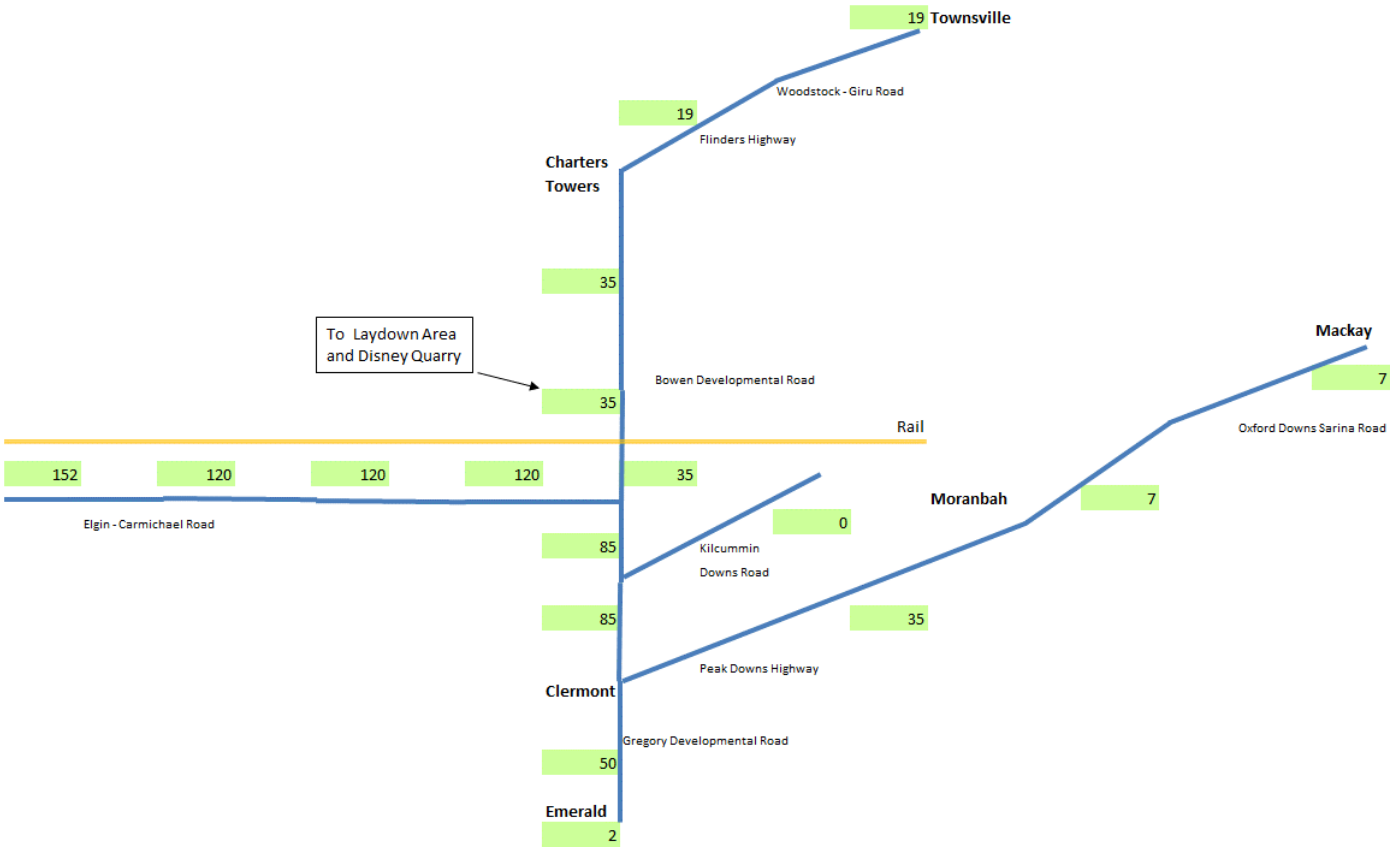
4.4 Scenario Test of Additional +10 year Assessment

For beyond 2024, an additional 10 year assessment has been undertaken. The extended assessment looks 10 years beyond 2024, to the year 2034. The additional 10 year projection assumes a background traffic growth rate of 7% pa growth over the period. Other projects that may possibly result in other impacts and may contribute to background traffic growth are:

- Macmines Austasia – China Stone Project
- Resolve Coal – Hyde Park Coal Project
- Comet Ridge – ATP743P & ATP744P
- QER (Queensland Energy Resources) – ATP1044P

The development traffic volumes in the year 2024 have been applied to each year in the period between the years 2024-2034. No growth in development traffic is expected as the Mine and its associated operations will be at a stable production level.

Figure 4.7: Estimated Daily Development Traffic Volumes (vehicles per day, total two-way) – for each year between 2024-2034



4.4.1 Intersection Assessments

For each year after 2024, the development traffic at each intersection within the area of the affected traffic network are unlikely to exceed a greater than 5% increase in traffic volume due to the project. This is consistent with the requirements of DTMR's GARID process. Indeed the impact of the development traffic on each of the intersections within the road network is expected to be minimal for each year in the extended assessment period.

However, notwithstanding the traffic operational impacts at each of the intersections along the Gregory Development Road have been reviewed from a safety perspective and commentary provided as to whether it is considered necessary to include separate lanes for left or right turning movements to mitigate any potential safety risks at each location. From this review it is concluded that consideration should be given to the Gregory Developmental Road / Carmichael Elgin Road having both short left and right turn lanes on the Gregory Developmental Road.

The Gregory Developmental Road / Kilcummin Downs Road intersection has not been considered since it is expected that no development traffic will traverse Kilcummin Downs Road in the 2024-2034 period because all project traffic ceases in this area at the completion of rail construction.

It is anticipated that the growth in background traffic volume will increase the through traffic volume along the Gregory Development Road by about 125 vehicles per hour on 2015 volumes.

The Gregory Developmental Road / Peak Downs Highway already has short left and right turn lanes. The estimated turning movements from the Peak Downs Highway will likely not exceed 100 vehicles per hour. At this intersection, these demands would generally translate into the need for DTMR's basic intersection form of CHR / AUL (see Figure 4.8 below). The intersection already satisfies this form.

The estimated turning movements from Carmichael Elgin Road will likely not exceed 7 vehicles per hour. At this intersection, these demands would generally translate into the need for DTMR's basic intersection form of BAR / BAL (see Figure 4.8 below). However, with consideration of traffic safety, particularly relating to the potential level of heavy vehicle usage, it is recommended for this locations to consist of DTMR's CHR(S) / AUL(S) arrangements as per the findings of the initial 10 year development assessment period.

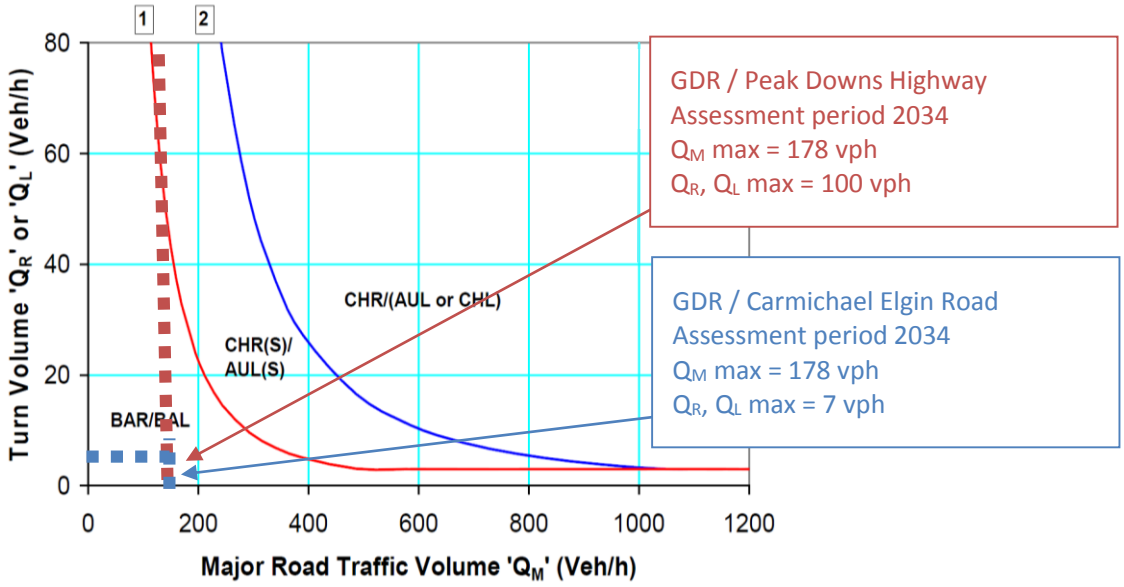


Figure 13.22 Warrants for Turn Treatments on Roads with a Design Speed ≥100km/h

Figure 4.8 Turn Warrants for a design speed>=100km/h

4.4.2 Road link assessments

Consistent with the road link assessment process undertaken in previous Section 4.3, the likely level of impact on the existing road network and its capacity has also been determined for both 2024 and 2034 years. The results from these analyses are presented below in Table 4.3.

The capacity calculations are based on the *Road Planning and Design Manual, Chapter 5, Traffic Parameters and Human Factors, August 2004*. The road type of relevance to this project is a rural two-lane, two-way road (refer Section 5.2.4.4). The roads of interest generally consist of the following cross-sections; rural road, single lane carriageway, generally narrow 1m shoulders, sealed and rural road, single lane carriageway, unsealed. These routes are generally within either flat or undulating terrain with limited steep grade sections.

The road capacity has been estimated based on the Road Planning and Design Manual, Chapter 5, Traffic Parameters and Human Factors, August 2004, Section 5.2.4.4 and Table 5.4. The capacity has been based on an assumed Level of Service (LOS) of C which equates to 800 veh/h total two-way or for the purposes of the assessment 8,000vpd (using a 10% peak to daily factor). For unsealed gravel sections this capacity may reduce to half of this capacity value (refer Capacity Reduction Factors, Section 5.2.4.2). This is only applicable to unsealed sections, this is particularly the case for the existing unsealed Moray – Carmichael Road; although do note for the purposes of the calculations it has been assumed the existing Moray - Carmichael Road will have been upgraded resulting in a higher capacity threshold value of 8,000 vehicles per day.

The road link assessment in Table 4.3, and the Level of Service threshold levels linked to daily traffic volumes as per Table 4.4 below, shows that it is expected that under the 2024 development scenario and the 2034 extended design horizon the impacted network will continue to function at a Level of Service "A" across all impacted road links, with

the exception of the Peak Downs Highway which is anticipated to function at worst as a Level of Service "B" assuming no corridor widening.

Table 4.3 Road link volume and capacity analyses (2024 and 2034), impacted road links

Road Link	Base traffic volume (vehicles per day, total two way) – "without the project"	Road Capacity (vehicles per day, total two way)	% used of available road capacity – "without the project", Base case	% used of available road capacity – "with the project" (worst case volume), With Development
Year 2024				
Gregory Developmental Road (Peak Downs Highway to Flinders Highway, Charters Towers)	903	8,000	11.3%	12.4%
Moray – Carmichael Road (Gregory Developmental Road to Mine Site)	37	8,000	0.5%	2.4%
Kilcummin Downs Road (Gregory Developmental Road to Rail Camp 1 turnoff)	140	8,000	1.8%	1.8%
Peak Downs Highway (Gregory Developmental Road to Goonyella Road, Moranbah)	1,443	8,000	18.0%	18.5%
Year 2034				
Gregory Developmental Road (Peak Downs Highway to Flinders Highway, Charters Towers)	1,776	8,000	22.2%	23.3%
Moray – Carmichael Road (Gregory Developmental Road to Mine Site)	73	8,000	0.9%	3.3%
Kilcummin Downs Road (Gregory Developmental Road to Rail Camp 1 turnoff)	275	8,000	3.4%	3.4%
Peak Downs Highway (Gregory Developmental Road to Goonyella Road, Moranbah)	2,839	8,000	35.5%	36.0%

Table 4.4: Level of Service thresholds (rural roads, level terrain)

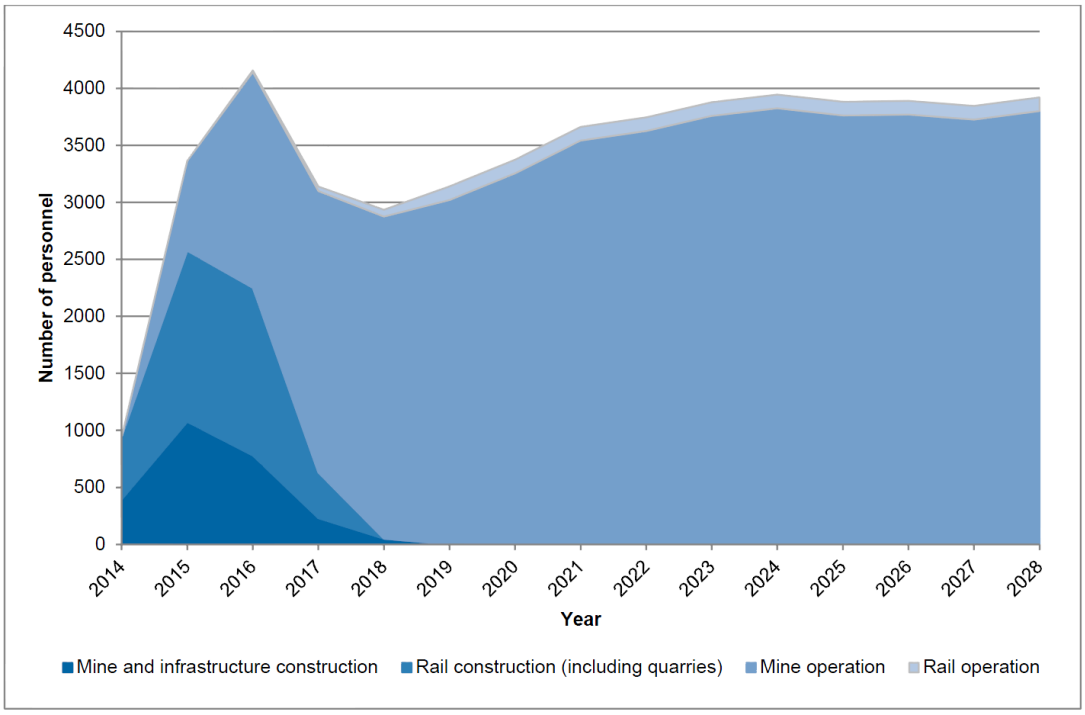
Design Hour Volume to AADT Ratio	Level of Service and Daily traffic Flows				
	A	B	C	D	E
0.10	2,400	4,800	7,900	13,500	22,900
0.11	2,200	4,400	7,200	12,200	20,800
0.12	2,000	4,000	6,600	11,200	19,000
0.13	1,900	3,700	6,100	10,400	17,600
0.14	1,700	3,400	5,700	9,600	16,300
0.15	1,600	3,200	5,300	9,000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

Source: AustRoads (1988) *Guide to Traffic Engineering Practice, Part 2: Roadway Capacity*, Table 3.9, from TRB Highway Capacity Manual (1985) Table 8.10.

4.5 FIFO Arrangements and the Transport Impact at Source Locations

It is estimated that the project (mine and rail) will reach peak workforce in 2016 with more than 4,000 staff as a result of some overlap between construction and operation workforce (see Figure 4.9 below).

Figure 4.9 Total Anticipated Project Workforce



(Source: Carmichael Coal Mine and Rail Project SEIS Appendix D, Report for Revised Social Impact Assessment, Figure 18, 29 October 2013)

Due to the remoteness of the project, FIFO will be a key operating principle primarily due to the large distances that would otherwise be required to be travelled on the regional road network by workers to / from the various work sites.

Both construction and operation workforces are intended to be source from major population centres on the east coast of Queensland. The final locations for FIFO operations will be determined during the recruitment phase following contractor selection. This is anticipated to occur within the next six to twelve months.

Based on similar projects in Queensland, the FIFO construction workers would be collected from one or more population centres on the east coast of Queensland and flown to the proposed airstrip adjacent to the mine site.

This may mean that FIFO construction workers reside at these various population centres or nearby to the nominated points, or will travel from their place of residence, expected to be close by the departure points (maximum travel distances will apply), to this point to commence travel to the mine. The impact of this travel on the transport network for the FIFO arrangement is considered to be minor.

Optimal collection points will be determined after full consideration of:

- Skilled workforce availability in the immediate vicinity of airports
- Airport capacity and flight schedule performance
- Surrounding infrastructure such as public transport and parking
- Training facilities to ensure long term efficient and reliable transit for workers.

Adani is developing a Workforce Management Strategy which will manage workforce sources in coordination with relevant agencies. Key stakeholders include:

- Workers
- Training and recruitment providers
- DETE
- FIFO Coordinators from potential source communities in Queensland – Cairns, Gold Coast and Wide Bay
- DATSIMA
- QPS
- Health services providers

5 Transport Infrastructure Impact Assessment

5.1 Introduction

The following chapter outlines the outcomes and process undertaken to understand the key infrastructure impacts that may be considered for upgrading arising from the anticipated transport demands.

5.2 Pavement Impact Assessment

5.2.1 Assessment process and assumptions

A pavement impact assessment has been undertaken for this project consistent with DTMR's requirements as defined within GARID. GARID requires those routes that have the potential for an increase in ESA's (Equivalent Standard Axles) beyond 5% over existing ESA's without the development be subject to analyses.

The process that was utilised in the calculation of the potential pavement impacts has been based on a DTMR standardised spreadsheet calculation process. For the purposes of this report this assessment has only been undertaken for the state controlled road network as other processes and agreements are being pursued in relation to any of the impacted local government roads within the area of interest for this project, for example, the Carmichael – Elgin Road Link (connecting the Mine site and the Gregory Developmental Road).

The pavement impact assessment has considered both the construction and operational phases for all components of the project including the mine, workers accommodation (camps), airport, quarries and rail. The assessment utilises the transport demand data as defined previously within Section 3 – Development Traffic.

The pavement impact assessment has utilised the latest available pavement (seal width, roughness data) and AADT data as supplied by DTMR (Mackay / Whitsunday and Northern (Townsville) Regions). However, do note that despite this being the latest available data it is understood that Transport and Main Roads are currently undertaking or have recently finalised upgrade works along the Gregory Developmental Road between Belyando Crossing and the Flinders Highway. The estimate for the pavement impact is therefore considered to be a conservative estimate and as such these works should be considered by Transport and Main Roads during discussions with Adani in terms of any contribution arrangement.

For the purposes of the assessment the standard key assumption set has been adopted. These are considered to be a reasonable basis for this assessment. Some of the key quantitative assumptions have been:

- Roughness increase of 3 counts per year
- Terminal roughness of 120 NRM
- HV (Heavy vehicle) growth rate (for background traffic) of 3% as a constant for all road sections
- ESA's / HV at 3.2 ESA's / HV for all road sections

The analysis process divided up the various road sections into consistent road sections based on:

- construction standard (based on nominal seal width consistent over lengths greater than 1km and rounded to the nearest metre)
- present (background) traffic volumes (AADT)
- development traffic loadings (consistent with Section 3 – Development Traffic).

Each lane of each road section was assessed separately, ie. loaded and unloaded directions were nominated for the purposes of the calculations. Also, each lane of a two-way road section is assumed to have the same roughness.

Do note that for Kilcummin Diamond Downs Road there is a section of about 55km that is unsealed. This section of road will only be utilised during the construction phases for a limited period in 2015 and 2016. It could be that during the construction phase of the project, one maintenance cycle may be required along the unsealed section of Kilcummin Diamond Downs Road.

5.2.2 Pavement impact assessment outcomes

The results from the pavement impact analyses are presented and discussed below. It is estimated that an impact of about 1,313,334 ESA's will occur over the 10 year development period. For the scenario test 10 years further beyond 2024, the estimated number of ESA's increases to 3,081,689 for the 20 year period starting in 2014. The results are presented in Table 5.1 expressed in terms of the reduce pavement life arising from the development demands over the 20 year period for the key road sections impacted by the development.

Table 5.1 Pavement Impact Analysis Outcomes – Pavement Life Impacts due to Development Traffic by Major Road Link

Road No.	Road Name	Transport and Main Roads Region	Road Sections	Reduced Pvt Life (%) To			Reduced Pvt Life (%) From		
14A				Min	Max	Average	Min	Max	Average
14A	Flinders Highway	Northern (Townsville)	Townsville - Charters Towers	0.6	2.1	1.8	0	0.1	0.1
14B	Gregory Development Road	Northern (Townsville)	Charters Towers - Disney Quarry/Laydown Area	4.4	12	8	0.3	0.9	0.6
98B	Gregory Development Road	Northern (Townsville)	Disney Quarry/Laydown Area - Elig-Carmichael Road	8.5	10.9	9.7	0.6	0.8	0.7
98A	Gregory Development Road	Mackay / Whitsundays	Clermont - Elign-Carmichael Road	18.9	33.3	22.7	1.8	3	2.1
33A	Peak Downs Highway	Mackay / Whitsundays	Clermont - Moranbah	1.4	6.5	4.4	0.1	0.5	0.4
33B	Peak Downs Highway	Mackay / Whitsundays	Moranbah - Mackay	0.1	0.7	0.4	0	0	0
5309	Kilcummin-Diamond Downs Road	Mackay / Whitsundays	Kilcummin Downs Road	2.4	3.3	2.9	0.3	0.4	0.4

For each link in 2014, the number of ESA's which triggered an increase in over 5% of ESA's impact without the development are shown in Figure 5.4. The Gregory Developmental Road is the link along which the pavement impacts are estimated to be highest in 2014, particularly north of the intersection with the Peak Downs Highway. Nearly 56% of the total impact the first year of the proposed development can be attributed to the section of the Gregory Developmental Road north of the Peak Downs Highway. The majority of the traffic volumes north of the Peak Downs Highway in 2014 are estimated to be generated by the Stage II Mine Development.

Similarly in 2015, the greatest pavement impact is estimated to be along the Gregory Developmental Road between Clermont and Charters Towers. For each link in 2015, the pavement impact ESA's are shown in Figure 5.5.

Figure 5.1: Pavement Impacts for 2014

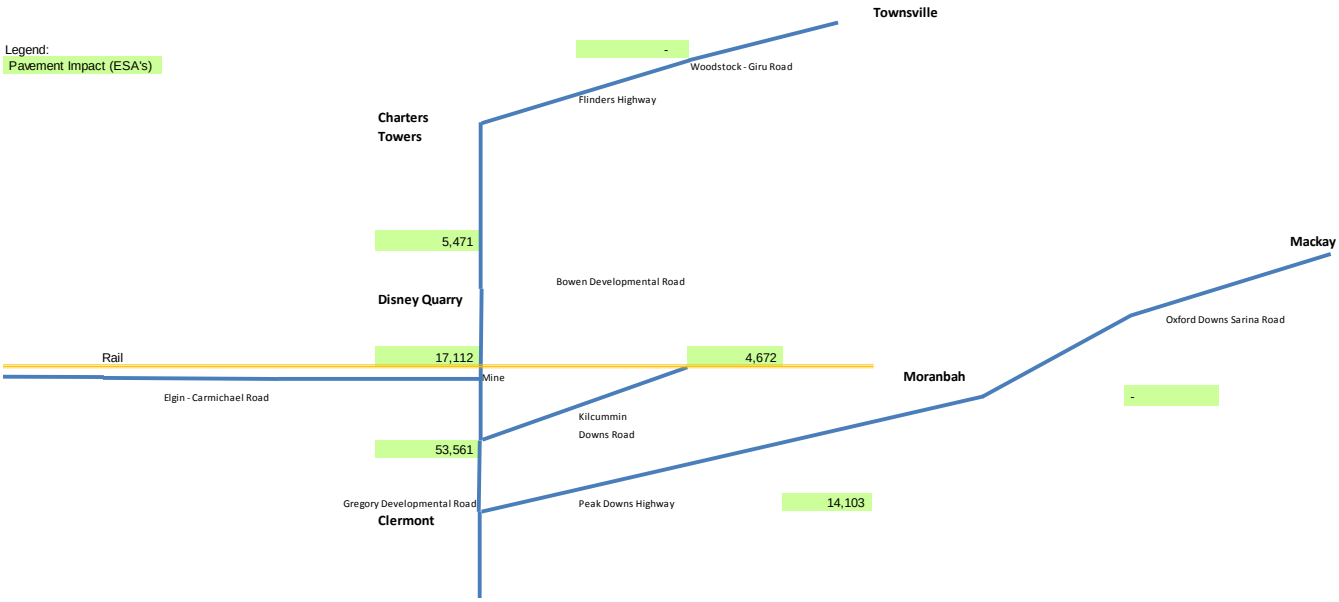
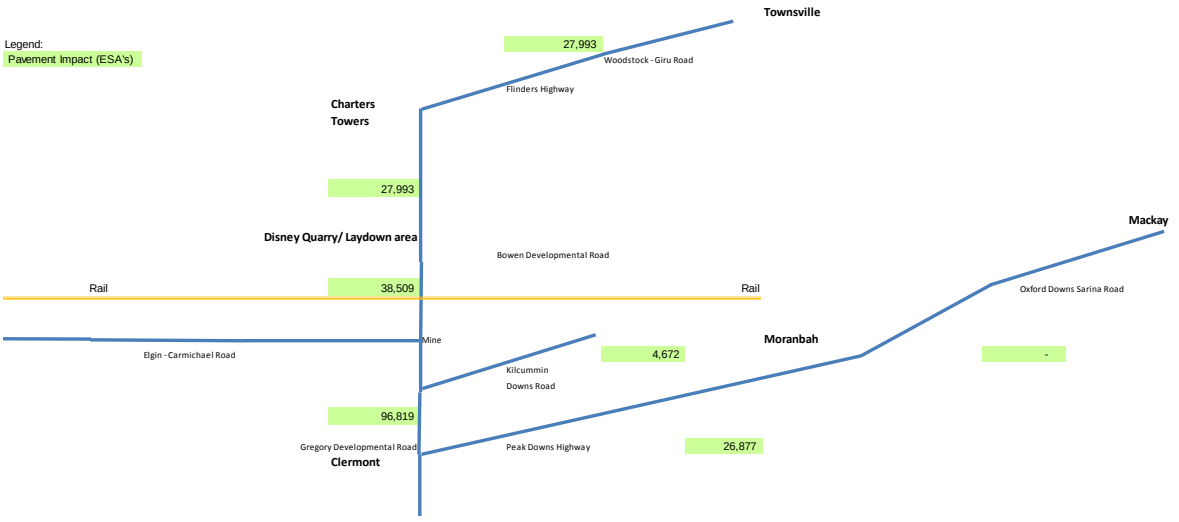


Figure 5.2: Pavement Impacts for 2015



The ESA's pavement impact for the periods years 1-5 and years 1-10 are shown in Figures 5.6 and 5.7. The Rail project finishes at the end of 2015, and as a result the pavement impacts are expected to arise from the mining activities only from 2016 (year 3) onwards. The largest ESA impact is expected to be along the Gregory Developmental Road, south of Elgin- Carmichael Road and north of the intersection with the Peak Downs Highway. The majority of the total traffic volume generated from year 3 onwards are vehicles are associated with the Mine Development Stages of the project.

Figure 5.3: Pavement Impacts for Years 1-5

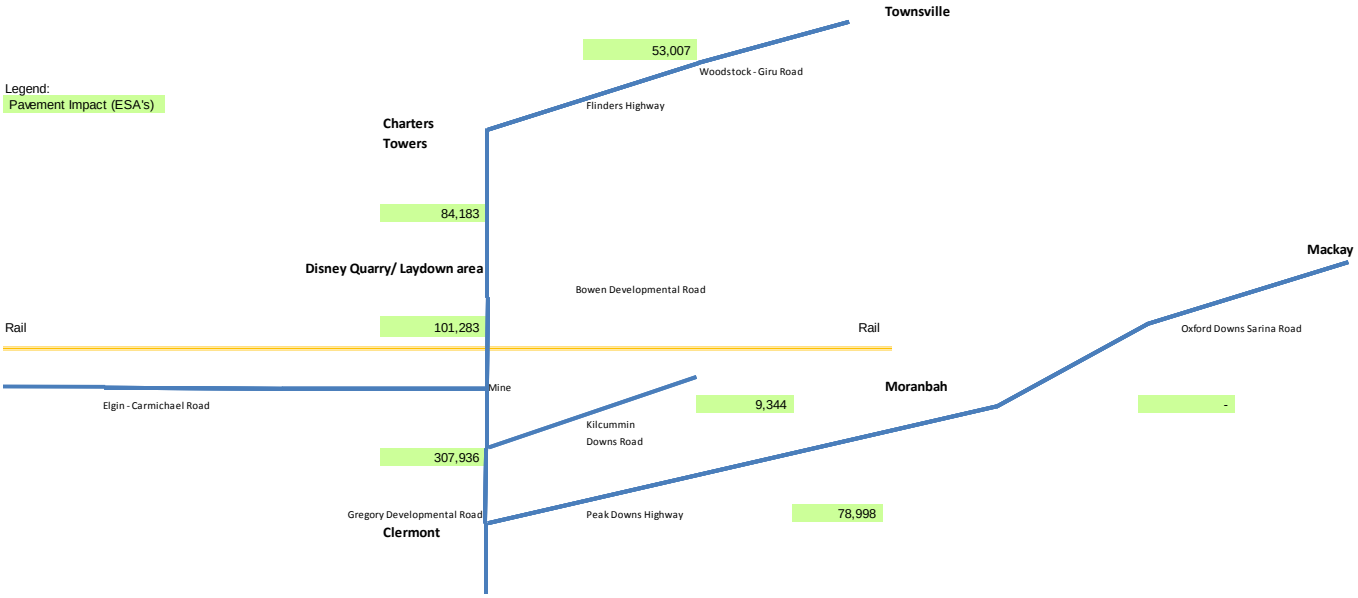


Figure 5.4: Pavement Impacts for Years 1-10

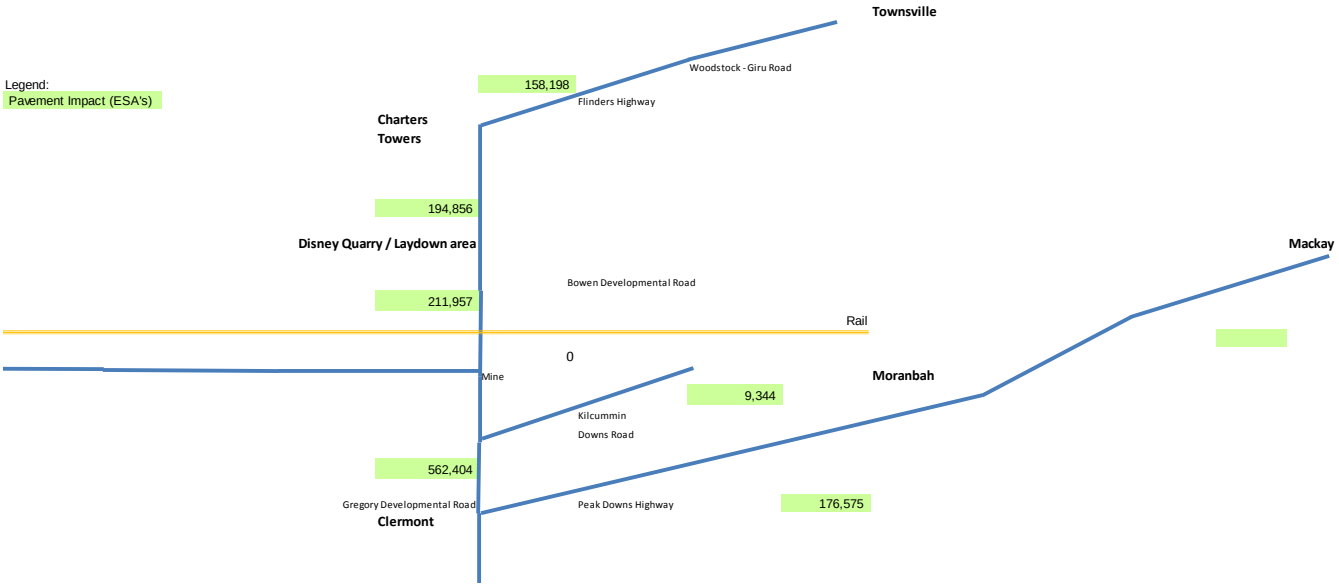


Figure 5.9 and Figure 5.10 show the proportions of the total pavement impacts that are attributable to the Mine and Rail construction phases, as well as the Mine operational phase from year 2 onwards.

Figure 5.5: Year 1 Pavement Impact (Number of ESA's)

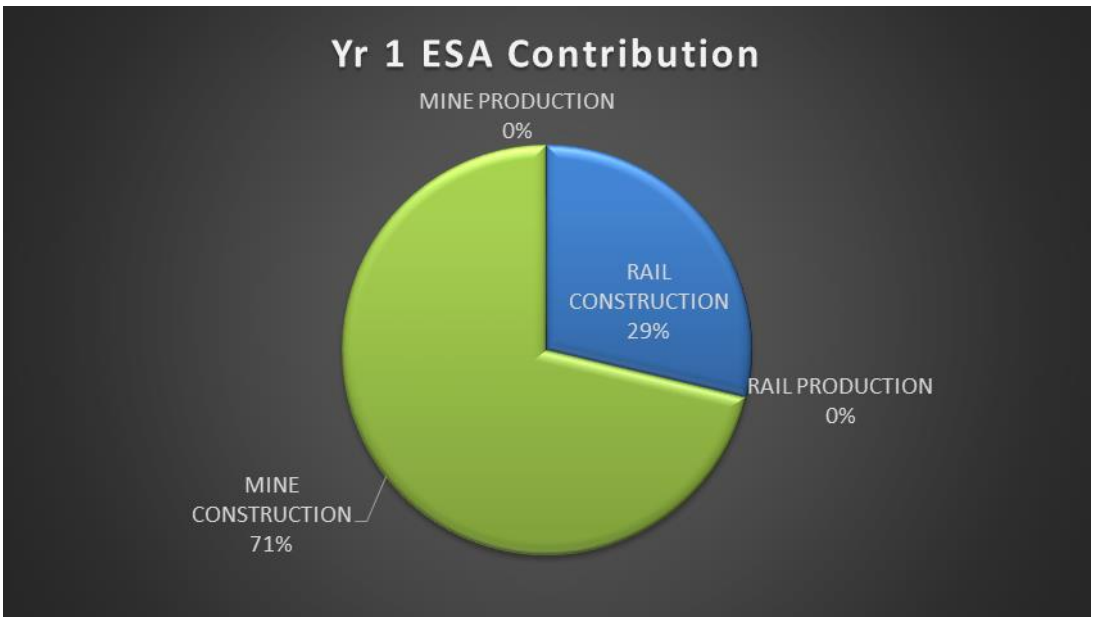
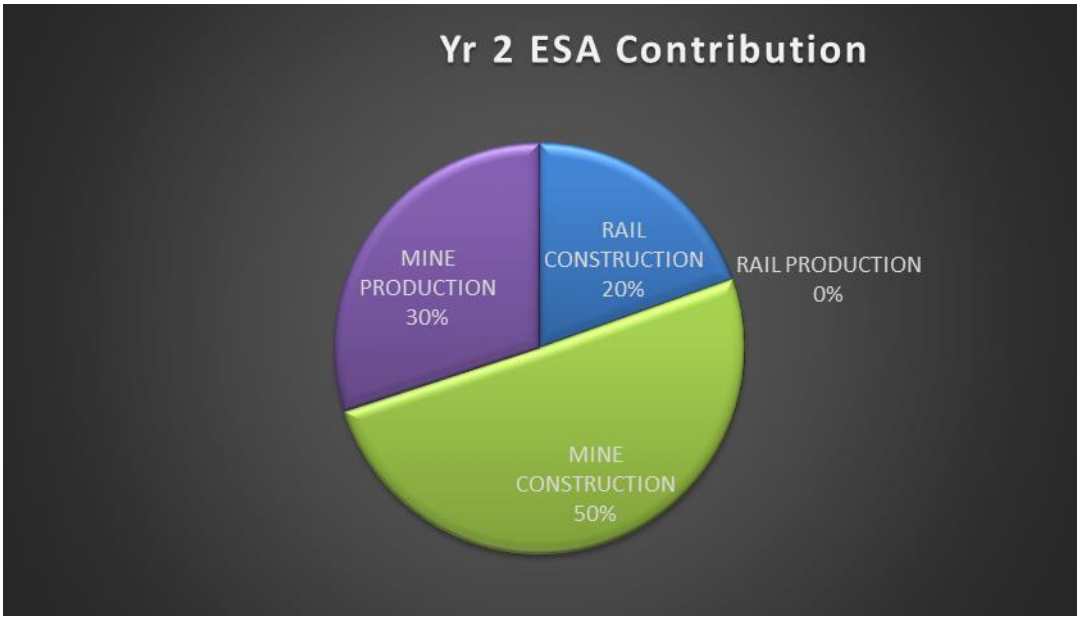


Figure 5.6: Year 2 Pavement Impact (Number of ESA's)



Overall, the majority of the pavement impacts are attributable to the operation of the Mine. The Rail project is attributable to less than 5% of the total pavement ESA's impact over the 10 year period. Figures 5.11 and 5.12 show that for years 1-5 and years 1-10 respectively, the majority of the pavement impacts arise because of the Mining activity.

Figure 5.7: Years 1-5 Pavement Impacts (Number of ESA's)

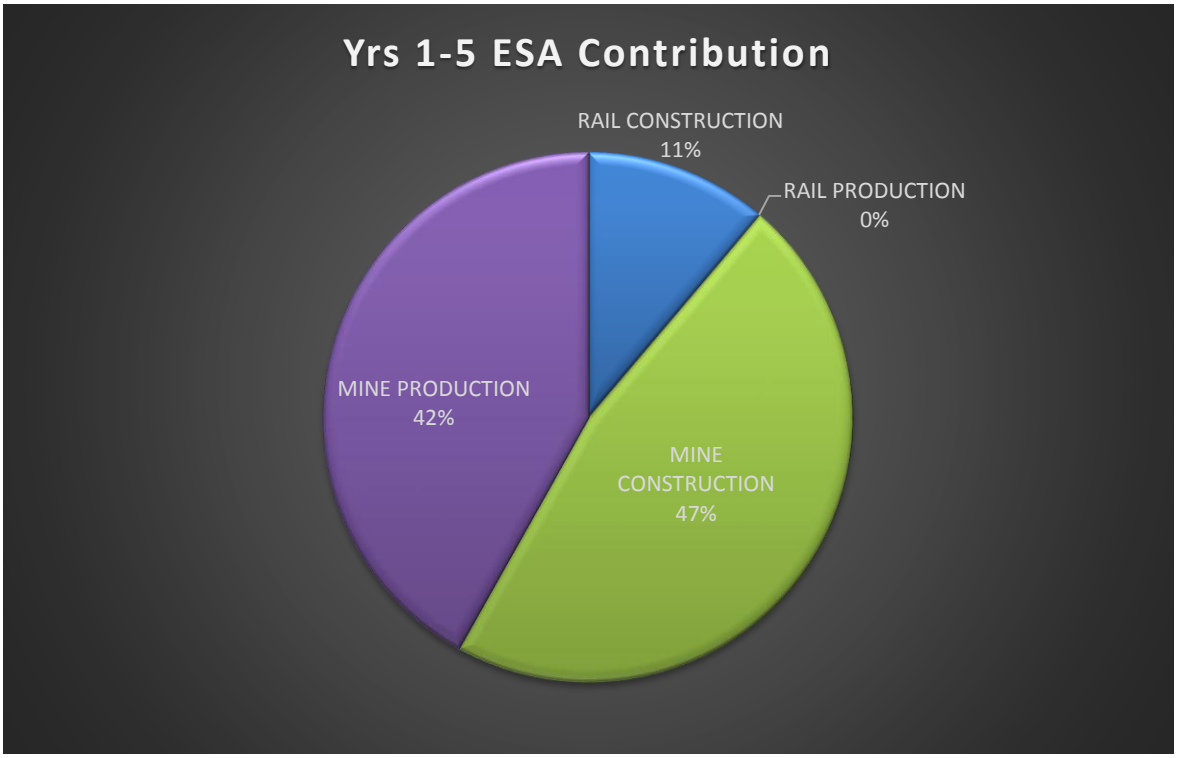
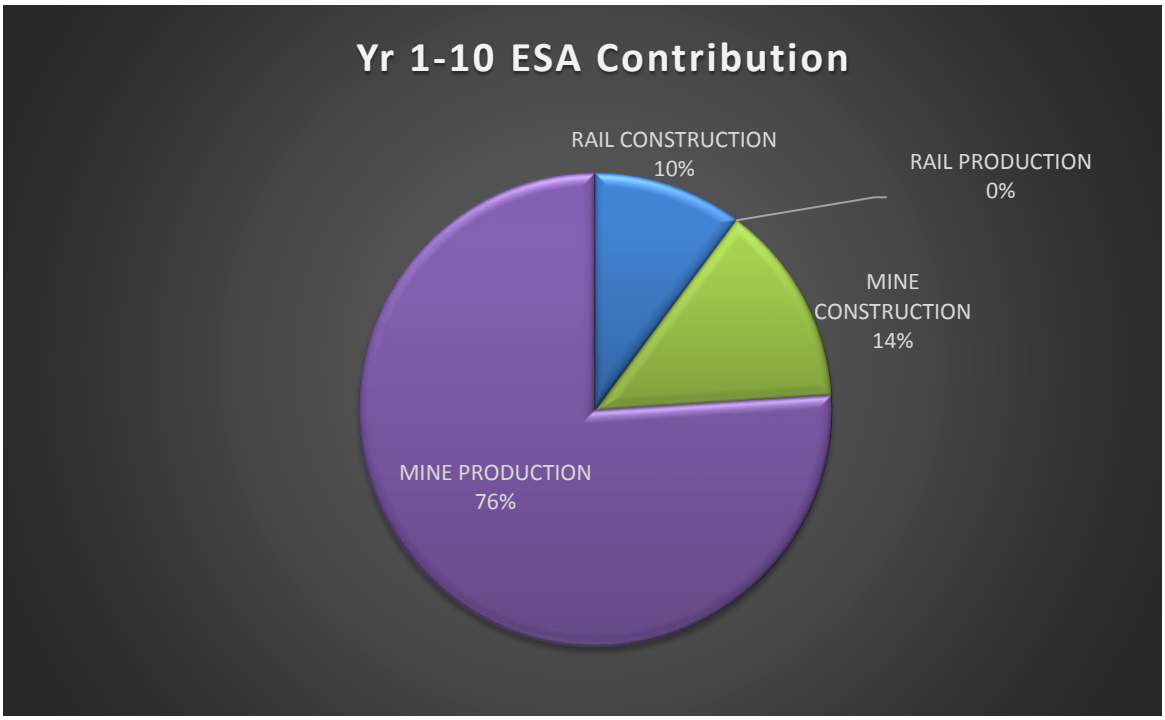


Figure 5.8: Years 1-10 Pavement Impacts (Number of ESA's)



5.3 Infrastructure Impact Assessment

As part of the transport assessment process a review of key infrastructure items was undertaken. Included as part of this process was the conduct of a site visit and sourcing of relevant information from Transport and Main Roads in relation to the existing infrastructure within the area of interest. From this review process it was determined that the following infrastructure items be considered as part of Adani's discussions with Transport and Main Roads in terms of the potentially impacted road infrastructure:

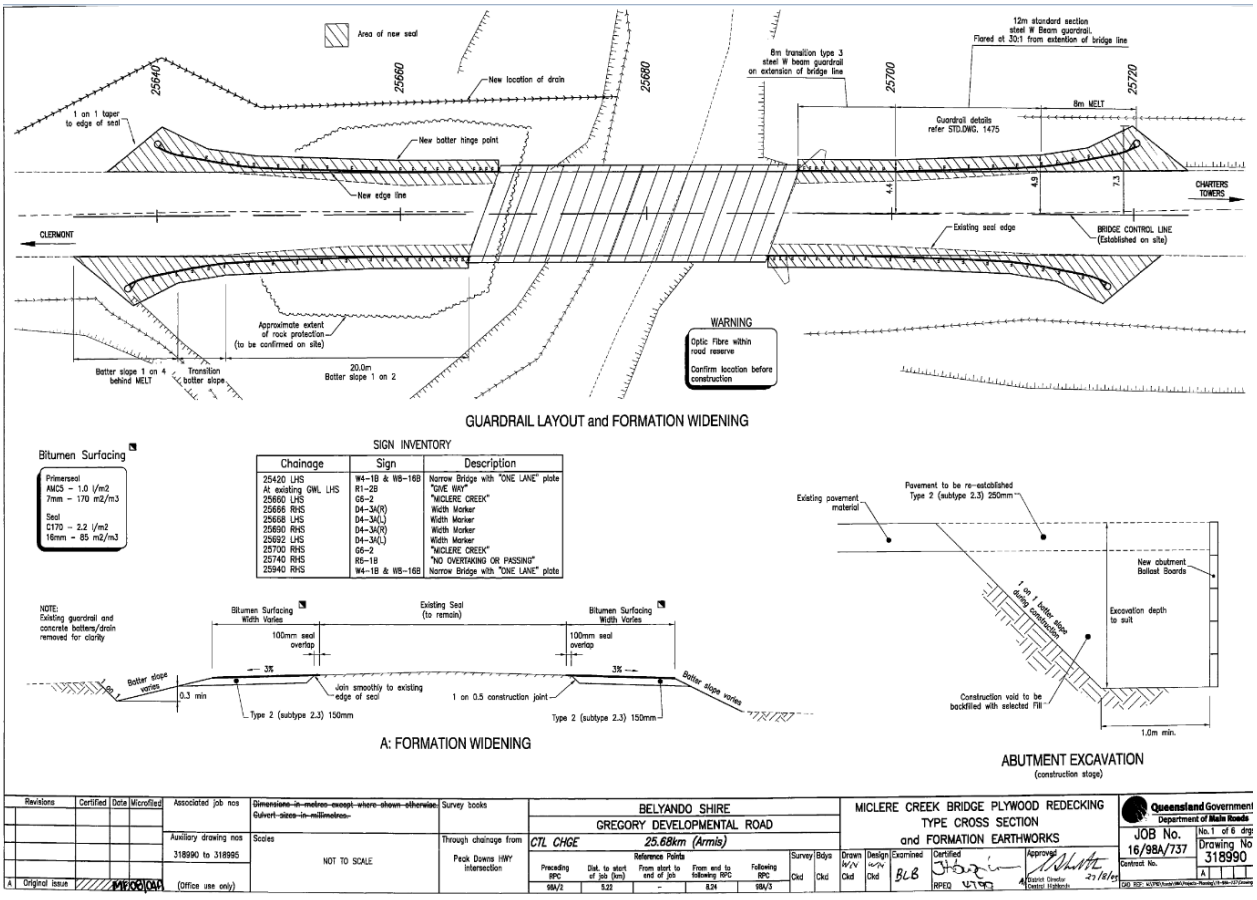
Upgrading the Miclere Creek Bridge along the Gregory Developmental Road

This bridge is a narrow bridge and is the only remaining narrow bridge location along the length of the Gregory Developmental Road. The bridge is located about 20km north of the intersection with the Peak Downs Highway. Figures 5.13, 5.14 and 5.15 show the existing bridge arrangement. This bridge location presents potential safety risk as it requires traffic to give-way along a relatively high speed road section.

Figure 5.9: Miclere Creek Bridge (Gregory Developmental Road) – photo taken looking north. Note Give-Way signage, narrow bridge in background and wider pavement for stopping away from the bridge section

Figure 5.10: Miclere Creek Bridge (Gregory Developmental Road) – photo taken looking north. Note Give-Way linemarking and narrow bridge with guardrail very close to the carriageway

Figure 5.11: Miclere Creek Bridge (Gregory Developmental Road) Plan Drawing for General Arrangements



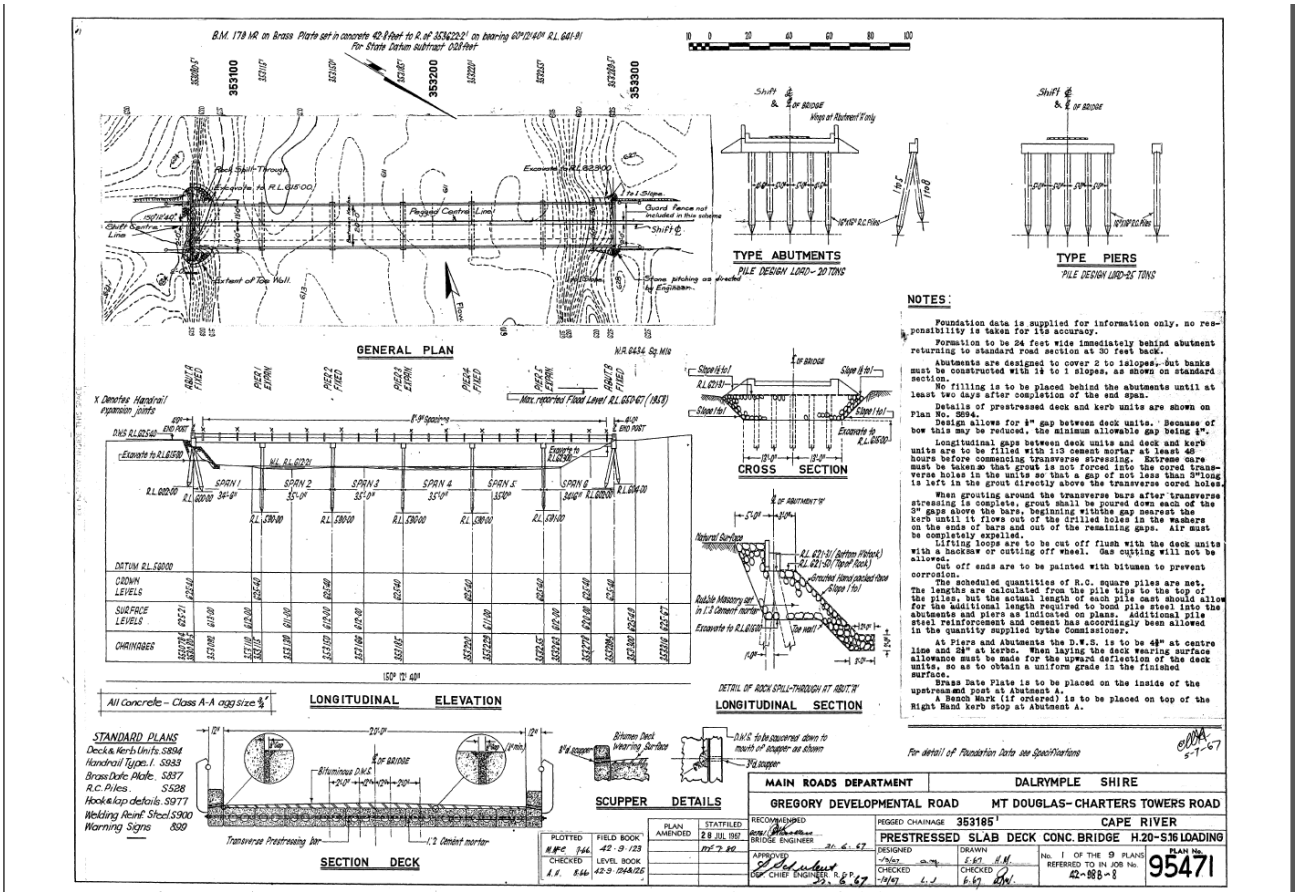
Review of Cape River Bridge and Causeway

North of Belyando Crossing at the Cape River an existing bridge and causeway traverse the Cape River. The Cape River leads downstream into the Burdekin River and dam and is about 108km south of Charters Towers. Consideration may need to be given to this crossing in terms of its all weather reliability.

The photo shown as Figure 5.16 illustrates the existing arrangement from a site visit with Figure 5.17 being Transport and Main Roads' drawing of the general arrangements for the bridge structure (bridge construction circa 1967).

Figure 5.12: Cape River Crossing Causeway and Bridge, photo taking looking south from the northern bank on the Gregory Developmental Road. Note river height marker in the foreground. The bridge section is in the background before the rise on the southern bank.

Figure 5.13: Cape River Crossing Causeway and Bridge General Arrangement Drawing



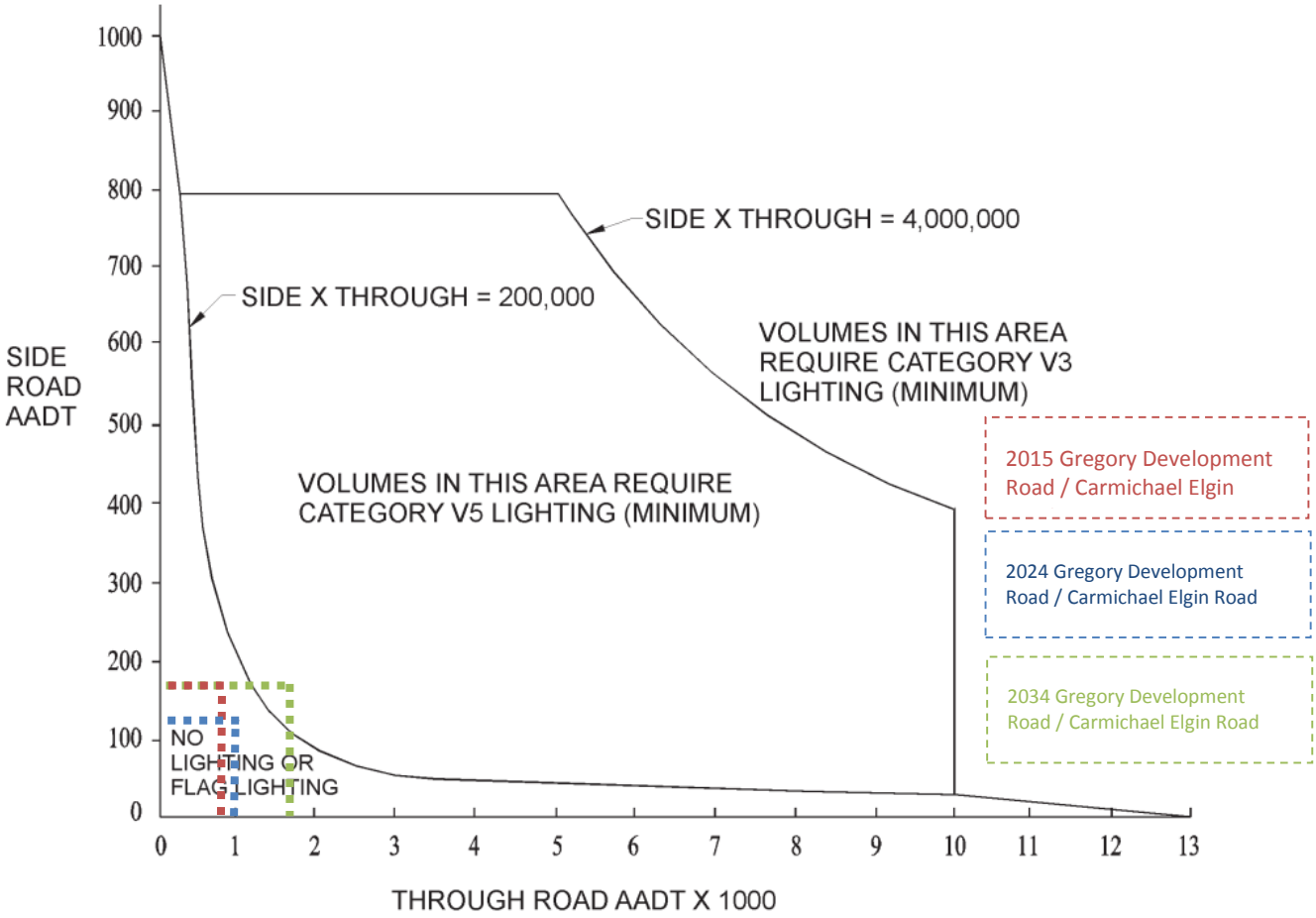
The above items are also then supplemented by those items that have been defined as likely requiring improvement based on the traffic operations and safety assessment reported in the other sections of the report. These items are also defined in Section 6 of this report and include:

- Upgrade the existing Carmichael – Elgin Road to become a sealed, single lane carriageway so as to provide a trafficable road under most rain event conditions and minimise the risk of closure. Intersections with the upgraded Carmichael – Elgin Road are recommended to be BAR / BAL as a minimum, although consideration may be given to upgrading particular locations to CHR(S)/AUL(S) if during the design process it is found relatively poor levels of sight distance will be achieved. This is to minimise the safety risk to road users at these locations particularly given the mix of heavy vehicles across the impacted network.
- Upgrade the existing Carmichael – Elgin Road / Gregory Developmental Road intersection – as part of the upgrade works for the Carmichael – Elgin Road it is recommended that the existing GDR intersection be upgraded to include protected right turn and left movements at this intersection. This is recommended to ensure the safe operation of the TMR intersection into the future, this is particularly given the mix of heavy vehicles anticipated to use this intersection during construction and operations of the Carmichael Coal Mine and Rail project.
- Signage at the Gregory Developmental Road / Kilcummin Downs Road – it is recommended that during the course of the construction period (2014 and 2015), including the life of the Rail Camp 1, "Trucks Turning" signage be installed at the intersection so as to advise road users of the potential for heavy vehicles to be negotiating this intersection. This is recommended for safety reasons rather than a capacity requirement.
- Upgrade Kilcummin Downs Road / Rail Camp 1 Site access – it is recommended that the proposed site access location be upgraded to allow for a protected right turn into the site access. This is to minimise the safety risk to road users at this location particularly given the mix of heavy vehicles across the impacted network.
- Signage located at the intersection of the Peak Downs Highway with the Gregory Developmental Road and also north of the proposed Disney Quarry along the Gregory Developmental Road to advise motorists of the construction activities along this road section

Road Lighting Assessment

A preliminary road lighting assessment has been undertaken as per the warrants set out in RPDM Chapter 17, Section 17.5, Warrants for Main Roads Public Lighting. Refer Figure 5.14 below that shows the traffic volumes for the Gregory Development / Carmichael Elgin Road intersection. Note that it is expected that the growth in background traffic may result in the intersection requiring road lighting Category V5 by 2034.

Figure 5.14 Warrants for Consideration of Main Roads Public Lighting



Generally the provision of lighting along routes is not required if the traffic volume (AADT) does not exceed 10,000 vehicles per day. In addition to the warrants above, lighting should however be considered at intersections with channelisation, or at the location of interchanges along major routes. Given these criteria it is recommended that as part of detail design, lighting may be required at the Gregory Developmental Road / Carmichael Elgin Road intersection.

The Gregory Developmental Road / Flinders Highway and the Gregory Developmental Road / Peak Downs Highway intersection already have road lighting in place.

The intersection of Gregory Developmental Road / Kilcummin Downs Road does not achieve the warrants in Figure 5.14, either in terms of traffic demand or channelisation, and as such it does not require road lighting.

6 Other Impacts and Issues

6.1 Noise

The noise impacts and commentary extracts identified in the following section has been derived from the EIS, Volumes 2 and 3, Section 9, Noise and Vibration.

The noise assessment as part of the EIS focussed on the Moray – Carmichael Road corridor. Information does not exist for the other road corridors such as the Gregory Developmental Road or Peak Downs Highway. Notwithstanding, given the frontage development along each of these corridors, particularly of a residential nature, this is considered to be acceptable especially given the anticipated low increase in daily traffic volume (from both an absolute and percentage basis) over each of these road corridors.

DTMR's *Road Traffic Noise Management: Code of Practice* (2007) provides guidance for the assessment of road traffic noise. It states that the traffic noise level of an existing state controlled road should not exceed $L_{A10(18hr)}$ 68 dB(A) assessed one metre in front of the most exposed part of an affected noise sensitive place.

The Project (Mine) has the potential to generate traffic on roads near sensitive receptors such as local homesteads and the mine workers accommodation village once the Project (mine) is operational.

The Project (Mine) will use standard construction equipment, general trade equipment and specialised equipment as required. The construction works will consist of the Project (mine) site itself. Impacts to the road network are unlikely to be due to road construction of the upgraded Moray – Carmichael Road from its intersection with the Gregory Developmental Road.

The land use surrounding the Project (mine) area is rural in nature with a limited number of possible sensitive receptors. The potential sensitive receptors included in the noise assessment are defined below in Table 6.1.

Table 6.1: Potential Sensitive Receptors

Potential Sensitive Receptor	Easting	Northing	Approximate Distance from Nearest Operational Noise Source (m)	Description/ Comment
1	437661	7572108	2,800	Commercial/ industrial precinct
2	447799	7569804	6,100	Workers accommodation village
3	453157	7544999	7,800	Bygana Homestead
4	450080	7541530	4,800	Lignum Homestead
5	446973	7530251	11,800	Mellaluka Homestead
6	422016	7559462	7,100	Doongmabulla Homestead
7	406412	7571007	16,900	Carmichael Homestead

(GHD: 2012)

Impacts are anticipated as part of the various construction and operational phases as outlined below.

Civil Works Traffic

Construction activities including civil works such as earthworks, drainage construction, pile driving and equipment use, and the Project (mine) construction have the potential to adversely impact on noise sensitive receptors through disturbance to sleep, social activities and / or work activities and disturbance of livestock and native fauna.

The peak construction noise levels for day time works are predicted to be less than 10dB(A) at all receptors except at sensitive receptors 3 and 4 where the noise levels are expected to range between 12 and 24dB(A) and 25 to 37dB(A) respectively. The predicted construction noise levels are well under the 55dB(A) WHO criteria at all sensitive receptors.

Construction Traffic

The main traffic that will be generated through the construction phase will be from plant, equipment and material deliveries. Potential traffic generated noise would be highest at noise monitoring Receptor 7 (Carmichael Homestead). The estimated traffic generated noise at this location was approximately 12 dB(A) below the DTMR criteria of 68 dB(A)L10,18hr. As such the potential impacts of traffic generated noise are expected to fall within the DTMR criteria at all sensitive receptors

Operations Traffic

Traffic generation due to the operation of the mine is expected to occur on the re-aligned Moray Carmichael Road accessing the Gregory Developmental Road. Whilst the detailed design of the final road alignment is to be determined, realignment is only likely to have an impact in the vicinity of Receptor 2 (Workers Accommodation Village) as the other receptors are not in proximity to the Moray Carmichael Road along the proposed haulage routes.

Potential traffic generated noise is predicted highest at Receptor 7 (Carmichael Homestead). The estimated traffic generated noise at this location was approximately 9 dB(A) below the DTMR criteria of 68 dB(A)L10,18hr. As such the potential impacts of traffic generated noise are expected to fall within the DTMR criteria at all sensitive receptors.

Given the relatively low projected traffic volumes, traffic noise is predicted to be below the relevant DTMR criteria at the nearest sensitive receptor or monitoring location.

6.2 Flooding Assessment

The flooding assessment work as part of the Project has understood to have focussed on the internal mine area and the key external road network element, ie. the Moray – Carmichael Road corridor. Information does not exist for the other road corridors such as the Gregory Developmental Road or Peak Downs Highway. Notwithstanding, given that there is no proposal to change the alignment or other physical features of the other roadways this is considered to be acceptable especially given the anticipated low increase in daily traffic volume (from both an absolute and percentage basis) over each of these road corridors.

The flooding impacts identified in the following section have been derived from the Carmichael Mine Road Upgrade Detailed Design – Detailed Design Report, 8 February 2013.

There are three stream gauging stations located within the Belyando River basin. Details of these gauging stations are provided in Table 6.2.

Table 6.2: Stream Gauging Stations

Location	Station	Period of Record	Length of Record (Years)	Catchment Area (km²)	Unit discharge (m³/s/km²)
Belyando River at Mt. Douglas	120301A	1949 - 1975	26	35,471	0.12
Mistake Creek at Charlton	120306A	1968 – 1993	25	2,583	0.29
Mistake Creek at Twin Hills	120309A	1976 - present	35	8,048	0.08

The Belyando Anabranch, Belyando River and Moray Anabranch crossings are part of a flat, braided and complicated catchment.

A unit discharge of less than 0.25 m³/s/km² indicates that a stream gauge is not recording data correctly or that an upstream water storage is affecting the results. The unit discharges of gauges 120301A and 120309A fall below this threshold and the gauges were deemed unfit for use in flood frequency analysis.

The key finding from the hydraulic assessment work for the Moray – Carmichael Road corridor is that an ARI 1 immunity of all crossings of the Moray – Carmichael Road is expected to results in an AATC or no more than 3 days.

Upgrading the major crossings at Mistake Creek, the Belyando Anabranch, Belyando River and Moray Anabranch to an ARI 2 will decrease the AATC to 1 day or less.

For other waterway crossings beyond the Carmichael-Elgin Road, for example along the Gregory Developmental Road at Cape River, consideration may be given to remote sensing flood monitoring technology to provide the community with real-time information on the condition of these major crossings.

6.3 Hazard and Risk Assessment

The potential hazards and risks arising from roads and traffic related to the projects construction and operational phases have been identified in the EIS, Volume 2, Chapter 12 – Hazard and Risk and Volume 3, Chapter 12 – Hazard and Risk. The key findings are as defined below.

6.3.1 Hazard Identification

Transport of hazardous substances constitutes on and off site Project (Mine) activities and form a part of the risk assessment. The routes from Townsville via the Flinders Highway and Gregory Development Road and Mackay via the Peak Downs Highway, Suttor Developmental Road, Bowen Developmental Road and Gregory Developmental Road are anticipated to be utilised as the haulage route for hazardous substances, consumables and machinery.

There will be light vehicle movements at the workers accommodation village, including food transport, linen laundering, fuel supplies, waste management contractors and maintenance servicemen.

Diesel trucks will be utilised during both the construction and operations phases.

Trucks carrying explosives will also traverse the Peak Downs Highway and Gregory Developmental Road. The explosives contactor will be responsible for transport, storage, handling and use of explosives.

Increased heavy vehicle traffic from the project along public transport corridors, including school bus corridors, presents a potential safety risk. Although an assessment of traffic volumes indicates that volumes are within the capacity of the roads, increased traffic volumes associated with the Project do have a minor potential to increase the likelihood of traffic crashes.

The Project (rail) will cross dedicated public road reserves (constructed and unconstructed) and private (farm) trails, and stock crossings which may impact on the operation of those networks.

6.3.2 Mitigation and Management

Transportation of hazardous substances will comply with the *Australian Code for Transport of Dangerous Goods by Road and Rail 7th edition (ADG Code)*.

Each crossing location has been assessed to determine whether the respective individual crossing should be retained or closed, and in the case of the retained crossings, to identify the appropriate treatment option, which may include separation (rail under road or rail over road), at-grade active control, at-grade passive control or road realignment.

Traffic management issues will be addressed through the preparation and implementation of construction and operation Traffic Management Plans. These will be developed during the detailed design phase. The Traffic Management Plans will be developed in consultation with the Department of Transport and Main Roads, police and local authorities. Initiatives to be undertaken as part of the development and execution of Traffic Management Plans are included in Volume 4 Appendix W Mine Transport Assessment and Rail Transport Report at Volume 4, Appendix AG. The Project will comply with the requirements under the Department of Transport and Main Roads (DTMR), namely the *Road Planning and Design Manual, DTMR Manual of Uniform Traffic Control Devices, Austroads Guide to Traffic Management* and particularly for the rail elements *Australian Rail Track Corporation Level Crossings – Configuration Standards*.

6.4 Cumulative Impacts

The potential cumulative negative impacts on roads, traffic and safety have been identified in the EIS, Volume 1, Chapter 8 – Cumulative Impacts and the impacts are expected to include:

- traffic disruption along the Gregory Developmental Road, Peak Downs Highway (from Mackay) and the Flinders Highway (from Townsville) during construction,
- increased traffic during mine operations on the Gregory Developmental Road, including safety of tourist traffic not familiar with large heavy vehicles on narrow roads,
- increased maintenance requirements on local and state roads as a result of mine construction and Operation,
- delays to traffic, including emergency services as a result of level crossings along the rail corridor,
- the construction of level crossings along the route may result in potential conflicts between rail and road traffic that will need to be managed by installing appropriate safety warning measures. These level crossings may result in delays to emergency services, school bus routes, stock movements (vehicle and foot), and local traffic.

The peak traffic generation during the construction phase of the Project is likely to be associated with the transporting of plant, equipment and material deliveries. The main traffic generated through the operation phase will be from plant, equipment and material deliveries. This traffic is anticipated to impact the Flinders Highway and Gregory Developmental Road. The State road network will be cumulatively impacted from the construction and operation of multiple mines and rail lines concurrently. The estimated traffic generated by the Project (Mine and rail construction and operations) is likely to exceed the threshold of a five per cent increase in annual average daily traffic along sections of the Gregory Developmental Road, Peak Downs Highway and Moray – Carmichael Road, see Section 4.3. Adani will consult with Department of Transport and Main Roads (DTMR) to establish how these impacts should be managed and to identify agreed mitigation measures. It is expected that other proponents will be having similar discussions which will enable DTMR to identify appropriate measures to mitigate cumulative road transport impacts.

7 Mitigation Measures

7.1 Introduction

From the traffic assessment that has been undertaken it can be concluded that various traffic management measures, both infrastructure and non-infrastructure, will be required to support the proposed Project.

The proposed mitigation measures are outlined below and these measures are intended to ameliorate the various impacts that are anticipated from the Project.

7.2 Traffic

- Agree a negotiated pavement rehabilitation and maintenance contribution framework for the duration of the project with Transport and Main Roads consistent with the outcomes defined within Chapter 5 Transport infrastructure impact assessment. In consultation with Transport and Main Roads consideration is also be given to the possible upgrading of the Miclere Creek Bridge and the Cape River Crossing located along the Gregory Developmental Road.
- Agree and prepare a Road Use Management Plan (RMP) in conjunction with Transport and Main Roads so as to allow the safe and effective management of all road users whilst minimising any potential impacts on the community during both the construction and operational phases of the project.
- Upgrade the existing Carmichael – Elgin Road to become a sealed, single lane carriageway so as to provide a trafficable road under most rain event conditions and minimise the risk of closure. The intersection forms with Carmichael – Elgin Road should be BAR / BAL as a minimum although consideration may be given to upgrading particular locations to CHR(S)/AUL(S) if during the design process it is found relatively poor levels of sight distance will be achieved. This is to minimise the safety risk to road users at these locations particularly given the mix of heavy vehicles across the impacted network.
- Upgrade the existing Carmichael – Elgin Road / Gregory Developmental Road intersection – as part of the upgrade works for the Carmichael – Elgin Road it is recommended that the existing intersection be upgraded to include protected right turn and left movements at this intersection. This is recommended to ensure the safe operation of the intersection into the future.
- Signage at the Gregory Developmental Road / Kilcummin Downs Road – it is recommended that during the course of the construction period (2014 and 2015), including the life of the Rail Camp 1, “Trucks Turning” signage be installed at the intersection so as to advise road users of the potential for heavy vehicles to be negotiating this intersection. This is recommended for safety reasons rather than a capacity requirement.
- Upgrade Kilcummin Downs Road / Rail Camp 1 Site access – it is recommended that the proposed site access location be upgraded to allow for a protected right turn into the site access. This is to minimise the safety risk to road users at this location particularly given the mix of heavy vehicles across the impacted network.
- Signage located at the intersection of the Peak Downs Highway with the Gregory Developmental Road and also north of the proposed Disney Quarry along the Gregory Developmental Road to advise motorists of the construction activities along this road section.
- The Gregory Developmental Road and Peak Downs Highway are not approved for HML vehicles. Should these routes be required to be used by HML a separate application is required for these routes. This will go through to DTMR for their review and is subject to their approval.
- A bus fleet will be required to support both the construction and operational phases of the project. The buses will primarily transport the workforce to / from the Airport(s) (FIFO) and each work site.
- Road lighting (Category V5) be considered for the Gregory Developmental Road / Carmichael-Elgin Road intersection.

7.3 Noise

No mitigation measures are recommended because the anticipated noise levels will meet the DTMR guidelines (see also section 5.1).

7.4 Flooding

Various options have been considered for the development of the Moray – Carmichael Road corridor to mitigate the impacts of flooding events (PB: 2013). These options include:

- Realignment 1 – North of existing Back Creek crossings
- Realignment 2 - East of Mistake Creek to meet up with Twin Hills Road
- Realignment 3 - North of existing alignment to meet with existing crossing area at Moray Anabranch
- Realignment 4 – South of existing crossing at Moray Anabranch
- Realignment 5 - South of North Creek and the proposed rail alignment and through the mining lease

From the flooding and staging assessment that has been undertaken for the Moray – Carmichael Road corridor it has been found that the option that is both the lowest capital and net present cost includes realignments 2, 4 and 5. This results in the shortest final stretch of road so will also result in the lowest cost for long term maintenance and fastest travel time from Gregory Developmental Road to the Project (mine) site. It is recommended that this alignment is used in the finalisation of the preliminary design.

For other waterway crossings beyond the Carmichael-Elgin Road, for example along the Gregory Developmental Road at Cape River, consideration may be given to remote sensing flood monitoring technology to provide the community with real-time information on the condition of these major crossings.

8 Conclusions and Recommendations

From the traffic assessment that has been undertaken it can be concluded that:

- The key road links that are anticipated to be impacted with traffic volumes greater than 5% (consistent with GARID requirements) are the Peak Downs Highway (Moranbah to the Gregory Developmental Road), Gregory Developmental Road (from the Peak Downs Highway to the Laydown Area and Disney Quarry) and the Moray Carmichael Road.
- If considered only from a traffic capacity perspective there are likely to be limited intersection impacts. However, to achieve safety improvements it is recommended that upgrades be considered at major intersections, in particular the Gregory Developmental Road / Moray Elgin Road intersection so that all movements are protected turns consistent with DTMR's CHR(S)/AUL(S) arrangements.

The proposed mitigation measures to address any anticipated deficiencies are defined below:

- Agree a negotiated pavement rehabilitation and maintenance contribution framework and cost allocation for the duration of the project with Transport and Main Roads consistent with the outcomes defined within Chapter 5 Transport infrastructure impact assessment. In consultation with Transport and Main Roads consideration is also to be given to the possible upgrading of the Miclere Creek Bridge and the Cape River Crossing located along the Gregory Developmental Road.
- Agree and prepare a Road Use Management Plan (RMP), in conjunction with Transport and Main Roads, so as to allow the safe and effective management of all road users whilst minimising any potential impacts on the community during both the construction and operational phases of the project.
- Upgrade the existing Carmichael – Elgin Road to become a sealed, single lane carriageway so as to provide a trafficable road under most rain event conditions and minimise the risk of closure. The intersection forms with Carmichael – Elgin Road should be DTMR BAR / BAL as a minimum although consideration may be given to upgrading particular locations to DTMR CHR(S)/AUL(S) if during the design process it is found relatively poor levels of sight distance will be achieved. This is to minimise the safety risk to road users at these locations particularly given the mix of heavy vehicles across the impacted network.
- Upgrade the existing Carmichael – Elgin Road / Gregory Developmental Road intersection – as part of the upgrade works for the Carmichael – Elgin Road it is recommended that the existing intersection be upgraded to include protected right turn and left movements at this intersection. This is recommended to ensure the safe operation of the intersection into the future.
- Signage at the Gregory Developmental Road / Kilcummin Downs Road – it is recommended that during the course of the construction period (2014 and 2015), including the life of the Rail Camp 1, "Trucks Turning" signage be installed at the intersection so as to advise road users of the potential for heavy vehicles to be negotiating this intersection. This is recommended for safety reasons rather than a capacity requirement.
- Upgrade Kilcummin Downs Road / Rail Camp 1 Site access – it is recommended that the proposed site access location be upgraded to allow for a protected right turn into the site access. This is to minimise the safety risk to road users at this location particularly given the mix of heavy vehicles across the impacted network.
- Signage located at the intersection of the Peak Downs Highway with the Gregory Developmental Road and also north of the proposed Disney Quarry along the Gregory Developmental Road to advise motorists of the construction activities along this road section.
- The Gregory Developmental Road and Peak Downs Highway are not approved for HML vehicles. Should these routes be required to be used by HML a separate application is required for these routes. This will go through to DTMR for their review and is subject to their approval.
- A bus fleet will be required to support both the construction and operational phases of the project. The buses will primarily transport the workforce to / from the Airport(s) (FIFO) and to each work site.
- For other waterway crossings beyond the Carmichael-Elgin Road, for example along the Gregory Developmental Road at Cape River, consideration may be given to remote sensing flood monitoring technology to provide the community with real-time information on the condition of these major crossings.
- Road lighting (Category V5) be considered for the Gregory Developmental Road / Carmichael-Elgin Road intersection.

BROWN

Appendices

Smart Consulting

Appendix A References

Appendix A: References

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Appendix B Key Mine Development Data Inputs – Summary

- *Mine Development Inputs (Construction and operations)*
- *Rail Development Inputs (Construction)*
- *Estimated Traffic Volumes and Key Development Inputs*

Summary of logistics by Mine Stage (linked to year) and by route

	From Townsville via GDR north		From Charters Towers via GDR north		From Brisbane via Warrego Hwy, Carnarvon, GDR south		From Emerald via GDR south		From Mackay via Peak Downs, GDR south		From Moranbah via Peak Downs, GDR south		From Clermont via GDR south		From Rockhampton via GDR south	
Mine Construction and Operations Phases	# trips pa (one way)	# trips per day (one way)	# trips pa (one way)	# trips per day (one way)	# trips pa (one way)	# trips per day (one way)	# trips pa (one way)	# trips per day (one way)	# trips pa (one way)	# trips per day (one way)	# trips pa (one way)	# trips per day (one way)	# trips pa (one way)	# trips per day (one way)	# trips pa (one way)	# trips per day (one way)
Stage I - [Apr 2013 - Mar 2014] - Existing Site Operations - 12 months	18.00	0.05	557.00	1.53	2.00	0.01	687.00	1.88	0.00	0.00	557.00	1.53	16.00	0.09	0.00	0.00
Stage II - [Apr 2014 - Sep 2014] - Bridge, Road, Airport & Camp Construction and Quarry Development - 6 months	58.00	0.32	802.67	4.41	1857.00	10.20	1246.67	6.85	32.00	0.18	802.67	4.41	49.00	0.27	0.00	0.00
(note for 6 month period the trips pa value is actually for the 6 month period only for this Stage II)																
Stage III - [Oct 2014 - Sep 2016] - Bulk Earthworks & Fixed Infrastructure - 24 months	1864.00	2.59	1779.33	9.44	1195.50	1.64	2689.33	13.45	140.00	0.19	1779.33	9.44	742.00	2.03	0.00	0.00
Stage IV - [Apr 2015 - Mar 2016] - Level I Mining Plant & Equipment - 12 months	764.00	2.09	2920.00	8.00	279.00	0.76	4797.00	13.14	156.00	0.43	3308.00	9.06	0.00	0.00	52.00	0.14
Stage V - [Apr 2016 - Mar 2017] - Level II (Ultraclass) Mining Plant & Equipment - 12 months	1218.00	3.34	2920.00	8.00	173.00	0.47	4797.00	13.14	283.00	0.78	3561.00	9.76	0.00	0.00	52.00	0.14
Year 10, 2024 Mining Plant & Equipment - 12 months	3422.00	9.38	2920.00	8.00	252.00	0.69	5162.00	14.14	1194.00	3.27	5278.00	14.46	0.00	0.00	52.00	0.14

Project Logistics Breakdown

Item	Description	Suppliers	Source Locations	Transport Routes	Typical Transports	Access Road Usage: Frequency	Access Road Usage: Total Volume	Comments	From Townsville via GDR north: vehicle type	# trips pa (one way)	# trips per day (one way)	From Brisbane via Warrego Hwy, Carnarvon, GDR south: vehicle type	# trips pa (one way)	# trips per day (one way)	From Emerald via GDR south: vehicle type	# trips pa (one way)	# trips per day (one way)	From Mackay via Peak Downs, GDR south: vehicle type	# trips pa (one way)	# trips per day (one way)	From Moranbah via Peak Downs, GDR south: vehicle type	# trips pa (one way)	# trips per day (one way)	From Charters Towers via GDR north: vehicle type	# trips pa (one way)	# trips per day (one way)	From Clermont via GDR south: vehicle type	# trips pa (one way)	# trips per day (one way)	From Rockhampton via GDR south	# trips pa (one way)	# trips per day (one way)
Stage I - [Apr 2013 - Mar 2014] - Existing Site Operations - 12 months																																
General																																
1	Fuel	Shell	Townsville (Port)	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	25m B Double - CML - 50kL	1.5 / month	12 full loads, approx 900kL		25m B Double - CML - 50kL	18	0.05																				
2	Lubricants & Chemicals (DG)	Shell	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	See item 4 "Parts & Consumables" below	See item 4 "Parts & Consumables" below	See item 4 "Parts & Consumables" below	Consolidated with item 4 in Emerald (Toll/NQX)																						
3	Plant & Equipment	Various	Various	Generally via Emerald, Moranbah or Charters Towers	Std 2/3/4 Axle Rigid Trucks 6 Axle Semitrailer / Truck & Quad Dog 25m B Double Prime Mover & 4x4 Float	Varies - approx 3-4 units per drilling rig mobilised including the rig itself	Up to 48 units of all types								see	192	0.53				see	192	0.53	see	192	0.53						
4	Parts & Consumables	Various	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	6 Axle Semitrailer / Truck & Quad Dog	1 / fortnight	26 loads								6 Axle Semitrailer / Truck & Quad Dog	26	0.07														
		Various	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Intermittent	2 loads					B Double - 25m CML - approx 35t payload max	2	0.01																
5	Camp Catering	Cater Care	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Std 3 Axle Rigid Trucks	1 / week	52 loads								Std 3 Axle Rigid Trucks	52	0.14														
6	Potable Water	Belyando Produce	Clermont	Peak Downs Hwy - Gregory Developmental Road	25m B Double - CML - 50kL	As required	3 loads	Minimum should be required																				25m B Double - CML - 50kL	3	0.06			
7	Construction / Other Water	N/A	N/A	N/A	N/A	N/A	N/A	Using water already on site																								
8	Construction (Quarry) Materials	N/A	N/A	N/A	N/A	N/A	N/A	Using materials already on site																								
9	Concrete	Clermont Concrete	Clermont	Peak Downs Hwy - Gregory Developmental Road	Std 3 & 4 Axle Rigid Trucks	10 / year	75 cubic metres																				Std 3 & 4 Axle Rigid Trucks	10	0.03			
10	Cranes	Clermont Cranes	Clermont	Peak Downs Hwy - Gregory Developmental Road	20-25t Franna Crane	3 / year	3 movements																				20-25t Franna Crane	3	0.01			
11	Light Vehicles	Various	Various	Generally via Emerald, Moranbah or Charters Towers	Up to 4.5t GVM	3 / day	1095 visits								Up to 4.5t GVM	365	1				Up to 4.5t GVM	365	1	Up to 4.5t GVM	365	1						
12	Waste Disposal	JJ Richards	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Std 3 Axle Rigid Trucks	1 / week	52 loads								Std 3 Axle Rigid Trucks	52	0.14														
TOTALS										18	0.05		2	0.01		687	1.88		0	0.00		557	1.53		557	1.53		16	0.09		0	0.00
Stage II - [Apr 2014 - Sep 2014] - Bridge, Road, Airport & Camp Construction and Quarry Development - 6 months																																
General										# trips 6 months			# trips 6 months			# trips 6 months			# trips 6 months			# trips 6 months			# trips 6 months			# trips 6 months			
1	Fuel	Shell	Townsville (Port)	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	25m B Double - CML - 50kL	2 / week	52 full loads / 2.6mL		25m B Double - CML - 50kL	52	0.29																				
2	Lubricants & Chemicals (DG)	Shell	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	See item 4 "Parts & Consumables" below	See item 4 "Parts & Consumables" below	See item 4 "Parts & Consumables" below	Consolidated with item 4 in Emerald (Toll/NQX)																						
3	Plant & Equipment	Various	Various	Generally via Emerald, Moranbah or Charters Towers	Std 2/3/4 Axle Rigid Trucks	1 / day	180 loads	Support vehicles & deliveries							Std 2/3/4 Axle Rigid Trucks	60.7	0.33				Std 2/3/4 Axle Rigid Trucks	60.7	0.33	Std 2/3/4 Axle Rigid Trucks	60.7	0.33						
					6 Axle Semitrailer / Truck & Quad Dog	1 / week	26 loads								6 Axle Semitrailer / Truck & Quad Dog	8.7	0.05				6 Axle Semitrailer / Truck & Quad Dog	8.7	0.05	6 Axle Semitrailer / Truck & Quad Dog	8.7	0.05						
					25m B Double	1 / fortnight	13 loads								25m B Double	4.3	0.02				25m B Double	4.3	0.02	25m B Double	4.3	0.02						
					Type 1 Road Train - 36.5m CML	As required	3 loads								Type 1 Road Train - 36.5m CML	1.0	0.01				Type 1 Road Train - 36.5m CML	1.0	0.01	Type 1 Road Train - 36.5m CML	1.0	0.01						
					Prime Mover, 2x4 Dolly & 4x4 Float	As required	24 loads								Prime Mover, 2x4 Dolly & 4x4 Float	8.0	0.04				Prime Mover, 2x4 Dolly & 4x4 Float	8.0	0.04	Prime Mover, 2x4 Dolly & 4x4 Float	8.0	0.04						
		Various	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Intermittent	3 loads					B Double - 25m CML - approx 35t payload max	3	0.02																
4	Parts & Consumables	Various	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	B Double - 25m CML - approx 35t payload max	1 / week	**26 loads**								B Double - 25m CML - approx 35t payload max	26	0.14														
		Various	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Intermittent	6 loads					B Double - 25m CML - approx 35t payload max	6	0.03																
		Various	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Std 2 Axle Rigid Truck	1 / day	**182 loads**								Std 2 Axle Rigid Truck	182	1														
5	Camp Catering	Cater Care	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Std 3 Axle Rigid Trucks	2/ week	**52 loads**								Std 3 Axle Rigid Trucks	52	0.29														
6	Potable Water	Belyando Produce	Clermont	Peak Downs Hwy - Gregory Developmental Road	25m B Double - CML - 50kL	As required	5 loads																				25m B Double - CML - 50kL	5	0.03			
7	Construction/Other Water	N/A	N/A	N/A	N/A	N/A	N/A	Using water already on site																								
8	Construction (Quarry) Materials	Refer separate documentation																														
9	Concrete	Not Known	Clermont	Peak Downs Hwy - Gregory Developmental Road	B Double - 25m CML - approx 35t payload max	4 / 3 months	8 loads / 280t	Portabatch on site, raw materials only - based on 700 cubic metres of concrete																				B Double - 25m CML - approx 35t payload max	8	0.04			
					B Double - 25m CML - approx 35t payload max	6 / month	36 loads / 1260t																				B Double - 25m CML - approx 35t payload max	36	0.20			
10	Cranes	Not Known	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Up to 100t mobiles - 2x4 Dolly & 4x4 Float	As required	4 movements	Cranes will be available on site (i.e. minimal movements to/from site)							Up to 100t mobiles - 2x4 Dolly & 4x4 Float	4	0.02														
11	Light Vehicles	Various	Various	Generally via Emerald, Moranbah or Charters Towers	Up to 4.5t GVM	12 / day	2160 visits								Up to 4.5t GVM	720	3.96				Up to 4.5t GVM	720	3.96	Up to 4.5t GVM	720	3.96						
12	Waste Disposal	JJ Richards	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Std 3 Axle Rigid Trucks	1 / day	180 loads								Std 3 Axle Rigid Trucks	180	0.99														
Project Specific																																
A	Piling Equipment	Not Known	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover, 2x4 Dolly & 4x4 Float	2 only	4 loads	Oversize loads										Prime Mover, 2x4 Dolly & 4x4 Float	2	0.01												
B	Bridge Beams	Not Known	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	6 Axle Extendable Semitrailer	5 / month	30 loads / 60 beams	15m long extendable trailers										6 Axle Extendable Semitrailer	30	0.16												
C	Bridge Decking	Not Known	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	With item B "Bridge Beams" above	With item B "Bridge Beams" above	With item B "Bridge Beams" above											With item B "Bridge Beams" above														
D	Concrete Culverts & Pipes	Humes	Townsville	Ingham Road - Bruce Hwy - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	1 / month	6 loads / 30 culverts		B Double - 25m CML - approx 35t payload max	6	0.03																				
E	Accommodation Modules	ATCO	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	**Refer attached schedules for 500 man multiples to build required size**							Drop deck extendable trailers	1183	6.50																		
F	Other Modules (Mess, STP/WTP etc.)	ATCO	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd								Standard 12m Semi-Trailer	665	3.65																		
TOTALS										58	0.32		1857	10.20		1247	6.85		32	0.18		803	4.41		803	4.41		49	0.27		0	0.00
Stage III - [Oct 2014 - Sep 2016] - Bulk Earthworks & Fixed Infrastructure - 24 months																																
General																																
1	Fuel	Shell	Townsville (Port)	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m CML - 95kL	2 / 3 days	475 full loads / 45mL	***Additional to operations logistics requirements***	Type 2 Road Train - 53.5m CML - 95kL	303	0.41																				
2	Lubricants & Chemicals (DG)	Shell	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - 35kL/35t payload (av)	1 / month	24 loads / 840kL	***Additional to operations logistics requirements***	B Double - 25m CML - 35kL/35t payload (av)	24	0.07																				
3	Plant & Equipment			Generally via Emerald, Moranbah or Charters Towers	Std 2/3/4 Axle Rigid Trucks	1 / day	730 loads	Support vehicles & deliveries							Std 2/3/4 Axle Rigid Trucks	243	0.33				Std 2/3/4 Axle Rigid Trucks	243	0.33	Std 2/3/4 Axle Rigid Trucks	243	0.33						
					6 Axle Semitrailer / Truck & Quad Dog	Intermittent	48 loads								6 Axle Semitrailer / Truck & Quad Dog	16	0.02				6 Axle Semitrailer / Truck & Quad Dog	16	0.02	6 Axle Semitrailer / Truck & Quad Dog	16	0.02						
					25m B Double	Intermittent	24 loads								25m B Double	8	0.01				25m B Double	8	0.01	25m B Double	8	0.01						
					Type 1 Road Train - 36.5m CML	Intermittent	12 loads								Type 1 Road Train - 36.5m CML	4	0.01				Type 1 Road Train - 36.5m CML	4	0.01	Type 1 Road Train - 36.5m CML	4	0.01						
					Prime Mover, 4x4 Float Only	Intermittent	80 loads	*All oversize but under 3.5m*							Prime Mover, 4x4 Float Only	27	0.04				Prime Mover, 4x4 Float Only	27	0.04	Prime Mover, 4x4 Float Only	27	0.04						
					Prime Mover, 2x4 Dolly & 4x4 Float	Intermittent	36 loads	*All oversize but under 3.5m*							Prime Mover, 2x4 Dolly & 4x4 Float	12	0.02				Prime Mover, 2x4 Dolly & 4x4 Float	12	0.02	Prime Mover, 2x4 Dolly & 4x4 Float	12	0.02						
					Prime Mover, 2x8 Dolly & 4x8 Platform	Intermittent	40 loads	*All oversize but under 5.5m*							Prime Mover, 2x8 Dolly & 4x8 Platform	13	0.02				Prime Mover, 2x8 Dolly & 4x8 Platform	13	0.02	Prime Mover, 2x8 Dolly & 4x8 Platform	13	0.02						
4	Parts & Consumables	Various	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	6 Axle Semitrailer	1 / day	180 loads	***First 6 months only - then refer operations logistics***							6 Axle Semitrailer	180	1.00				6 Axle Semitrailer	180	1.00	6 Axle Semitrailer	180	1.00						
		Various	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Intermittent	24 loads	***Additional to operations logistics requirements***				B Double - 25m CML - approx 35t payload max	24	0.03																
5	Camp Catering	Cater Care	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	6 Axle Semitrailer	2 / day	360 loads	***First 6 months only - then refer operations logistics***							6 Axle Semitrailer	360	2														
6	Potable Water	N/A	N/A	N/A	N/A	N/A	N/A	Local water source																								
7	Construction/Other Water	N/A	N/A	N/A	N/A	N/A	N/A	Using water already on site																								
8	Construction (Quarry) Materials	Refer separate documentation																														
9	Concrete	Not Known	Clermont	Peak Downs Hwy - Gregory Developmental Road	B Double - 25m CML - approx 35t payload max	1 / 2 days	385 loads / 13455t																				B Double - 25m CML - approx 35t payload max	274	0.75			
						9 / week	937 loads / 62790t	Portabatch on site, raw materials only																				Type 2 Road Train - 53.5m CML - approx 67t payload max	468	1.28			
					Type 2 Road Train - 53.5m CML - approx 67t payload max																												
10	Cranes	Not Known	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Up to 350t mobile & 350t crawler cranes - 2x8 Dolly & 4x8 Platform	As required	6 movements	Cranes will be available on site (i.e. minimal movements to/from site)							Up to 350t mobile & 350t crawler cranes - 2x8 Dolly & 4x8 Platform	6	0.01														
11	Light Vehicles	Various	Various	Generally via Emerald, Moranbah or Charters Towers	Up to 4.5t GVM	24 / day	4320 visits	***First 6 months only - then refer operations logistics***							Up to 4.5t GVM	1456	8				Up to 4.5t GVM	1456	8	Up to 4.5t GVM	1456	8						
12	Waste Disposal	JJ Richards	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Std 3 Axle Rigid Trucks	2 / day	360 loads	***Recycling and hazardous waste only, other waste managed on site - first 6 months only - then refer operations logistics***							Std 3 Axle Rigid Trucks	364	2														
Project Specific																																
A	Equipment - e.g. Pumps, Motors, Gen Sets	Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	25m B Double	1 / 2 days	700 loads / 16800t																									
B	Structural & Reinforcing Steel - Posts & Beams etc.	Not Known	Townsville	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m	1 / day	600 loads / 12000t		Type 2 Road Train - 53.5m	730	3	25m B Double	547.5	0.75																	
C	Office Modules & Dongas etc.	Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	6 Axle Extendable Semitrailer	1 / month	24 modules					6 Axle Extendable Semitrailer	24	0.03																		
D	Containerised Cargo	Not Known	Townsville	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m	1 / 2 days	700 loads / 25200t		Type 2 Road Train - 53.5m	547.5	0.75																				
E	Fixed Plant Modules	Not Known	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	25m B Double / Drop Deck / 4x4 Float / 4x8 Float	2 / week	200 loads / 4000t											25m B Double / Drop Deck / 4x4 Float / 4x8 Float	104	0.14												
F	Electrical Cable	Not Known	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	25m B Double	1 / 2 months	12 loads / 400t											25m B Double	36	0.05												
G	Power Poles	Not Known	Townsville	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	6 Axle Extendable Semitrailer	5 / 2 weeks	260 loads / 4630t	20m long extendable trailers	6 Axle Extendable Semitrailer	260	0.36																				
H	Pipework	Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	25m B Double	2 / 3 days	500 loads / 12000t					25m B Double	600	0.82																		
TOTALS										1864	2.59		1196	1.64		2689	13.45		140	0.19		1779	9.44		1779	9.44		742	2.03		0	0.00
Stage IV - [Apr 2015 - Mar 2016] - Level I Mining Plant & Equipment - 12 months																																

General																																
1	Fuel	Shell	Townsville (Port)	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m CML - 95kL payload	55184kL	581		Type 2 Road Train - 53.5m CML - 95kL payload	581	1.59																					
2	ANFO	Dyno	Moranbah	Goonyella Road - Peak Downs Hwy - Gregory Developmental Road	AB Triple - 36.5m CML - 67t payload	25979t	388														AB Triple - 36.5m CML - 67t payload	388	1.06									
3	Plant & Equipment -	Hastings Deering	Mackay	Caterpillar Dr - Farrellys Rd - Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52											B Double - 25m CML - approx 35t payload max	52	0.14												
	Components & Parts	Hitachi	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	B Double - 25m CML - approx 35t payload max	Weekly	52								B Double - 25m CML - approx 35t payload max	52	0.14															
		Liebherr	Mackay	Southgate Dr - Farrellys Rd - Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52											B Double - 25m CML - approx 35t payload max	52	0.14												
4	Tyres	Bridgestone	Townsville	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m CML - approx 67t payload max	240	27		Type 2 Road Train - 53.5m CML - approx 67t payload max	27	0.07																					
5	General Consumables	Various	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Type 1 Road Train - 36.5m CML - approx 45t payload max	Daily	365								Type 1 Road Train - 36.5m CML - approx 45t payload max	365	1															
			Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52											B Double - 25m CML - approx 35t payload max	52	0.14												
			Rockhampton	Bruce Hwy - Capricorn Hwy - Gregory Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52																							B Double - 25m CML - approx 35t payload max	52	0.14
			Townsville	Bruce Hwy - Flinders Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52		B Double - 25m CML - approx 35t payload max	52	0.14																					
6	Construction Materials	Various	Brisbane Owned or Council Pits	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52	See Quarry assessment information				B Double - 25m CML - approx 35t payload max	52	0.14																		
7	Magnetite	Martin & Robson	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	0	0											B Double - 25m CML - approx 35t payload max	0	0												
8	Machine Fluids	Shell	Brisbane	Eagle Farm Rd - Kingsford Smith Dr - Gateway Mwy - Logan Mwy - Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - 35kL/35t payload (av)	792kL	23					B Double - 25m CML - 35kL/35t payload (av)	23	0.06																		
9	Camp Catering	Cater Care	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	6 Axle Semitrailer	2 / Day	730								6 Axle Semitrailer	730	2															
10	Light Vehicles	Various	Various	Generally via Emerald, Moranbah or Charters Towers	Up to 4.5t GVM	24 / Day	8760								Up to 4.5t GVM	2920	8				Up to 4.5t GVM	2920	8	Up to 4.5t GVM	2920	8						
11	Aviation Fuel	Shell	Townsville (Port)	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m CML - 95kL payload	1 / Week	52		Type 2 Road Train - 53.5m CML - 95kL payload	52	0.14																					
12	Waste Disposal	JJ Richards	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Std 3 Axle Rigid Trucks	2 / Day	730								Std 3 Axle Rigid Trucks	730	2															
Project Specific																																
A	Mining Equipment - 240t Truck Payload Class	Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover, 2x4 Dolly & 4x4 Float	Intermittent	59 loads	Refer attached schedules				Prime Mover, 2x4 Dolly & 4x4 Float	59	0.16																		
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover, 2x8 Dolly & 4x8 Platform	Intermittent	14 loads	Refer attached schedules				Prime Mover, 2x8 Dolly & 4x8 Platform	14	0.04																		
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover & 7x8 Platform	Intermittent	12 loads	Refer attached schedules				Prime Mover & 7x8 Platform	12	0.03																		
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover & 8x8 Platform	Intermittent	30 loads	Refer attached schedules				Prime Mover & 8x8 Platform	30	0.08																		
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover & 10x8 Platform	Intermittent	36 loads	Refer attached schedules				Prime Mover & 10x8 Platform	36	0.10																		
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Standard Flat Top or Drop Deck	Intermittent	17 loads	Refer attached schedules				Standard Flat Top or Drop Deck	17	0.05																		
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Overwidth Flat Top or Drop Deck	Intermittent	36 loads	Refer attached schedules				Overwidth Flat Top or Drop Deck	36	0.10																		
		Not Known	Townsville	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Overwidth Flat Top or Drop Deck	Intermittent	52 loads	Refer attached schedules	Overwidth Flat Top or Drop Deck	52	0.14																					
TOTALS										764	2.09		279	0.76		4797	13.14		156	0.43		3308	9.06		2920	8.00		0	0.00		52	0.14
Stage V - [Apr 2016 - Mar 2017] - Level II (Ultraclass) Mining Plant & Equipment - 12 months																																
General																																
1	Fuel	Shell	Townsville (Port)	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m CML - 95kL payload	95585kL	1006		Type 2 Road Train - 53.5m CML - 95kL payload	1006	2.76																					
2	ANFO	Dyno	Moranbah	Goonyella Road - Peak Downs Hwy - Gregory Developmental Road	AB Triple - 36.5m CML - 67t payload	42937t	641														AB Triple - 36.5m CML - 67t payload	641	1.76									
3	Plant & Equipment -	Hastings Deering	Mackay	Caterpillar Dr - Farrellys Rd - Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52											B Double - 25m CML - approx 35t payload max	52	0.14												
	Components & Parts	Hitachi	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	B Double - 25m CML - approx 35t payload max	Weekly	52								B Double - 25m CML - approx 35t payload max	52	0.14															
		Liebherr	Mackay	Southgate Dr - Farrellys Rd - Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52											B Double - 25m CML - approx 35t payload max	52	0.14												
4	Tyres	Bridgestone	Townsville	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m CML - approx 67t payload max	416	46		Type 2 Road Train - 53.5m CML - approx 67t payload max	46	0.13																					
5	General Consumables	Various	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Type 1 Road Train - 36.5m CML - approx 45t payload max	Daily	365								Type 1 Road Train - 36.5m CML - approx 45t payload max	365	1															
			Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52											B Double - 25m CML - approx 35t payload max	52	0.14												
			Rockhampton	Bruce Hwy - Capricorn Hwy - Gregory Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52																							B Double - 25m CML - approx 35t payload max	52	0.14
			Townsville	Bruce Hwy - Flinders Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52		B Double - 25m CML - approx 35t payload max	52	0.14																					
6	Construction Materials	Various	Brisbane Owned or Council Pits	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52					B Double - 25m CML - approx 35t payload max	52	0.14																		
7	Magnetite	Martin & Robson	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	2750t	79											B Double - 25m CML - approx 35t payload max	79	0.22												
8	Machine Fluids	Shell	Brisbane	Eagle Farm Rd - Kingsford Smith Dr - Gateway Mwy - Logan Mwy - Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - 35kL/35t payload (av)	1290kL	37					B Double - 25m CML - 35kL/35t payload (av)	37	0.10																		
9	Camp Catering	Cater Care	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	6 Axle Semitrailer	2 / Day	730								6 Axle Semitrailer	730	2															
10	Light Vehicles	Various	Various	Generally via Emerald, Moranbah or Charters Towers	Up to 4.5t GVM	24 / Day	8760								Up to 4.5t GVM	2920	8				Up to 4.5t GVM	2920	8	Up to 4.5t GVM	2920	8						
11	Aviation Fuel	Shell	Townsville (Port)	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m CML - 95kL payload	1 / Week	52		Type 2 Road Train - 53.5m CML - 95kL payload	52	0.14																					
12	Waste Disposal	JJ Richards	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Std 3 Axle Rigid Trucks	2 / Day	730								Std 3 Axle Rigid Trucks	730	2															
Project Specific																																
A	Mining Equipment - 360t Truck Payload Class	Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover, 2x4 Dolly & 4x4 Float	Intermittent	19 loads	Refer attached schedules				Prime Mover, 2x4 Dolly & 4x4 Float	19	0.05																		
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover, 2x8 Dolly & 4x8 Platform	Intermittent	6 loads	Refer attached schedules				Prime Mover, 2x8 Dolly & 4x8 Platform	6	0.02																		
		Not Known	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover & 6x8 Platform	Intermittent	16 loads	Refer attached schedules										Prime Mover & 6x8 Platform	16	0.04												
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover & 7x8 Platform	Intermittent	3 loads	Refer attached schedules				Prime Mover & 7x8 Platform	3	0.01																		
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover & 8x8 Platform	Intermittent	8 loads	Refer attached schedules				Prime Mover & 8x8 Platform	8	0.02																		
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover & 10x8 Platform	Intermittent	20 loads	Refer attached schedules				Prime Mover & 10x8 Platform	20	0.05																		
		Not Known	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	2 Prime Movers & 16x8 Platform	Intermittent	16 loads	Refer attached schedules										2 Prime Movers & 16x8 Platform	16	0.04												
		Not Known	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	25m B Double	Intermittent	16 loads	Refer attached schedules										25m B Double	16	0.04												
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Standard Flat Top or Drop Deck	Intermittent	6 loads	Refer attached schedules				Standard Flat Top or Drop Deck	6	0.02																		
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Overwidth Flat Top or Drop Deck	Intermittent	22 loads	Refer attached schedules				Overwidth Flat Top or Drop Deck	22	0.06																		
		Not Known	Townsville	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Overwidth Flat Top or Drop Deck	Intermittent	62 loads	Refer attached schedules	Overwidth Flat Top or Drop Deck	62	0.17																					
TOTALS										1218	3.34		173	0.47		4797	13.14		283	0.78		3561	9.76		2920	8.00		0	0.00		52	0.14
MINING PLANT & EQUIPMENT DELIVERIES BEYOND YEAR 2 (2017) / STAGE V ABOVE WILL BE ANNUALLY EQUIVALENT TO LIST IMMEDIATELY ABOVE EVERY YEAR FOR LOGISTICS PURPOSES																																

Year 10, 2024 Mining Plant & Equipment - 12 months

General

1	Fuel	Shell	Townsville (Port)	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m CML - 95kL payload	2903244L	3056		Type 2 Road Train - 53.5m CML - 95kL payload	3056	8.37																									
2	ANFO	Dyno	Moranbah	Goonyella Road - Peak Downs Hwy - Gregory Developmental Road	AB Triple - 36.5m CML - 67t payload	158001	2358															AB Triple - 36.5m CML - 67t payload	2358	6.46												
3	Plant & Equipment -	Hastings Deering	Mackay	Caterpillar Dr - Farrellys Rd - Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	3 / Week	156												B Double - 25m CML - approx 35t payload max	156	0.43														
	Components & Parts	Hitachi	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	B Double - 25m CML - approx 35t payload max	Weekly	52									B Double - 25m CML - approx 35t payload max	52	0.14																		
		Liebherr	Mackay	Southgate Dr - Farrellys Rd - Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52												B Double - 25m CML - approx 35t payload max	52	0.14														
4	Tyres	Bridgestone	Townsville	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m CML - approx 67t payload max	1334	148		Type 2 Road Train - 53.5m CML - approx 67t payload max	148	0.41																										
5	General Consumables	Various	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Type 1 Road Train - 36.5m CML - approx 45t payload max	2 / Day	730									Type 1 Road Train - 36.5m CML - approx 45t payload max	730	2																		
			Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52												B Double - 25m CML - approx 35t payload max	52	0.14														
			Rockhampton	Bruce Hwy - Capricorn Hwy - Gregory Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52																											B Double - 25m CML - approx 35t payload max	52	0.14
			Townsville	Bruce Hwy - Flinders Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52									B Double - 25m CML - approx 35t payload max	52	0.14																		
			Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52							B Double - 25m CML - approx 35t payload max	52	0.14																				
6	Construction Materials	Various	Owned or Council Pits																																	
7	Magnetite	Martin & Robson	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	31000t	886												B Double - 25m CML - approx 35t payload max	886	2.43														
8	Machine Fluids	Shell	Brisbane	Eagle Farm Rd - Kingsford Smith Dr - Gateway Mwy - Logan Mwy - Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - 35kL/35t payload (av)	4045kL	116					B Double - 25m CML - 35kL/35t payload (av)	116	0.32																						
9	Camp Catering	Cater Care	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	6 Axle Semitrailer	2 / Day	730									6 Axle Semitrailer	730	2																		
10	Light Vehicles	Various	Various	Generally via Emerald, Moranbah or Charters Towers	Up to 4.5t GVM	24 / Day	8760									Up to 4.5t GVM	2920	8			Up to 4.5t GVM	2920	8	Up to 4.5t GVM	2920	8										
11	Aviation Fuel	Shell	Townsville (Port)	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m CML - 95kL payload	2 / Week	104		Type 2 Road Train - 53.5m CML - 95kL payload	104	0.28																										
12	Waste Disposal	JJ Richards	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Std 3 Axle Rigid Trucks	2 / Day	730									Std 3 Axle Rigid Trucks	730	2																		

Project Specific

A	Mining Equipment - 360t Truck Payload Class	Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover, 2x4 Dolly & 4x4 Float	Intermittent	19 loads	Refer attached schedules				Prime Mover, 2x4 Dolly & 4x4 Float	19	0.05																						
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover, 2x8 Dolly & 4x8 Platform	Intermittent	6 loads	Refer attached schedules				Prime Mover, 2x8 Dolly & 4x8 Platform	6	0.02																						
		Not Known	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover & 6x8 Platform	Intermittent	16 loads	Refer attached schedules											Prime Mover & 6x8 Platform	16	0.04																
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover & 7x8 Platform	Intermittent	3 loads	Refer attached schedules				Prime Mover & 7x8 Platform	3	0.01																						
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover & 8x8 Platform	Intermittent	8 loads	Refer attached schedules				Prime Mover & 8x8 Platform	8	0.02																						
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Prime Mover & 10x8 Platform	Intermittent	20 loads	Refer attached schedules				Prime Mover & 10x8 Platform	20	0.05																						
		Not Known	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	2 Prime Movers & 16x8 Platform	Intermittent	16 loads	Refer attached schedules											2 Prime Movers & 16x8 Platform	16	0.04																
		Not Known	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	25m B Double	Intermittent	16 loads	Refer attached schedules											25m B Double	16	0.04																
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Standard Flat Top or Drop Deck	Intermittent	6 loads	Refer attached schedules				Standard Flat Top or Drop Deck	6	0.02																						
		Not Known	Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	Overwidth Flat Top or Drop Deck	Intermittent	22 loads	Refer attached schedules				Overwidth Flat Top or Drop Deck	22	0.06																						
		Not Known	Townsville	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Overwidth Flat Top or Drop Deck	Intermittent	62 loads	Refer attached schedules	Overwidth Flat Top or Drop Deck	62	0.17																										
TOTALS										3422	9.38		252	0.69		5162	14.14		1194	3.27		5278	14.46		2920	8.00		0	0.00		52	0.14			

Operations Logistics
2015 and 2024

Frequency

Item	Description	Suppliers	Source Locations	Transport Routes	Typical Transports	Year 1	2015	Year 2	2016	Year 3	2017	Year 4	2018	Year 5	2019	Year 6	2020	Year 7	2021	Year 8	2022	Year 9	2023	Year 10	2024	Comments
						Qty/Freq	Ann Lds	Qty/Freq	Ann Lds	Qty/Freq	Ann Lds	Qty/Freq	Ann Lds	Qty/Freq	Ann Lds	Qty/Freq	Ann Lds	Qty/Freq	Ann Lds	Qty/Freq	Ann Lds	Qty/Freq	Ann Lds	Qty/Freq	Ann Lds	
1	Fuel	Shell	Townsville (Port)	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m CML - 95kL payload	55184kL	581	95585kL	1006	132065kL	1390	154389kL	1625	187649kL	1975	209414kL	2204	249195kL	2623	269862kL	2841	273055kL	2874	290324kL	3056	
2	ANFO	Dyno	Moranbah	Goonyella Road - Peak Downs Hwy - Gregory Developmental Road	AB Triple - 36.5m CML - 67t payload	25979t	388	42937t	641	59983t	895	73731t	1100	87177t	1301	101815t	1520	119484t	1783	137654t	2055	140353t	2095	158001	2358	
3	Plant & Equipment -	Hastings Deering	Mackay	Caterpillar Dr - Farrellys Rd - Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	2 / Week	104	2 / Week	104	2 / Week	104	2 / Week	104	3 / Week	156	
	Components & Parts	Hitachi	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	B Double - 25m CML - approx 35t payload max	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	
		Liebherr	Mackay	Southgate Dr - Farrellys Rd - Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	
4	Tyres	Bridgestone	Townsville	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m CML - approx 67t payload max	240	27	416	46	591	66	712	79	844	94	961	107	1130	126	1230	137	1254	139	1334	148	
5	General Consumables	Various	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Type 1 Road Train - 36.5m CML - approx 45t payload max	Daily	365	Daily	365	Daily	365	Daily	365	Daily	365	Daily	365	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	
			Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	
			Rockhampton	Bruce Hwy - Capricorn Hwy - Gregory Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	
			Townsville	Bruce Hwy - Flinders Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	
			Brisbane	Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	Weekly	52	
6	Construction Materials	Various	Owned or Council Pits																							Refer separate documentation
7	Magnetite	Martin & Robson	Mackay	Bruce Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - approx 35t payload max	0	0	2750t	79	11000t	314	15000t	429	19000t	543	23000t	657	27000t	771	29000t	829	31000t	886	31000t	886	
8	Machine Fluids	Shell	Brisbane	Eagle Farm Rd - Kingsford Smith Dr - Gateway Mwy - Logan Mwy - Ipswich Mwy - Warrego Hwy - Carnarvon Hwy - Dawson Hwy - Gregory Hwy - Peak Downs Hwy - Gregory Developmental Rd	B Double - 25m CML - 35kL/35t payload (av)	792kL	23	1290kL	37	1898kL	54	2211kL	63	2618kL	75	2992kL	85	3460kL	99	3750kL	107	3846kL	110	4045kL	116	
9	Camp Catering	Cater Care	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	6 Axle Semitrailer	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	
10	Light Vehicles	Various	Various	Generally via Emerald, Moranbah or Charters Towers	Up to 4.5t GVM	24 / Day	8760	24 / Day	8760	24 / Day	8760	24 / Day	8760	24 / Day	8760	24 / Day	8760	24 / Day	8760	24 / Day	8760	24 / Day	8760	24 / Day	8760	
11	Aviation Fuel	Shell	Townsville (Port)	Southern Port Rd - Stuart Bypass - Flinders Hwy - Gregory Developmental Rd	Type 2 Road Train - 53.5m CML - 95kL payload	1 / Week	52	1 / Week	52	1 / Week	52	1 / Week	52	1 / Week	52	2 / Week	104	2 / Week	104	2 / Week	104	2 / Week	104	2 / Week	104	
12	Waste Disposal	JJ Richards	Emerald	Gregory Hwy - Peak Downs Hwy - Gregory Developmental Road	Std 3 Axle Rigid Trucks	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	2 / Day	730	Hazardous goods only, other waste disposed of near site

Total loads pa	12020	12810	13720	14297	14989	15678	16872	17439	17574	18086
Year on year growth rate		6.6	7.1	4.2	4.8	4.6	7.6	3.4	0.8	2.9 year on year growth rate (%pa)
										50.5 10 years growth rate (%)

Rail Logistics - Construction

Note that there is anticipated to be no impacts on the local or state controlled network by the rail project during the operations (production) phase of the project.
All of the anticipated impacts arising from the rail element of the project are expected to occur during the construction phase.

The sleepers will come into Townsville using B doubles with smaller payload or alternatively use of either triple road train or a road train with increased payload.
The rail from Mackay will be extendable trailers complete with an escort vehicle to handle the 25m rails.

The bulk haul earthworks may use special haul trucks with a capacity of 315 – 350t and these would utilise the rail haul road alongside the SP1 and SP2.

363 days per year
30.25 days per month (average)

Mackay trips via Peak Downs (per month)

Mackay to GDR road link

Mackay trips via Peak Downs (per day)

Mackay to GDR road link (total two way vol)

Mackay trips via Peak Downs (per day) AVERAGE USED

Mackay to GDR road link (total two way vol)

	Track						Bridge									
	Sleeper	Rail : Option 1 (25 m rail)	Ballast	Girders SP1	Girders SP2	Girders SP3	Girders Total	Culverts SP1	Culverts SP2	Culverts SP3	Culverts Total				Batching Plants SP1	Batching Plants SP2
From	Townsville	Mackay	Borrow 7	Mackay	Mackay	Mackay	Mackay	Mackay	Mackay	Mackay	Mackay				Clermont	Clermont
To	Construction depot	Construction depot		Bridge Site	Bridge Site	Bridge Site	Bridge Site	Drainage Site	Drainage Site	Drainage Site	Drainage Site				Batching Plants	Batching Plants
Road	via GDR, Charters Towers	via Moranbah, Peak Downs Hwy	Within corridor through access road	GDR	GDR	GDR	via Moranbah, Peak Downs Hwy	GDR	GDR	GDR	via Moranbah, Peak Downs Hwy				GDR	GDR
	via GDR Laydown Area near Rail	via GDR Laydown Area near Rail					via GDR Laydown Area near Rail				via GDR Laydown Area near Rail					
truck type	Bdouble	Extendable Trailers					Bdouble				Bdouble					
Month 1												**0**	**0**			
Month 2												**0**	**0**			
Month 3												**0**	**0**			
Month 4								86			**86**	**86**	**3**		25	
Month 5								86			**86**	**86**	**3**		25	
Month 6								86			**86**	**86**	**3**		25	
Month 7								86	18		**103**	**103**	**3**		25	16
Month 8				8			**8**	86	18		**103**	**111**	**4**	4	25	16
Month 9			750					86	18		**103**	**103**	**3**		25	16
Month 10			1750	48	8		**56**	86	18		**103**	**159**	**5**		25	16
Month 11			1750					86	18		**103**	**103**	**3**		25	16
Month 12	364	320	1750	12	16		**28**	86	18		**103**	**451**	**15**		25	16
Month 13	364	320	1750	8	8		**16**	86	18		**103**	**439**	**15**		25	16
Month 14	364	320	1750			0		86	18	0	**103**	**423**	**14**		25	16
Month 15	364	320	1750	12	20		**32**	86	18	0	**103**	**455**	**15**		25	16
Month 16	364	320	1750	36		0	**36**	86	18	0	**103**	**459**	**15**		25	16
Month 17	364	320	1750					86	18	0	**103**	**423**	**14**	8	25	16
Month 18	364	160	1750	8	12		**20**	86	18	0	**103**	**283**	**9**		25	16
Month 19				36	8		**44**	86	18	0	**103**	**147**	**5**		25	16
Month 20								86	18	0	**103**	**103**	**3**		25	16
Month 21						0				0	**0**	**0**	**0**			8
Month 22										0	**0**	**0**	**0**			8
Month 23						0				0	**0**	**0**	**0**			8
Month 24										0	**0**	**0**	**0**			8
Month 25										0	**0**	**0**	**0**			8
Month 26										0	**0**	**0**	**0**			8
Month 27										0	**0**	**0**	**0**			8

Note: 1. Figures quoted are for return trips. Above numbers need to be doubled to arrive at one way trips.

Note: 2. Figures quoted above are in relation to the handling of materials only and exclude truck movements required for construction activities or that originating from construction camps.

Note 3: Time shown in months is from the start of the project.

Note 4: Port assumed for importation of goods is Mackay. However, this may be changed to Townsville if considered a preferred port.

Assumptions:

Girders
One 20 m girder per truck from Mackay with no pilot.
Girders will be stockpiled at Mackay Port until specific bridge site is ready for delivery.
Girders will be transported directly to each specific bridge site in the month prior to the proposed bridge completion.
Numbers for SP3 taken from Alpha bridge details.

Culverts
Maximum number of culverts per truck = 18 (9 on main tray and 9 on additional trailer).
Culverts will be delivered directly to each specific drainage structure point.
Total of SP3 culverts based on pro rata of SP1 culverts.

Concrete
Batching rate of 500 cubic metres per batching plant per day
SP1 – 3 batching plants, SP2 – 2 batching plants, SP3 – 2 batching plants
Concrete mix of 450 metres cubed of material (sand, agg and cement) to achieve 500 metres cubed of concrete
Truck capacity of 20 cubic metres or 50 tonne.

Sleeper and Rail

Trailer type		Sleepers/ trip	25mRails / trip		20mRails / trip
B Double Trailers	110 sleepers/ trailer	116 (110)	-		
Extendible trailer	10 rails of 25m lemgth/ trailer	77 (75)		10	16.67

Truck Requirements for various construction materials (Two way/ Return trips)

		Clermont trips via GDR to Peak Downs Hwy per day (total two way volume) concrete trucks	Clermont trips (AVERAGE USED) via GDR to Peak Downs Hwy per day (total two way volume) concrete trucks	TOTAL GDR road link from Peak Downs / GDR to Laydown (B Doubles, extendable trailers and concrete Trucks) (total two way vol)	TOTAL (AVERAGE USED) GDR road link from Peak Downs / GDR to Laydown (B Doubles, extendable trailers and concrete Trucks) (total two way vol)	TOTAL from Townsville via Charters Towers and GDR B Doubles per day (total two way vol)	TOTAL (AVERAGE USED) from Townsville via Charters Towers and GDR B Doubles per day (total two way vol)				
Batching Plants SP3	Batching Plants Total							Earthwork	Others	Bulkfill SP1*	Bulkfill SP1*
Clermont	Clermont									Borrow 7	Borrow 7
Batching Plants	Batching Plants										
GDR	GDR									Within corridor through access road	Within corridor through access road
	via GDR Laydown Area near Rail										
	Concrete Truck										
		0		0		0				769	769
		0		0		0				769	769
		0		0		0				769	769
	25	1		4		0				769	769
	25	1		4		0				769	769
	25	1		4		0				769	769
	42	1		5		0				769	769
	42	1	1	5	4	0	1			769	769
	42	1		5		0				769	769
	42	1		7		0				769	769
	42	1		5		0				769	769
	42	1		16		12				769	769
	42	1		16		12					
0	42	1		15		12					
0	42	1		16		12					
0	42	1		17		12					
0	42	1	1	15	9	12	6				
0	42	1		11		12					
0	42	1		6		0					
0	42	1		5		0					
0	8	0		0		0					
0	8	0		0		0					
0	8	0		0		0					
0	8	0		0		0					
0	8	0		0		0					
0	8	0		0		0					
0	8	0		0		0					

* assumes triple

Earthwork				
Bulkfill SP1*	Bulkfill Sp2*	Capping Sp1*	Capping SP2*	
Borrow 7	Borrow 7	Borrow 7	Borrow 7	
Within corridor through access road	**Within corridor through access road**	**Within corridor through access road**	**Within corridor through access road**	Total
769		2183		4490
769		2183		4490
769		2183		4490
769		2183		4805
769		2183		4805
769		2183		4805
769	371	2183		5264
769	371	2183		5299
769	371	2183	633	6647
769	371	2183	633	7819
769	371	2183	633	7647
769	371	2183	633	8770
	371	2183	633	6426
	371	2183	633	6377
	371	2183	633	6476
	371		633	4305
	371		633	4217
	371		633	3925
	371		633	1542
			633	1036
			633	650
				17
				17
				17
				17
				17
				17
road train (75 tonnes) - requires special permit from main roads				104390

Adani Carmichael Coal
Transport Assessment
Traffic Design and Capacity Standards
The traffic assessment will be based on an assessment against these respective standards

DTMR Roads Planning and Design Manual (RPDM), Chapter 13

13.5.4 Unsignalised Minor Road Intersections

At intersections carrying light crossing and turning volumes, the capacity figures for uninterrupted flow generally apply for the approach roads.

Table 13.4 indicates the maximum traffic volume combinations for uninterrupted flow conditions. It is unnecessary to flare intersection approaches or carry out an intersection analysis when the combinations of major road and minor road volumes are less than those in the table.

However, separate lanes for left or right-turning vehicles may be added to the major road for safety reasons (see Section 13.7). For more detailed information refer to Austroads (1988a) 'GTEP Part 2 - Roadway Capacity'.

Table 13.4 Intersection Capacity – Uninterrupted Flow Conditions

Major Road Types[1]	Major Road Flow (vph)[2]	Minor Road Flow (vph)[3]
Two-Lane	400	250
	500	200
	650	100
Four-Lane	1000	100
	1500	50
	2000	25

Notes
1. Major road is through road i.e. has priority
2. Major road design volumes include through and turning movements
3. Minor road design volumes include through and turning volumes

EIS transport assessment parameters

Table 2-1 Level of Service for Rural Roads

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

Source: *AUSTROADS (1988) Guide to Traffic Engineering Practice Part 2: Roadway Capacity*

Table 2-2 Performance Criteria (GARID) – Assessment

Performance Measure	Criteria Adopted
Level of Service	LOS C can be considered the minimum standard in a rural context, although LOS D may be considered satisfactory where weekend peaks are the defining event and occur on recreational occasions. LOS E should be considered the limit of acceptable urban area operation and remedial works would be needed if LOS F would otherwise result.
Per cent increase in daily traffic on the state-controlled road network	An increase within five per cent is generally considered acceptable
Per cent increase in pavements loadings (equivalent standard axles)	An increase within five per cent is generally considered acceptable

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

In cases where traffic, terrain or geometric data may not be precisely known, the AUSTROADS Guide (1988) provides planning guidance on maximum Annual Average Daily Traffic (AADT) (represented as number of vehicles) values that two-lane, two-way rural roads can accommodate under various terrain conditions. Table 2-3 shows the performance range values for a two-lane two-way rural road with level terrain under varying peak hour volume to AADT ratios.

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

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

Source: *AUSTROADS (1988) Guide to Traffic Engineering Practice, Part 2: Roadway Capacity*, Table 3.9, from TRB Highway Capacity Manual (1985) Table 8.10.

For a LOS C, the maximum AADT values range from 5,300 to 7,900 depending on the peak hour design hour volume to AADT ratio. The above performance value ranges will be used to evaluate network performance deficiencies associated with construction vehicle access to the Project (Rail) corridor.

2.5 Assumptions and Limitations

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

- The availability of traffic flow data for roads surrounding the Project (Rail) corridor, as traffic data is not routinely collected for all local roads within the Study Area
- The availability of crash data for roads surrounding the Project (Rail) corridor, as crash data is not routinely collected for all local roads within the Study Area.

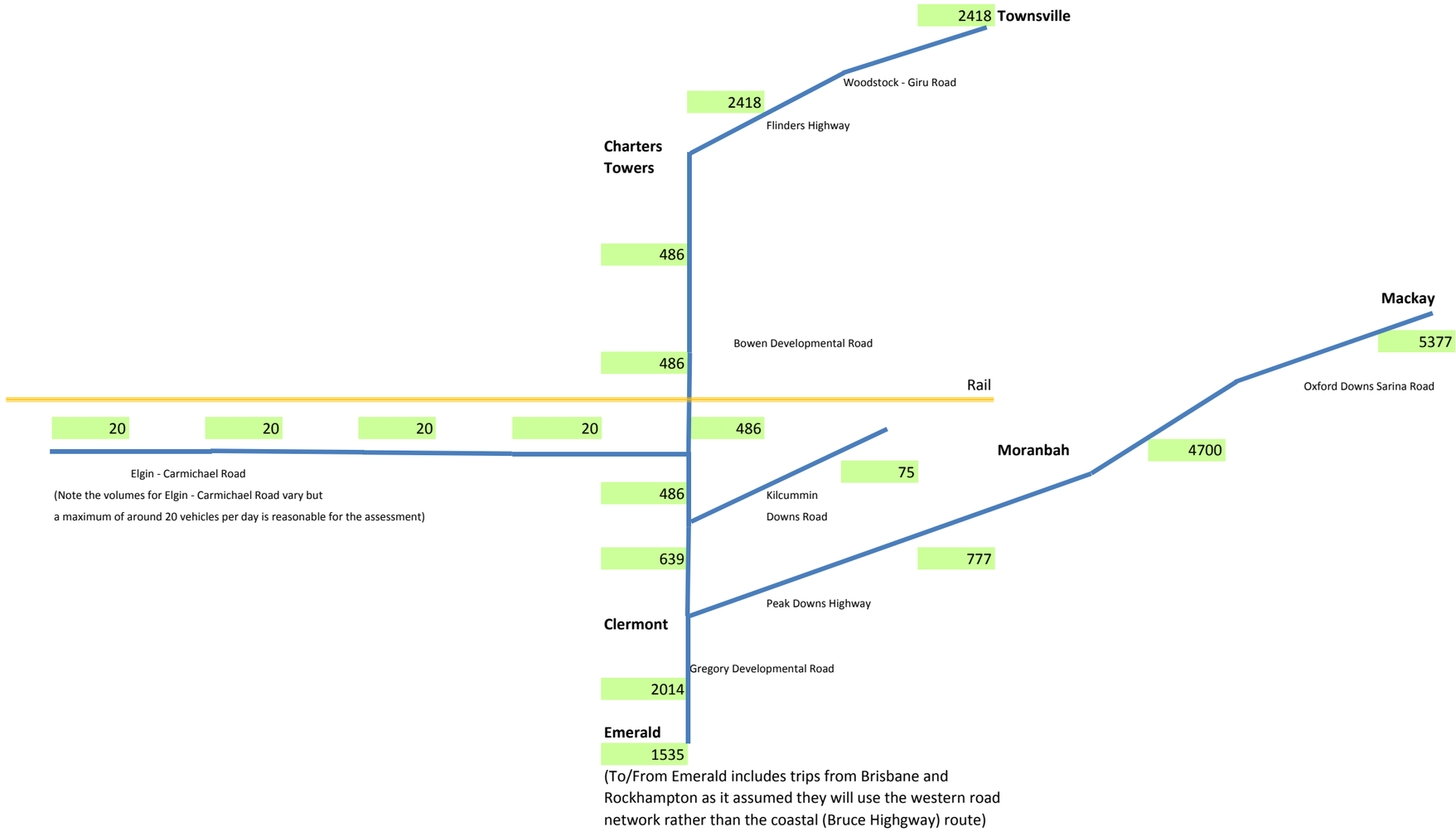
Naming conventions for roads within the Project (Rail) Study Area are not consistent between datasets. Further, local roads are often unnamed or have a local name not presented in datasets. While care has been taken to maintain consistency and use of specific names it is likely that some discrepancies may occur.

Base Network Volumes
Without development

2013

volumes are total two-way daily volumes

The volumes below are from DTMR or other reports or sources such as the Isaac Regional Council.
For DTMR based data the volumes have been growthed from 2012 to 2013 based on the traffic growth rate (10 y average).



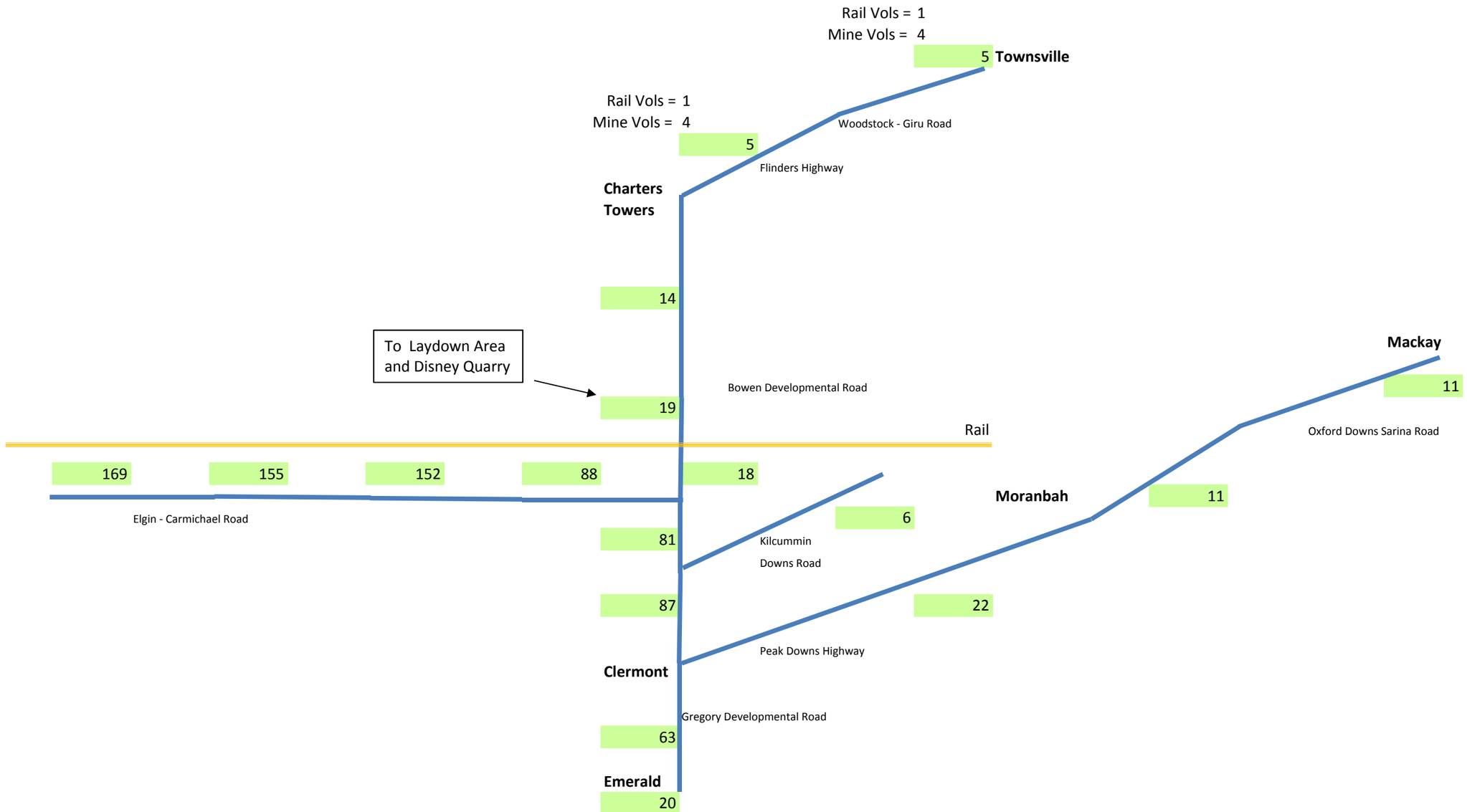
(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

not compounded - linear to be conservative and to balance 7% pa growth rate
0.07

	base 2013	base 2015	capacity	v/c	worst vol 2015	worst v/c 2015	base 2024	worst vol 2024	v/c	with dev
gregory developmental road	486	554	8000	0.069	147	0.088	903	85	0.113	0.124
moray - carmichael road	20	23	8000	0.003	260	0.035	37	152	0.005	0.024
kilcummin diamond downs road	75	86	8000	0.011	6	0.011	140	0	0.018	0.018
peak downs highway	777	886	8000	0.111	55	0.118	1443	35	0.180	0.185

Network Volumes
Total estimated development volumes
2014
volumes are total two-way daily volumes

The 2014 scenario is the sum of various datasheets:
- Stage II 2014 mine development
- Airport phase I
- Quarries
- Camps
- Rail construction 2014



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes

Estimated % of 2014 development traffic of base 2014 volumes

2014

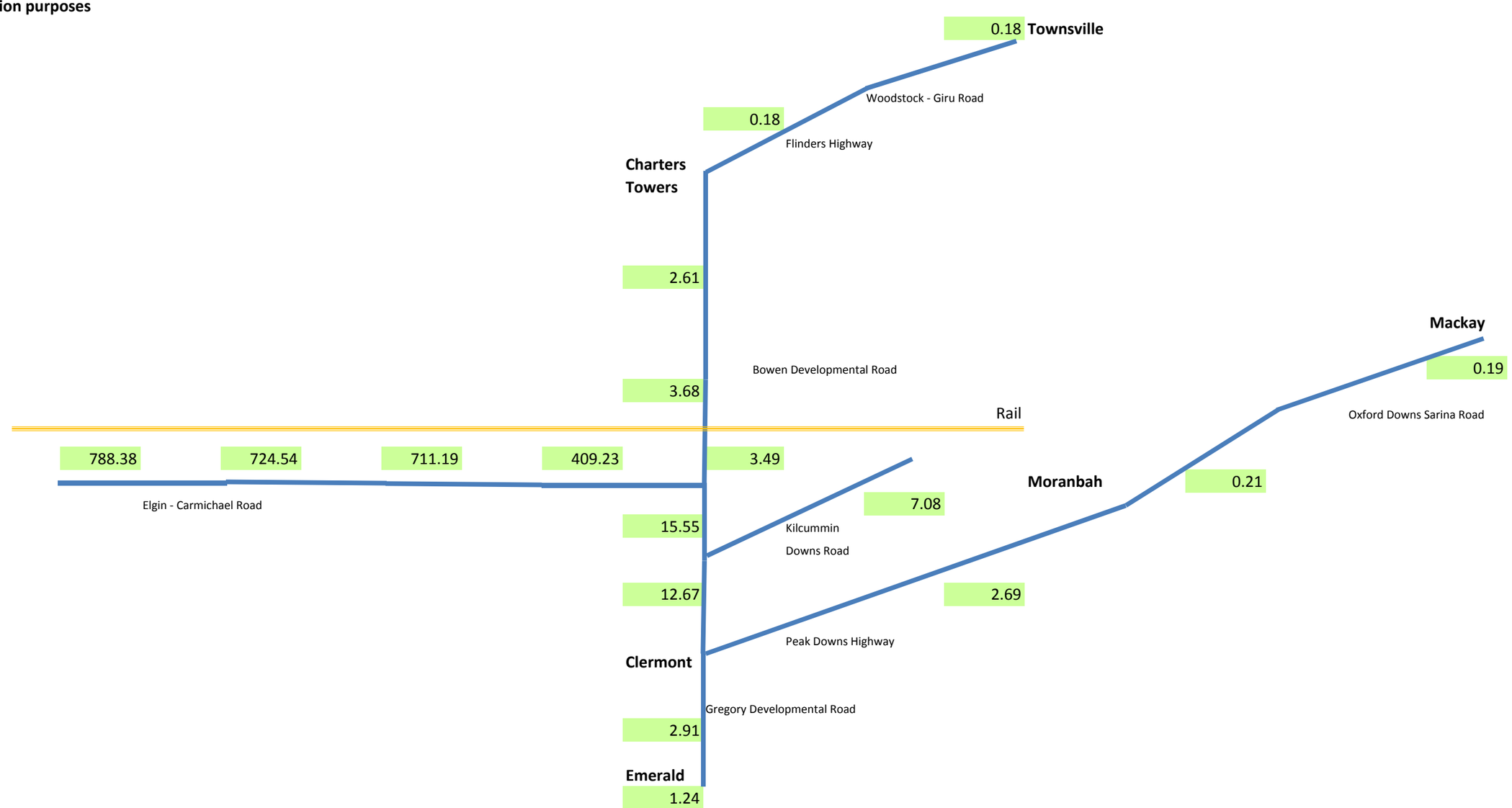
% of base 2014 volume

base traffic volumes are assumed to grow by 7% pa

7% % pa

1 years growth

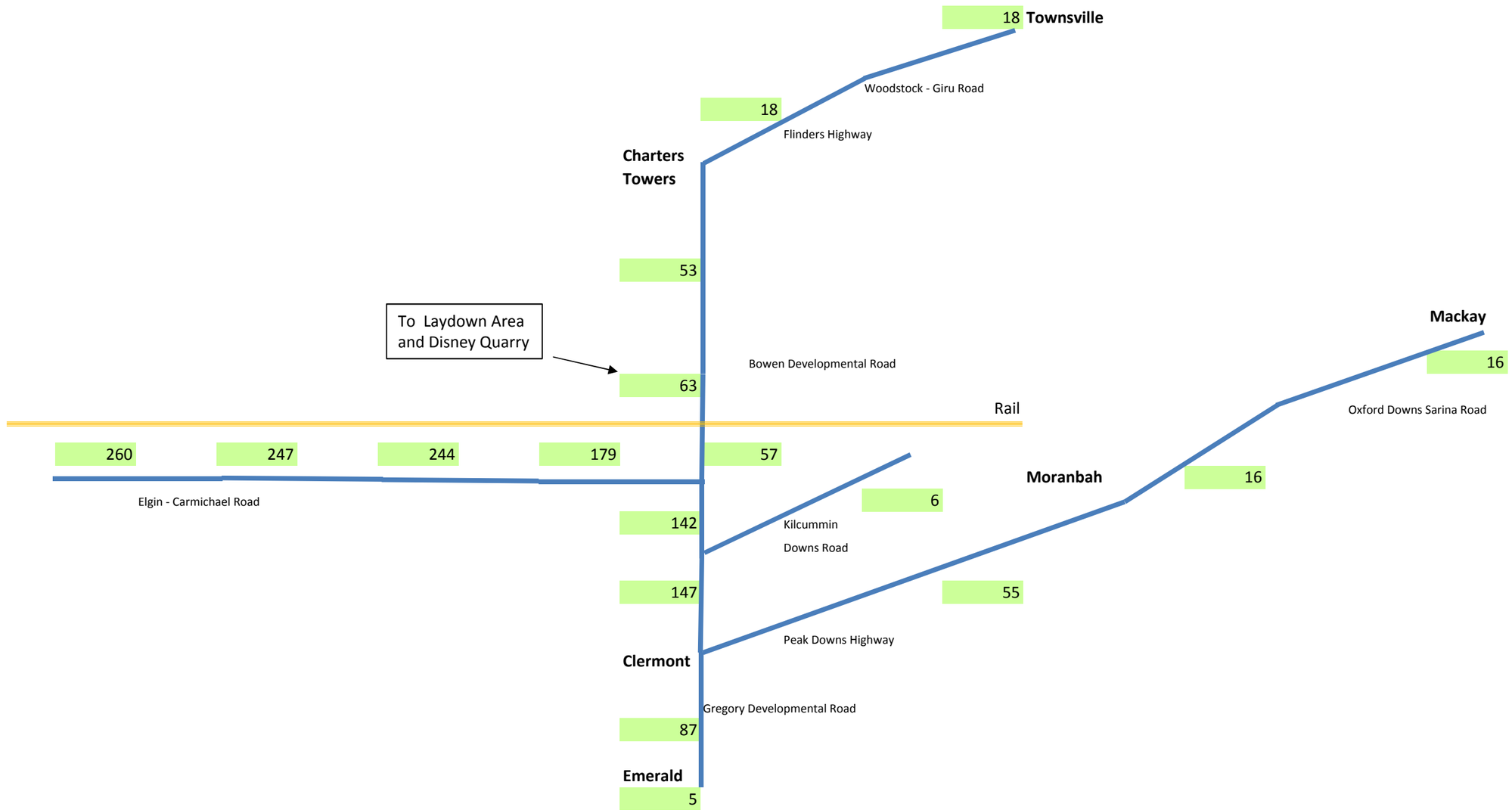
not compounded for simple calculation purposes



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Total estimated development volumes
2015
volumes are total two-way daily volumes

The 2015 scenario is the sum of various datasheets:
- Stage III mine development
- Stage IV mine development
- Airport phase I
- Quarries
- Camps
- Rail construction 2015



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes

Estimated % of 2015 development traffic of base 2015 volumes

2015

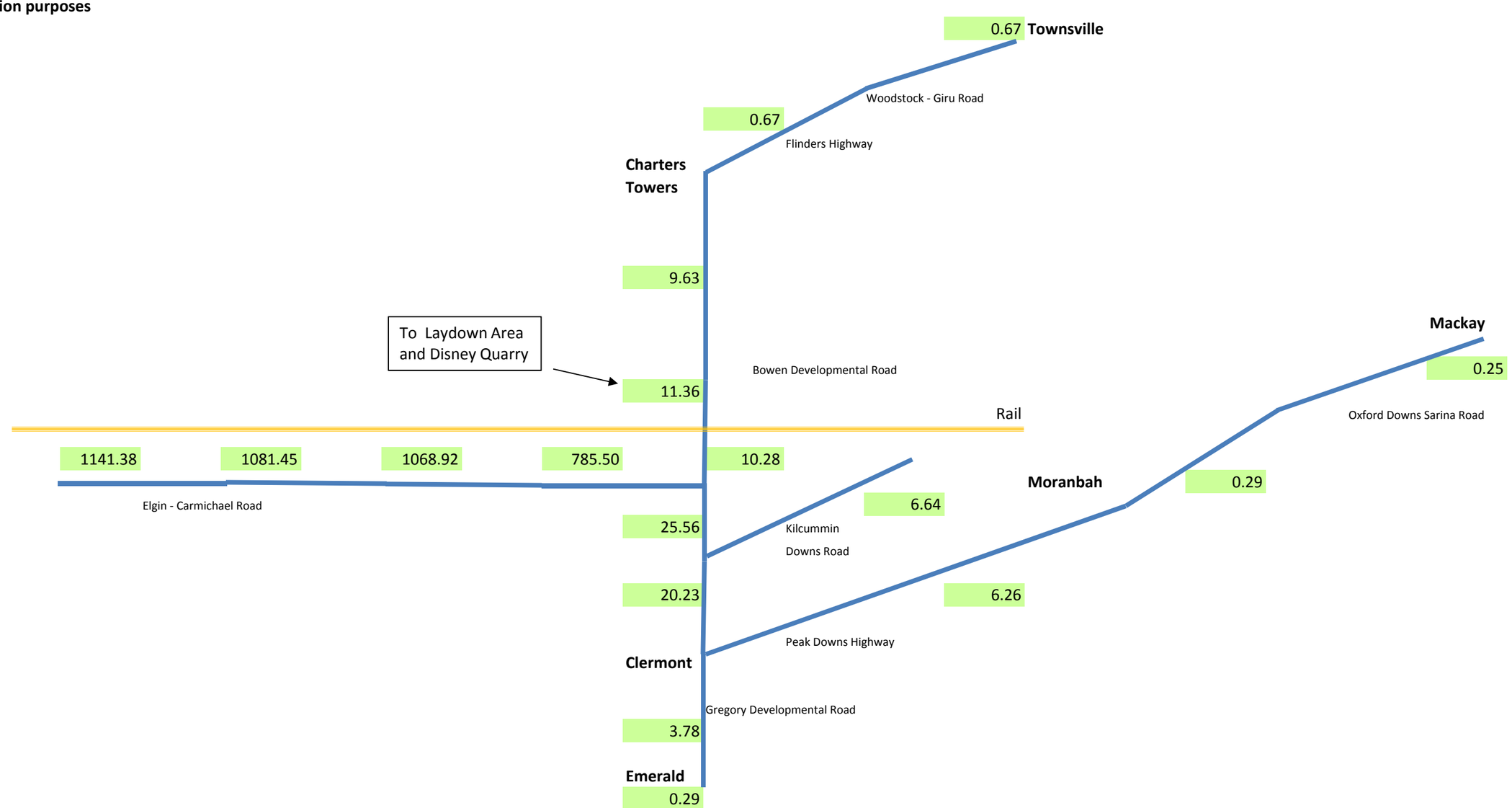
% of base 2015 volume

base traffic volumes are assumed to grow by 7% pa

7% % pa

2 years growth

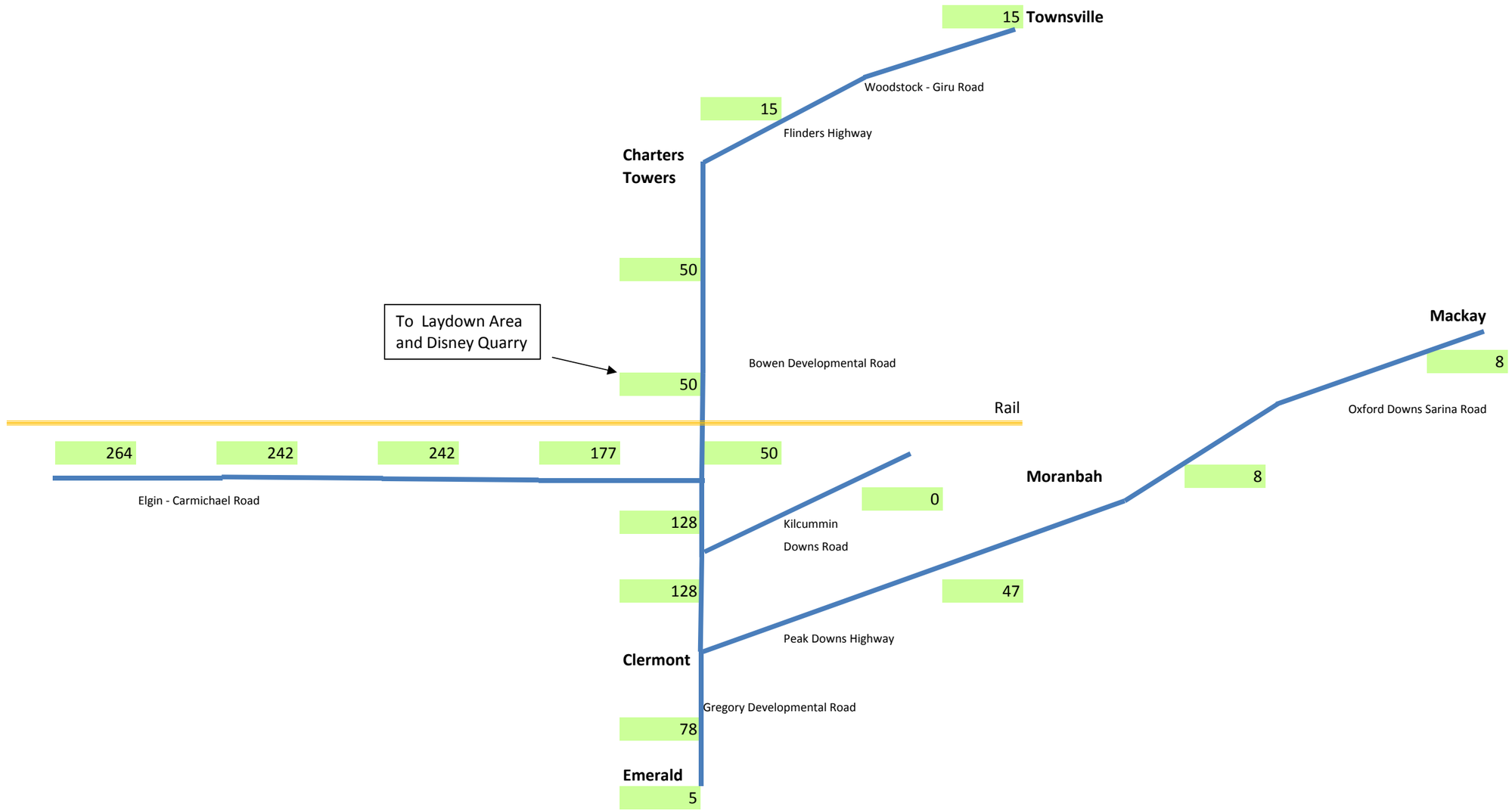
not compounded for simple calculation purposes



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Total estimated development volumes
2016
volumes are total two-way daily volumes

The 2016 scenario is the sum of various datasheets:
- Stage III mine development
- Stage V mine development
- Airport phase II
- Quarries
- Mine Camp only (Rail Camps finish at the end of 2015)



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes

Estimated % of 2016 development traffic of base 2016 volumes

2016

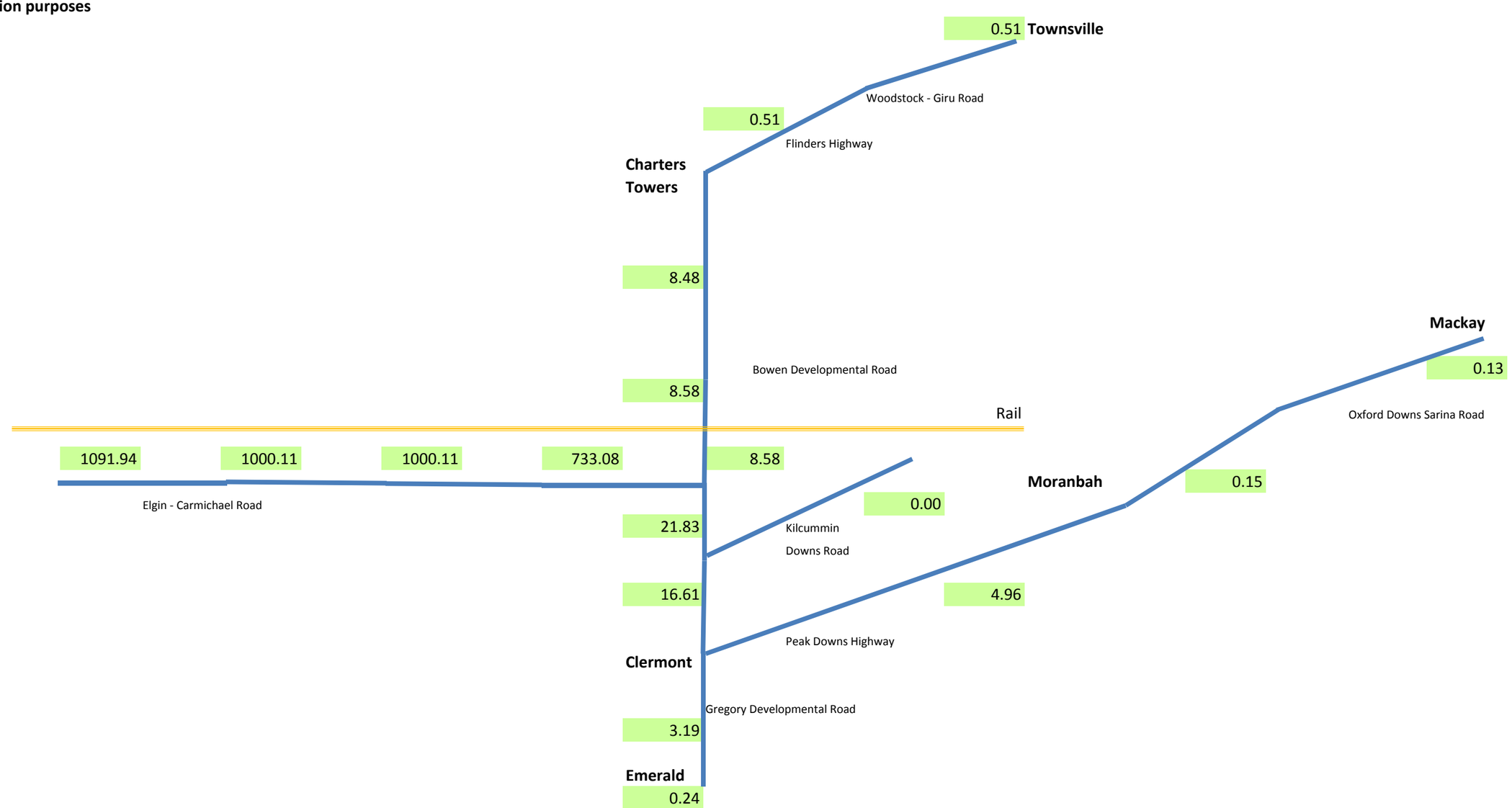
% of base 2016 volume

base traffic volumes are assumed to grow by 7% pa

7% % pa

3 years growth

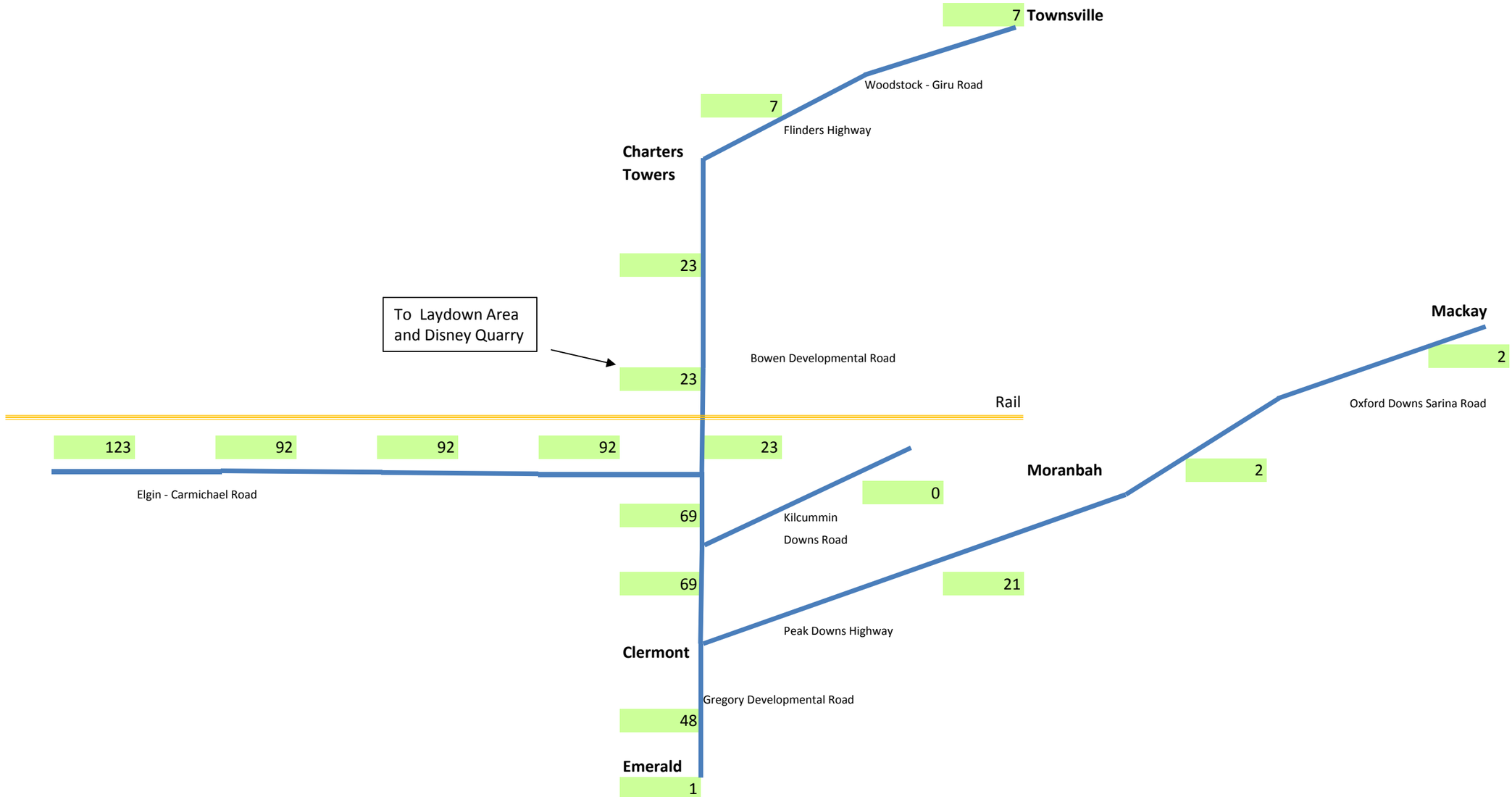
not compounded for simple calculation purposes



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Total estimated development volumes
2017
volumes are total two-way daily volumes

The 2017 scenario is the sum of various datasheets:
- Stage V mine development
- Airport operations only
- Mine Camp only (Rail Camps finish at the end of 2015)



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes

Estimated % of 2017 development traffic of base 2017 volumes

2017

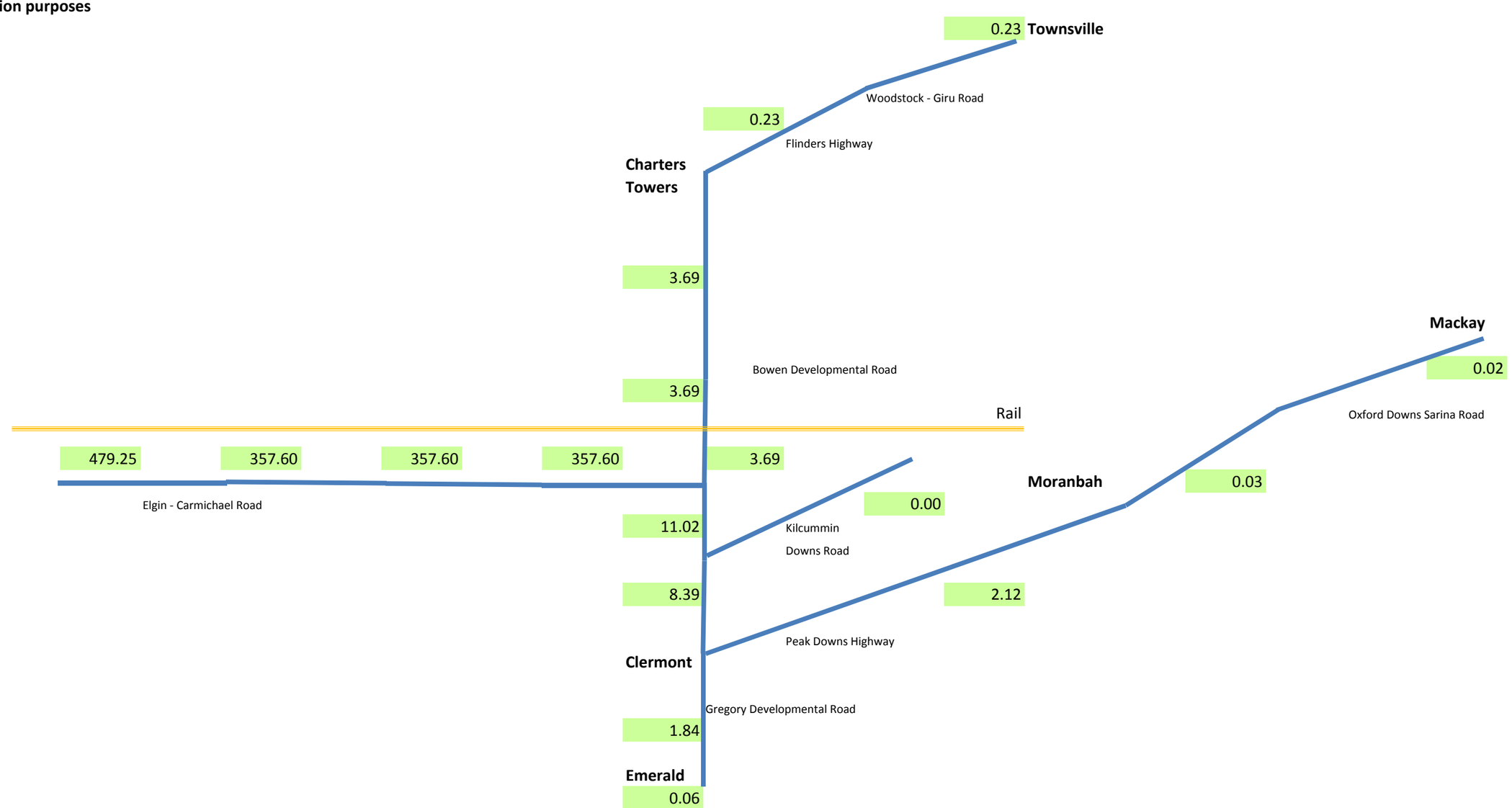
% of base 2017 volume

base traffic volumes are assumed to grow by 7% pa

7% % pa

4 years growth

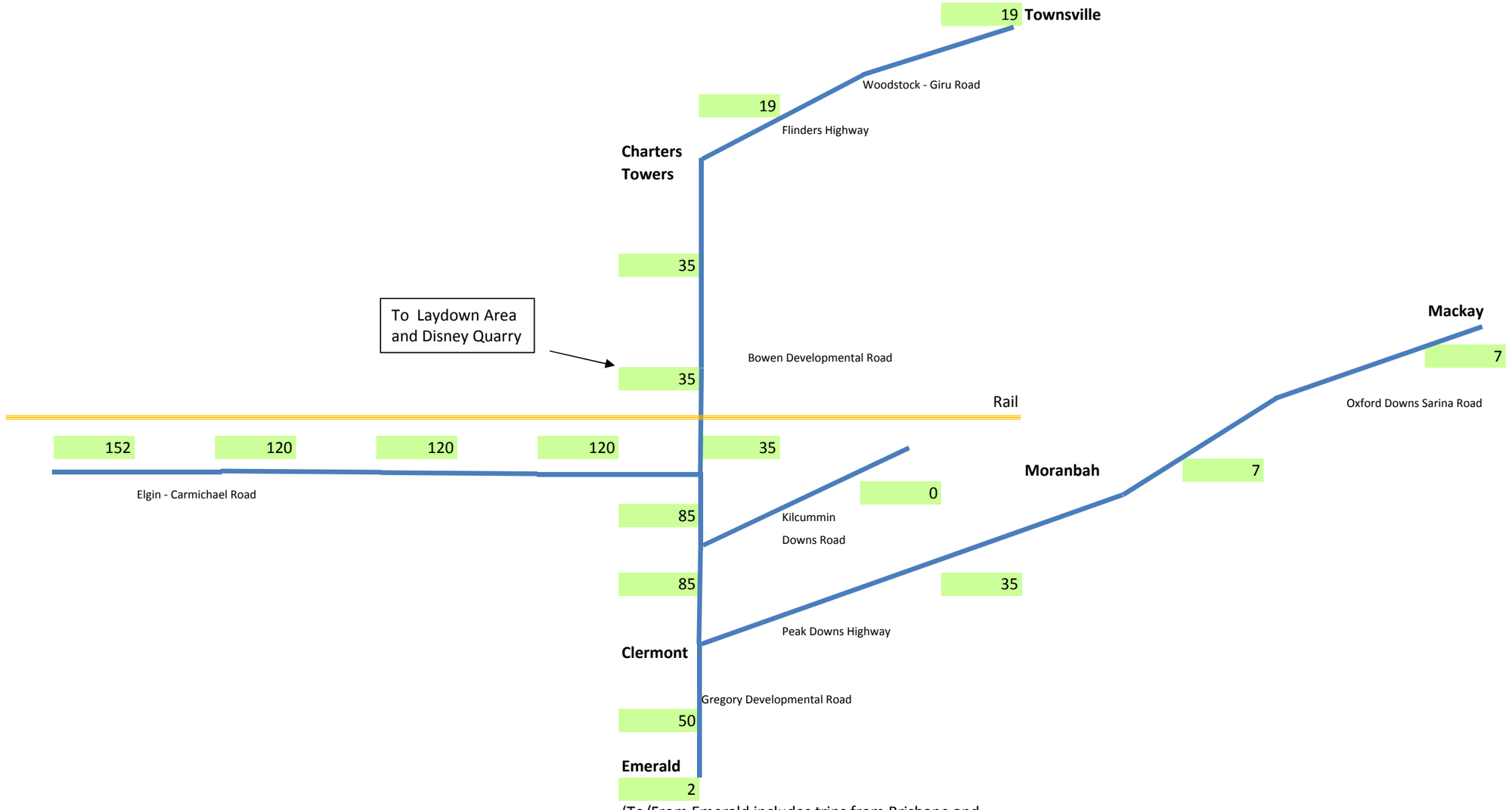
not compounded for simple calculation purposes



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Total estimated development volumes
2024
volumes are total two-way daily volumes

The 2024 scenario is the sum of various datasheets:
- 2024 mine development
- Airport operations
- Mine Camp only (Rail Camps finish at the end of 2015)



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes

Estimated % of 2024 development traffic of base 2024 volumes

2024

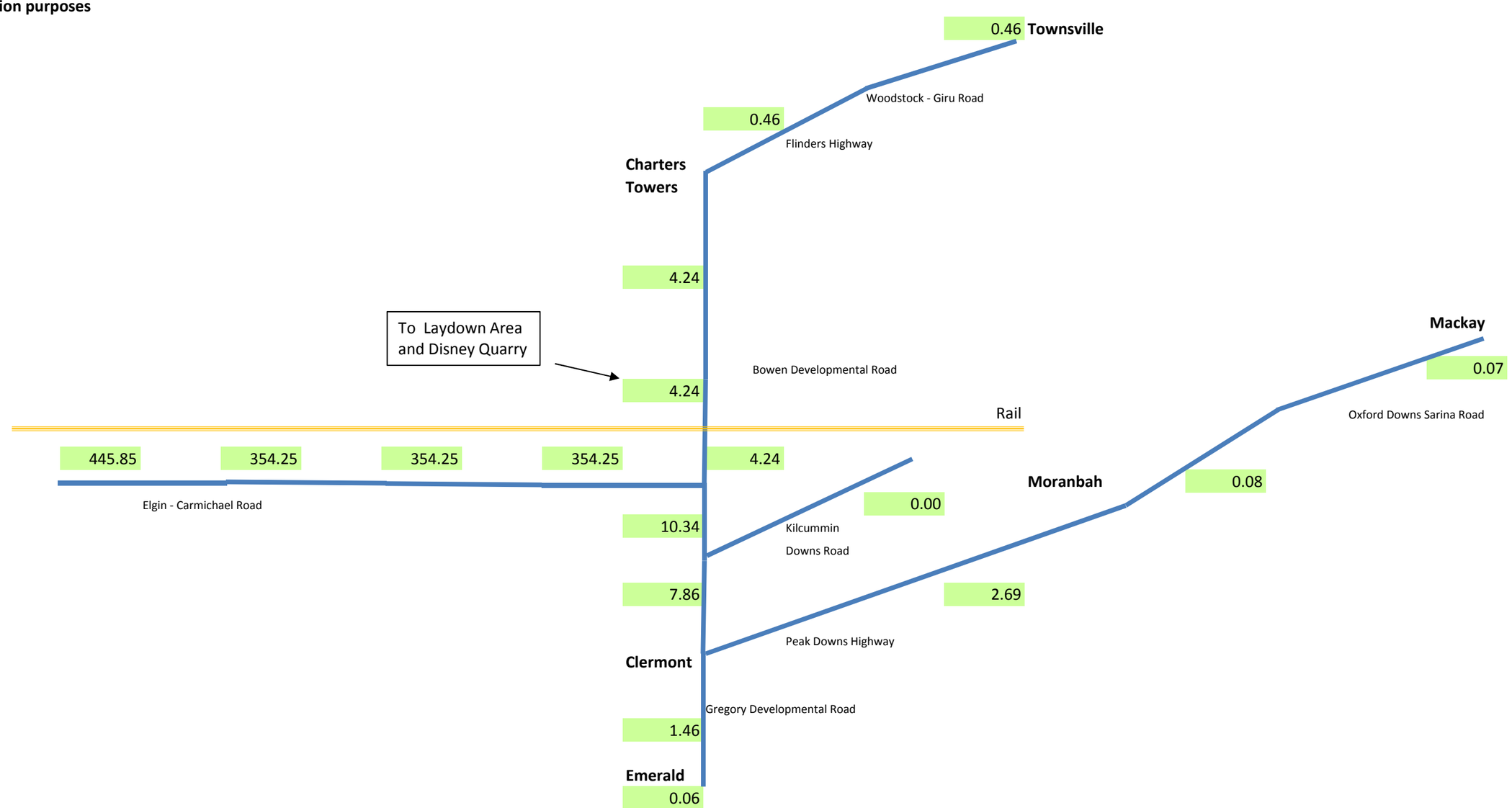
% of base 2024 volume

base traffic volumes are assumed to grow by 7% pa

7% % pa

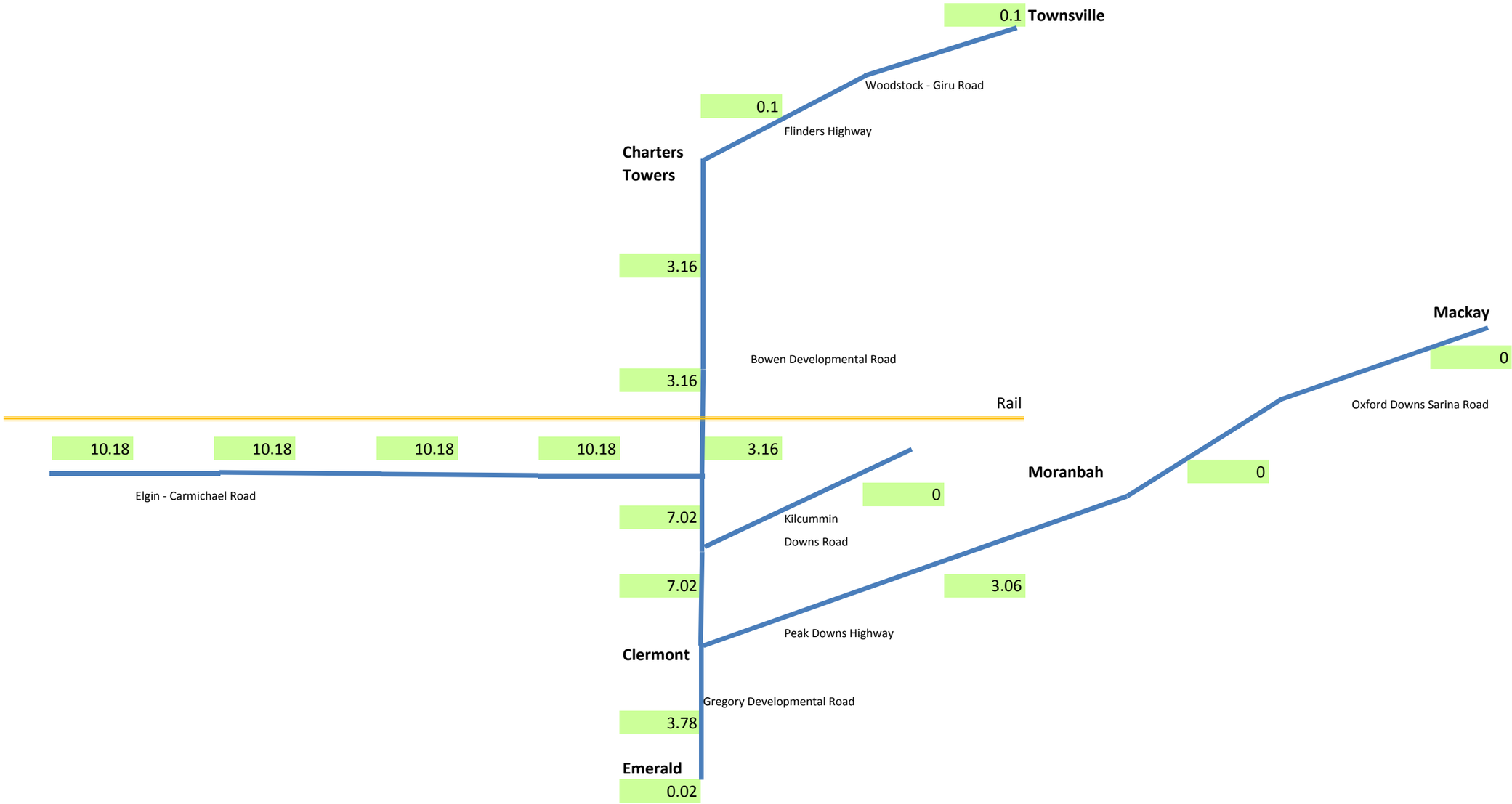
10 years growth

not compounded for simple calculation purposes



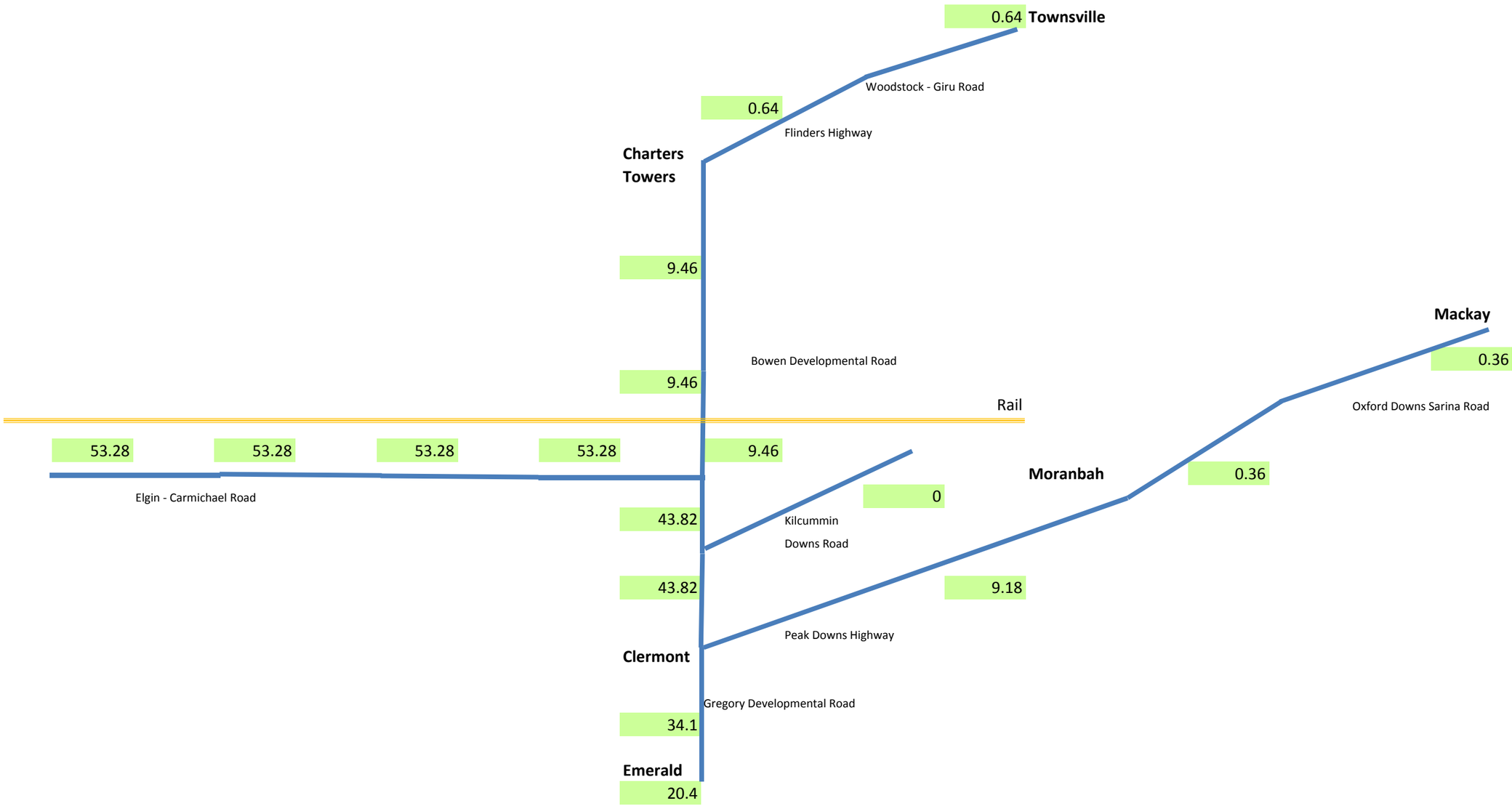
(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Mine development volumes
Stage I 2013
April 2013 - March 2014
volumes are total two-way daily volumes



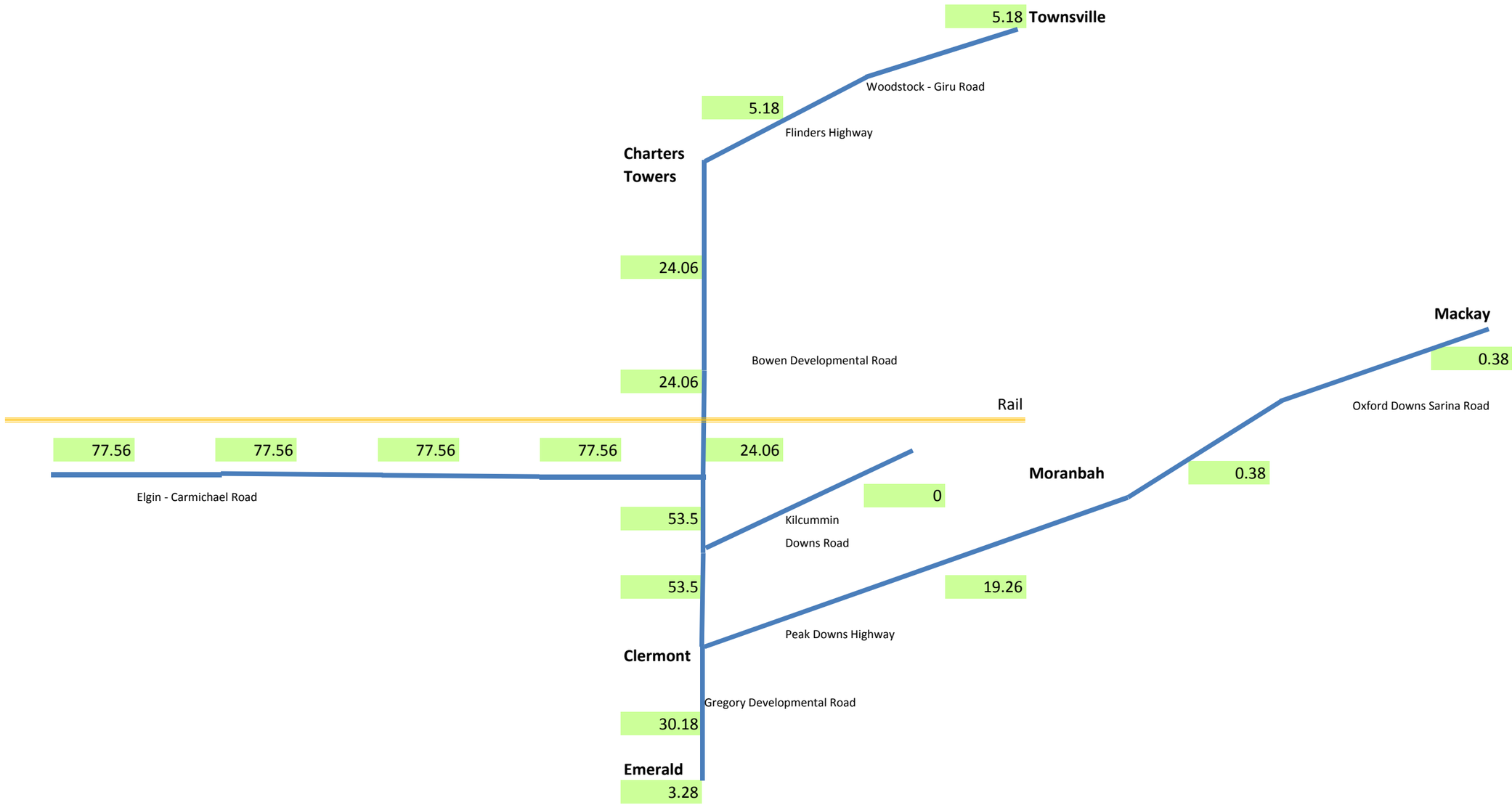
(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Mine development volumes
Stage II 2014
April 2014 - Sept 2014
volumes are total two-way daily volumes



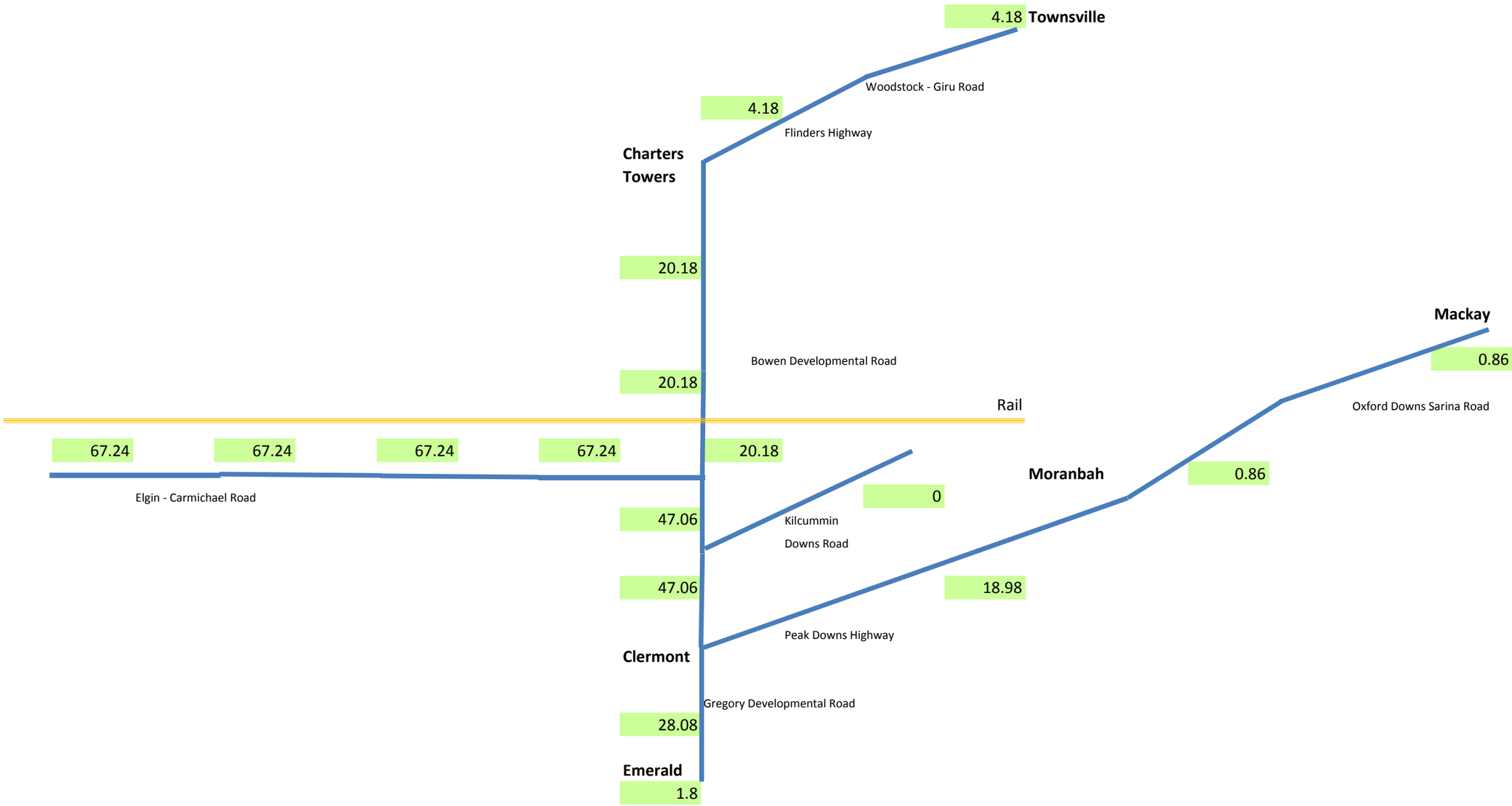
(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Mine development volumes
Stage III 2014 - 2016
Oct 2014 - Sept 2016
volumes are total two-way daily volumes



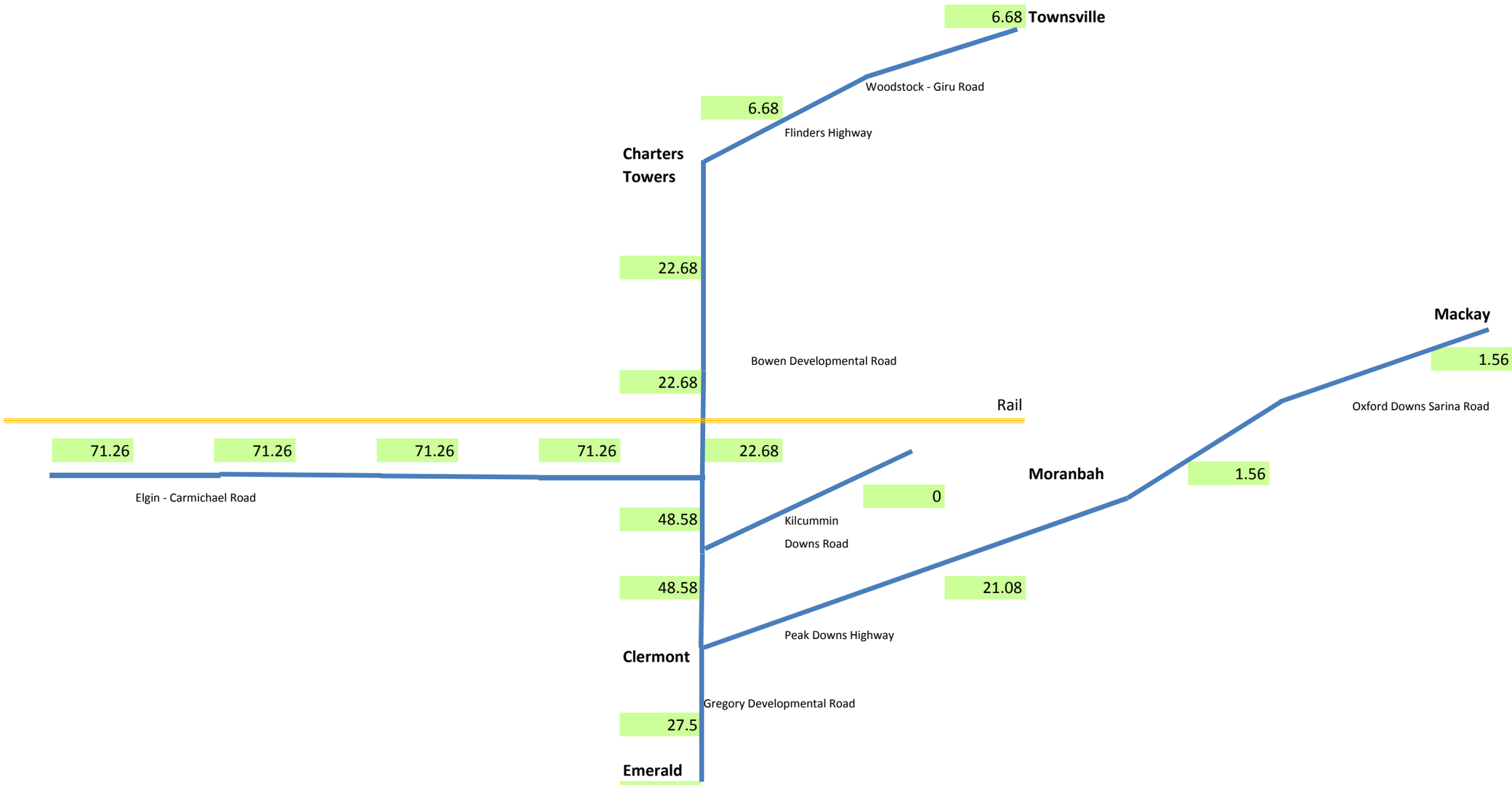
(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Mine development volumes
Stage IV 2015 - 2016
Apr 2015 - Mar 2016
volumes are total two-way daily volumes



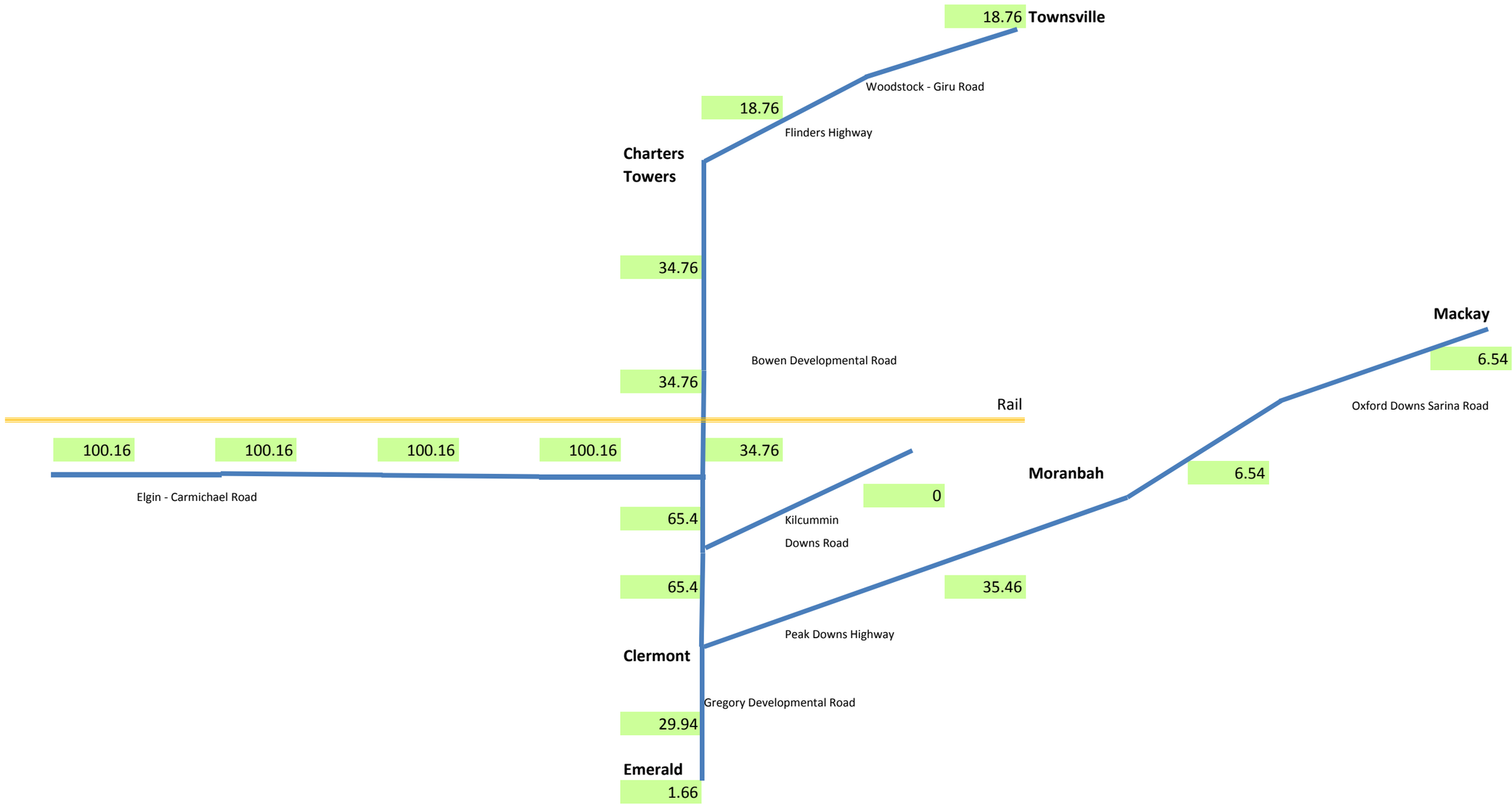
(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Mine development volumes
Stage V 2016 - 2017
Apr 2016 - Mar 2017
volumes are total two-way daily volumes



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Mine development volumes
Year 10
2024
volumes are total two-way daily volumes



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Airport development volumes
Phase 1 - includes construction and operations
April 2014 - Sept 2014
volumes are total two-way daily volumes

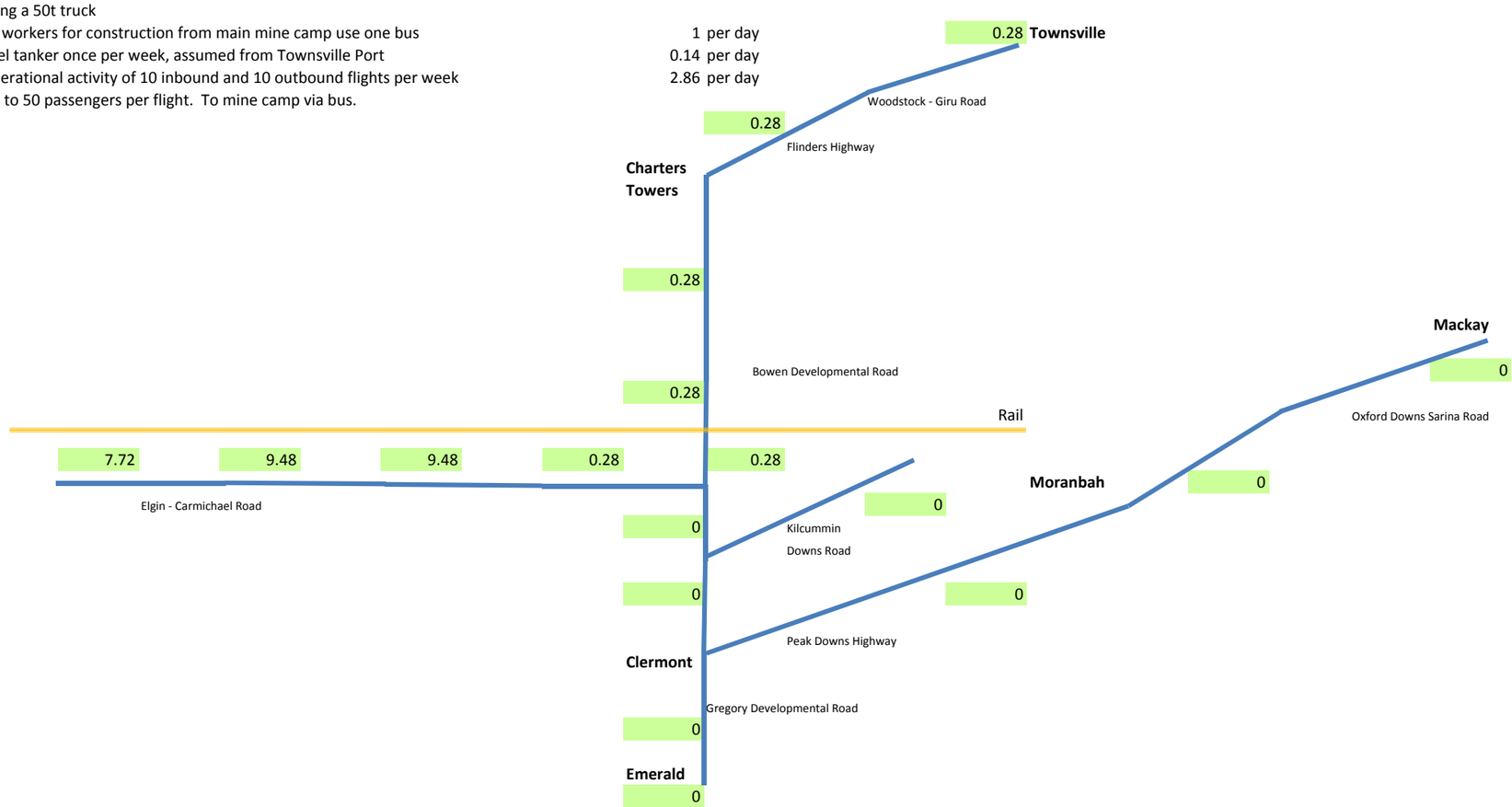
The phase-I construction work is proposed to be started in April 2014 and will continue till Sept 2014. It is expected that the construction activity will require transportation of quarry material from Moray quarry or Elgin Quarry located on Elgin-Moray & Moray-Carmichael road. It is estimated that the construction works requires transportation of quarry material and other construction material on this road at about 32 trips (One way) per week using up to 50T trucks. Road and air tarmac machinery such as graders and road rollers will be trucked to site and are there for the duration of construction.

A demountable building will be provided for airport operations and late 2016 a special purpose facility is planned to be built. A fuel storage facility will be available for aircraft refuelling. A fuel tanker would call once a week. Emergency services will be contracted out.

The construction work force will comprise approx. 45 people who will be based at the main mine accommodation camp and commute to proposed airstrip.

On completion there will be one person responsible for the airport day to day operation together with 4 to 10 ground personal that will live at the main camp. It is estimated that there will be 10 inbound and 10 outbound flights per week with each flight having up to 50 passengers. Buses will transfer workers to mine site along the Carmichael Road.

		one way
32	trips per week one-way via Elgin Carmichael Rd to Elgin and Moray Quarries using a 50t truck	4.6 per day
1	45 workers for construction from main mine camp use one bus	1 per day
1	Fuel tanker once per week, assumed from Townsville Port	0.14 per day
	Operational activity of 10 inbound and 10 outbound flights per week	2.86 per day
	Up to 50 passengers per flight. To mine camp via bus.	



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

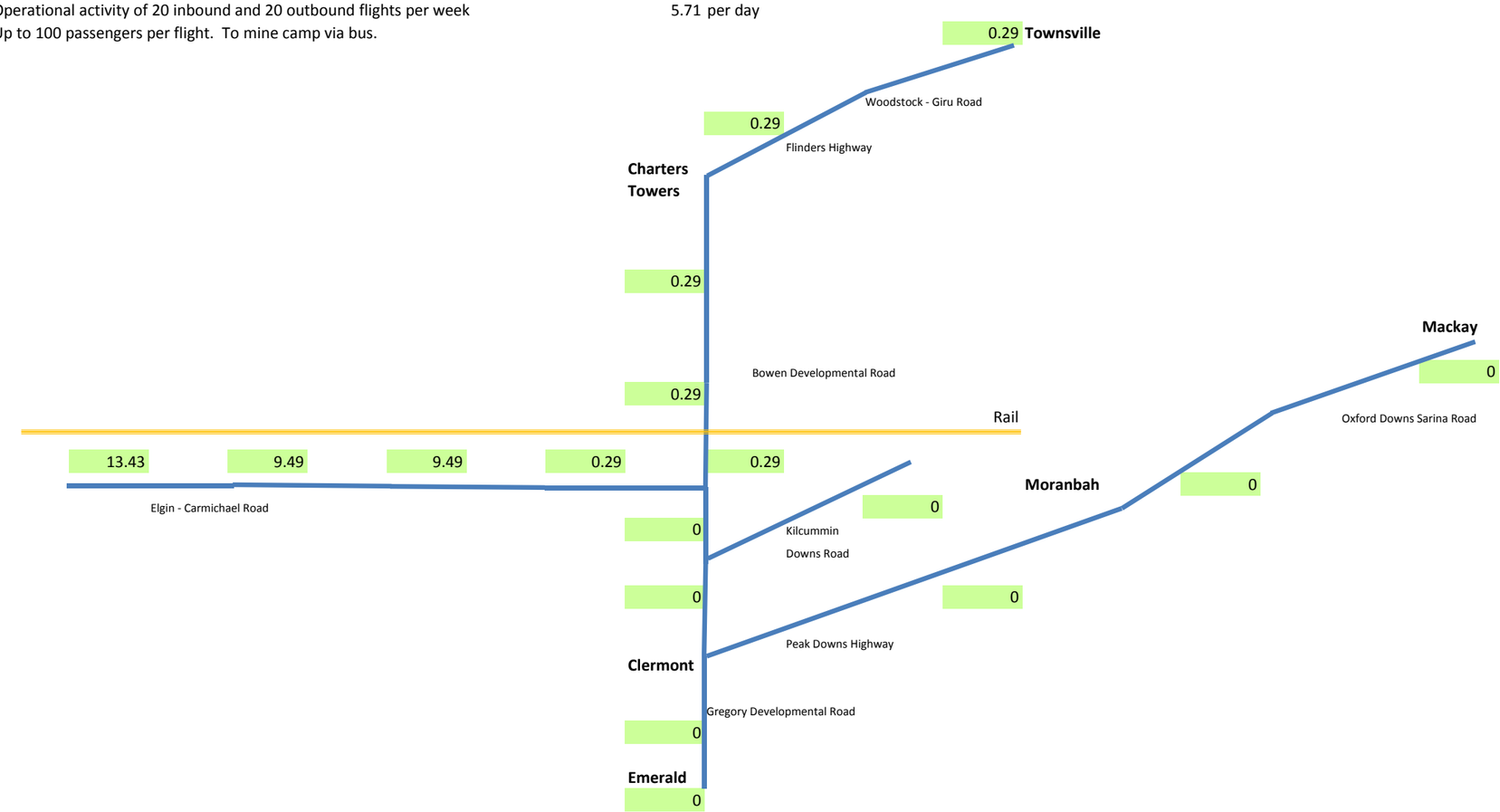
Network Volumes
Airport development volumes
Phase 2 - includes construction and operations
late 2016
volumes are total two-way daily volumes

late 2016 a special purpose facility is planned to be built. A fuel storage facility will be available for aircraft refuelling. A fuel tanker would call once a week. Emergency services will be contracted out.

As the mine construction program expands, it is proposed to meet the demand for construction and mine workers with the runway being extended in 2018 to 2200 meters. This is to facilitate larger aircraft types with passenger capacity of up to 100 seats. Again this construction activity will be similar to the original building of the runway.

By 2018 the mine work force would comprise approx. 3000 people with the majority working on a split roster of 7 days on, 7 days off. On that basis 1500 passengers would be flown in and out over 20 return flights each week. This is based on the roster changing most personnel over a 3 day period.

		one way	
32	trips per week one-way via Elgin Carmichael Rd to Elgin and Moray Quarries using a 50t truck	4.6	per day
1	45 workers for construction from main mine camp use one bus	1	per day
1	Fuel tanker once per week, assumed from Townsville Port	0.14	per day
	Operational activity of 20 inbound and 20 outbound flights per week	5.71	per day
	Up to 100 passengers per flight. To mine camp via bus.		



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

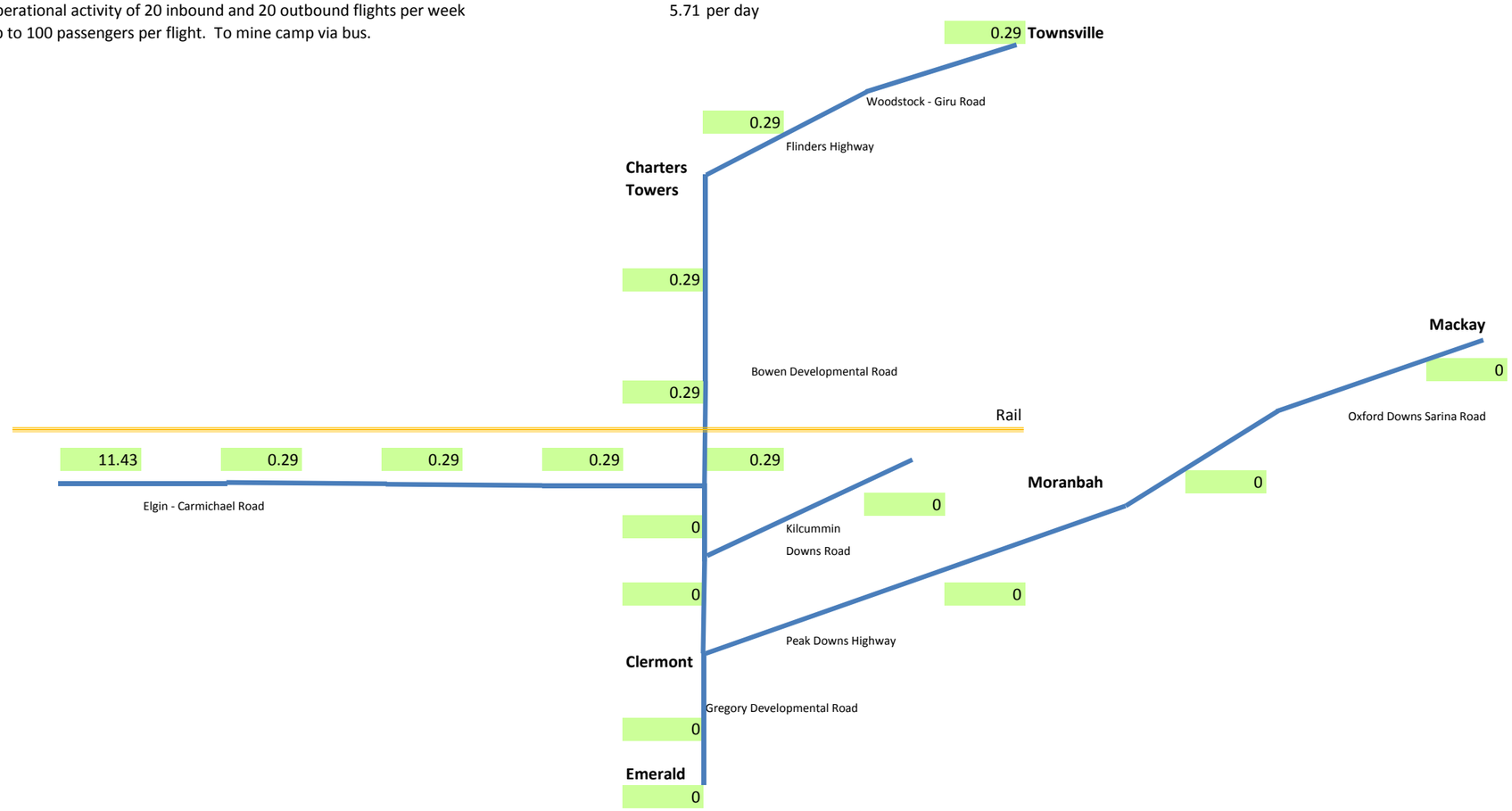
Network Volumes
Airport development volumes
Post opening of Phase 2
2017
volumes are total two-way daily volumes

late 2016 a special purpose facility is planned to be built. A fuel storage facility will be available for aircraft refuelling. A fuel tanker would call once a week. Emergency services will be contracted out.

By 2018 the mine work force would comprise approx. 3000 people with the majority working on a split roster of 7 days on, 7 days off. On that basis 1500 passengers would be flown in and out over 20 return flights each week. This is based on the roster changing most personnel over a 3 day period.

1 Fuel tanker once per week, assumed from Townsville Port
Operational activity of 20 inbound and 20 outbound flights per week
Up to 100 passengers per flight. To mine camp via bus.

one way
0.14 per day
5.71 per day



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Quarries development volumes
Year is ongoing
2013 start
volumes are total two-way daily volumes

North Creek Quarry 500,000 tpa
For the rail line works
Quarry vehicles
75t operation 26 total two way trips per day
assume 65t operation 30 total two way trips per day
the quarry trips are to go from the quarry to the rail access road only on Moray - Bulliwallah Road
Service vehicles

Fuel	1 per week B Double from Townsville	0.14	total one way
Water	2 per week B Double from Mackay	0.29	total one way
Maintenance	0 negligible		

site setup vehicles not included as small number of 10 vehicles as a one-off event

Moray Quarry 500,000 tpa
For the rail line and airport works
Quarry vehicles
75t operation 20 total two way trips per day
assume 65t operation 23 total two way trips per day
the quarry trips are to go from the quarry to the rail access road only on Moray - Bulliwallah Road
Service vehicles

Fuel	1 per week B Double from Townsville	0.14	total one way
Water	2 per week B Double from Mackay	0.29	total one way
Maintenance	0 negligible		

site setup vehicles not included as small number of 20 vehicles as a one-off event

Disney Quarry 10,500,000 tpa
For the rail line works
Quarry vehicles
75t operation 498 total two way trips per day
assume 65t operation 575 total two way trips per day
the quarry trips are to go from the quarry directly to the rail access road and not on public roads
Service vehicles

Fuel	1 per week B Double from Townsville	0.14	total one way
Water	2 per week B Double from Mackay	0.29	total one way
Maintenance	0 negligible		

site setup vehicles not included as small number of 40 vehicles as a one-off event

Borrow 7 Quarry 1.900,000 tpa
For the rail line works and a lesser amount for the mine village and airport
Quarry vehicles
75t operation 68 total two way trips per day
assume 65t operation 78 total two way trips per day
the quarry trips are to go from the quarry directly to the rail access road and not on public roads
Service vehicles

Fuel	4 per week B Double from Townsville	0.57	total one way
Water	2 per week B Double from Mackay	0.29	total one way
Maintenance	8 per week B Double from Mackay	1.14	total one way

Con't over >

site setup vehicles, 180 vehicles, not included as a one-off event

Back Creek South Quarry 1,200,000 tpa

For the road works on Elgin Road and Moray - Bulliwallah Road upgrade, mine village and site access roads near the mine

Quarry vehicles

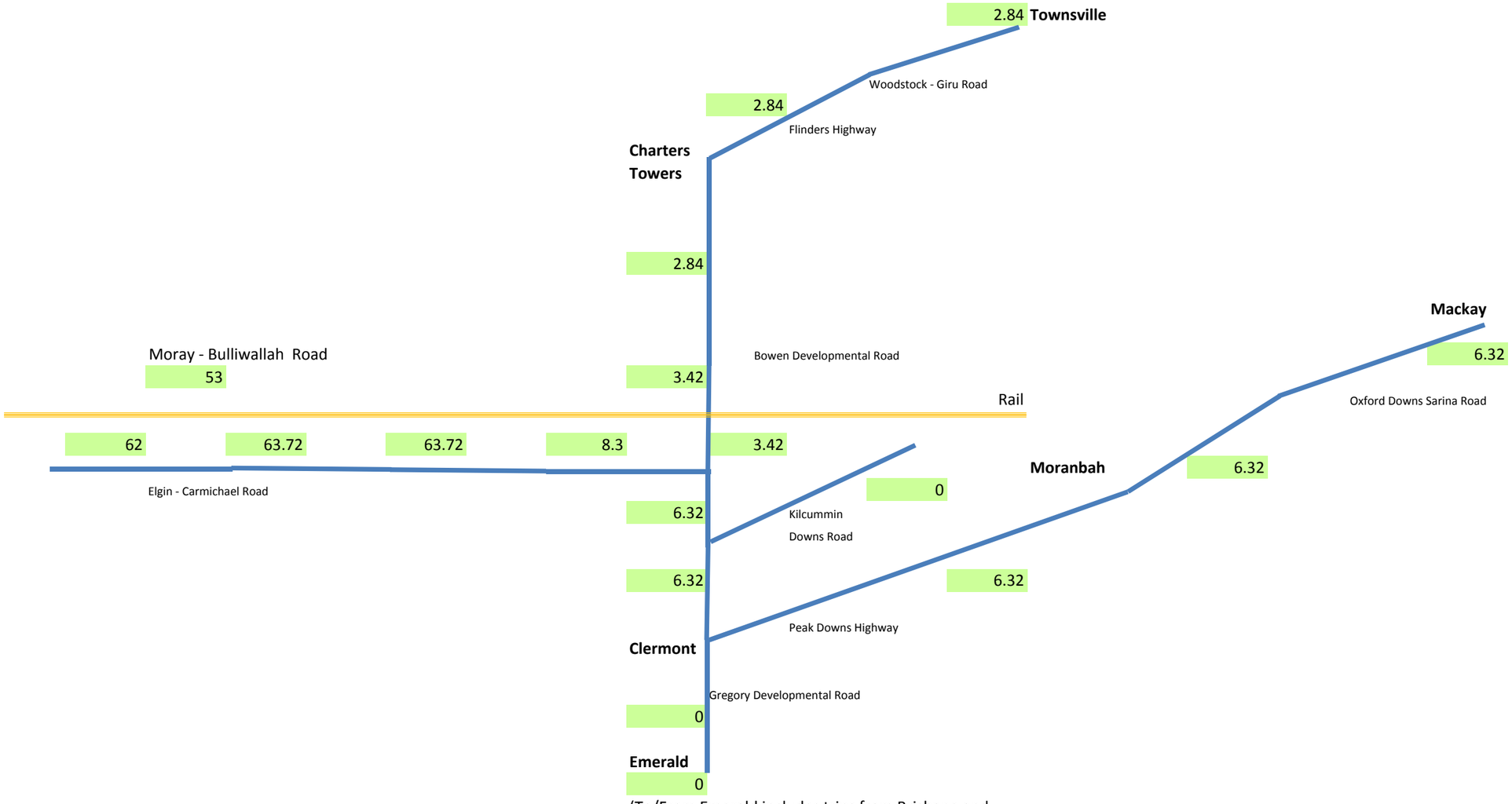
75t operation	54	total two way trips per day
assume 65t operation	62	total two way trips per day

the quarry trips are to go from the quarry to site locations via Elgin -Carmichael Road

Service vehicles

Fuel	3	per week B Double from Townsville	0.43	total one way
Water	2	per week B Double from Mackay	0.29	total one way
Maintenance	4	per week B Double from Mackay	0.57	total one way

site setup vehicles not included as 70 vehicles as a one-off event



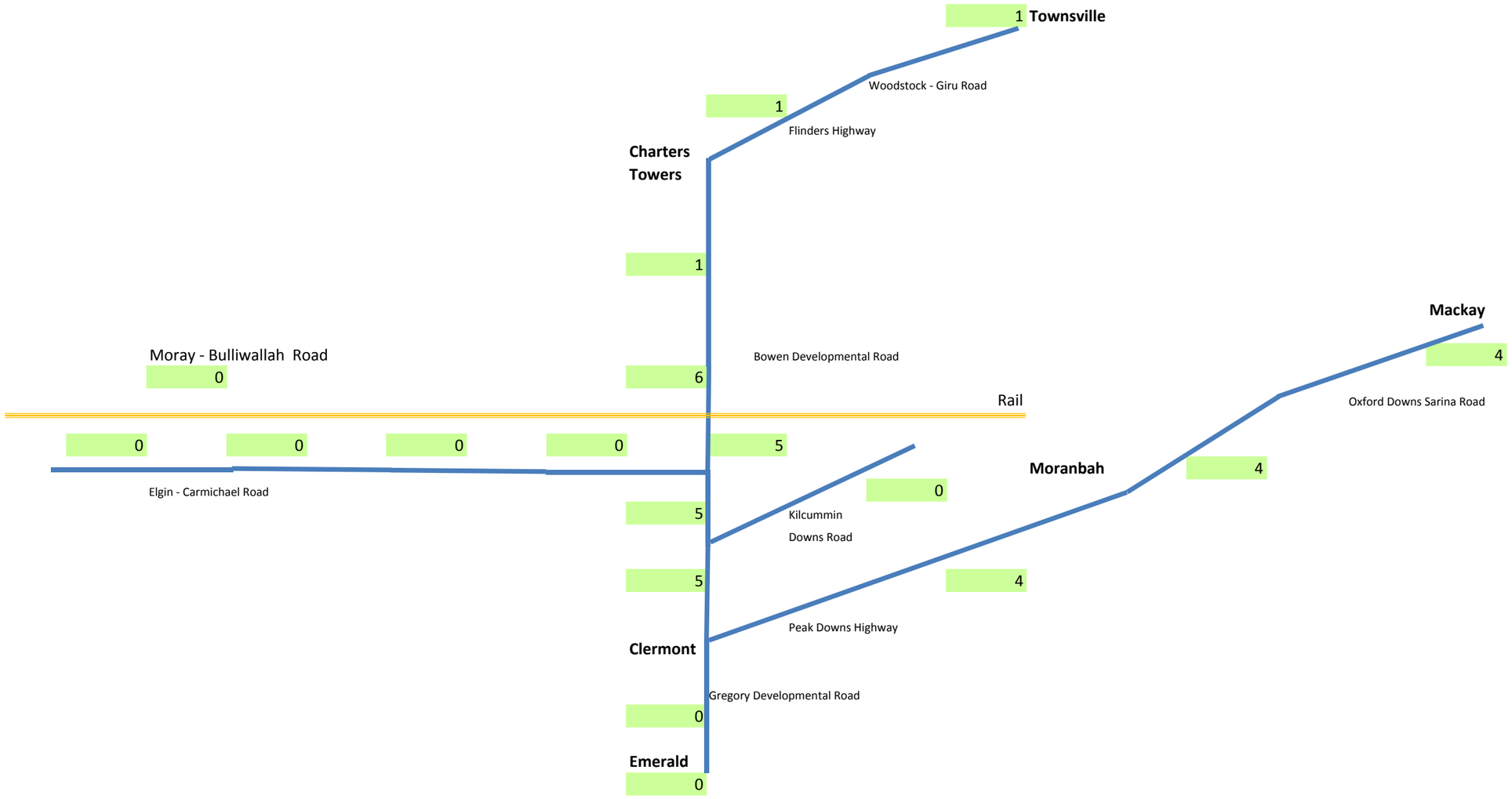
(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Rail construction volumes
2014
volumes are total two-way daily volumes

There are no volumes for rail operations as all movements will utilise the rail access road

The movement volumes below are "average" figures derived from the rail construction schedule
The averages are over each year period

From Mackay	4 vehicles per day total two way
From Clermont	1 vehicles per day total two way
From Townsville	1 vehicle per day total two way



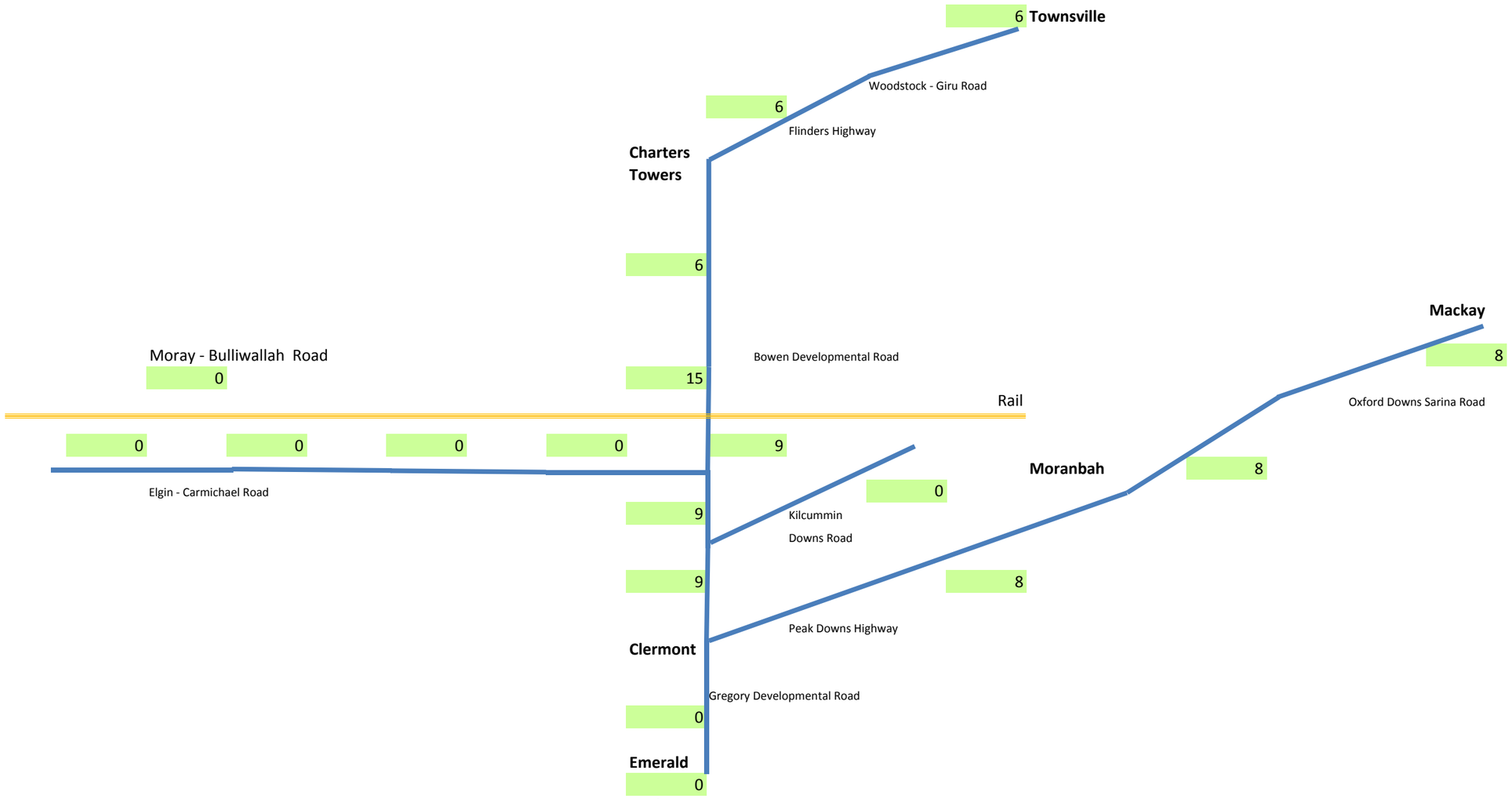
(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Rail construction volumes
2015
volumes are total two-way daily volumes

There are no volumes for rail operations as all movements will utilise the rail access road

The movement volumes below are "average" figures derived from the rail construction schedule
The averages are over each year period

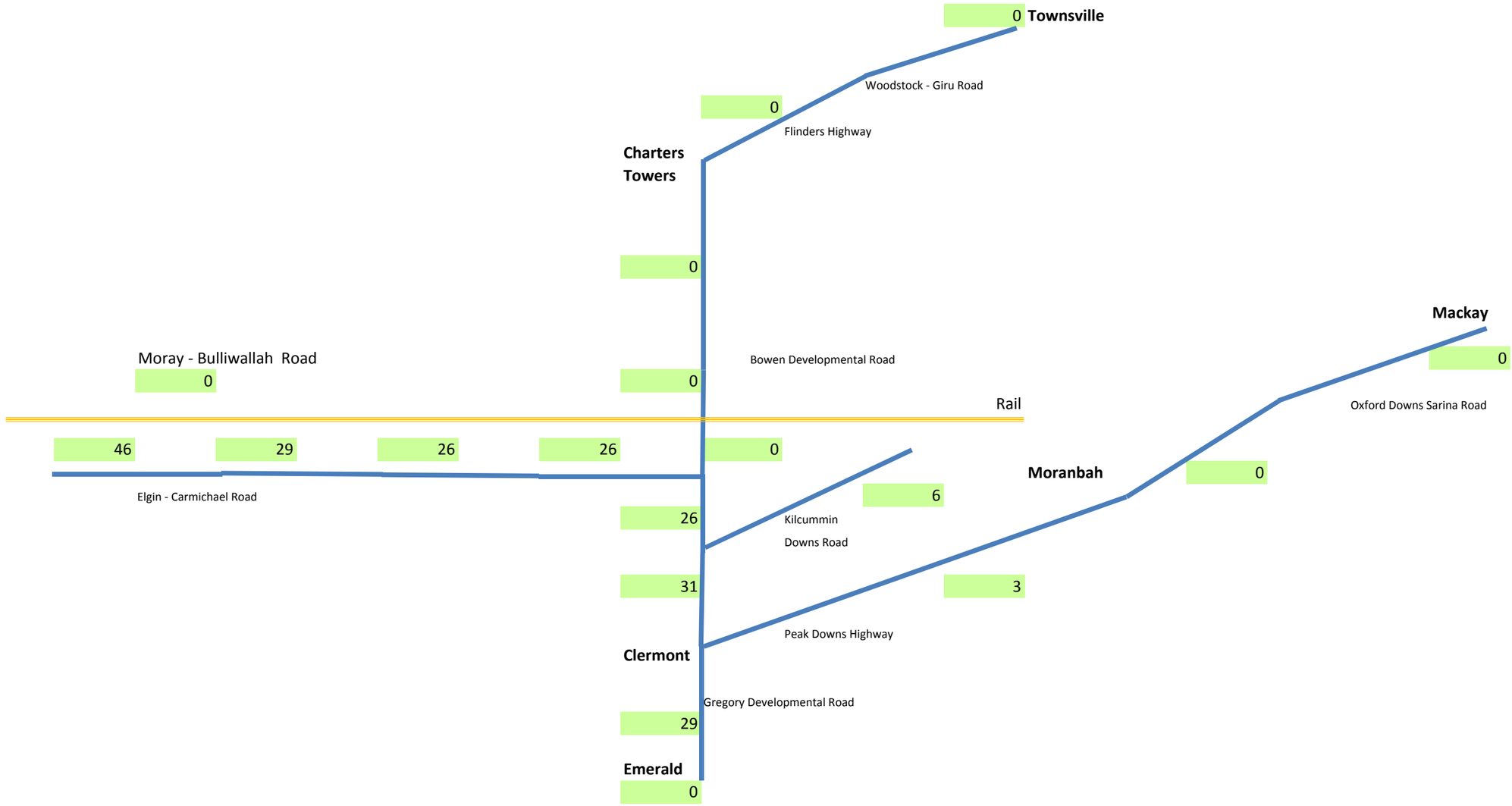
From Mackay	8	vehicles per day total two way
From Clermont	1	vehicles per day total two way
From Townsville	6	vehicle per day total two way



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Total Camp Volumes
2014
volumes are total two-way daily volumes
the construction volumes are included in the mine site construction calculations

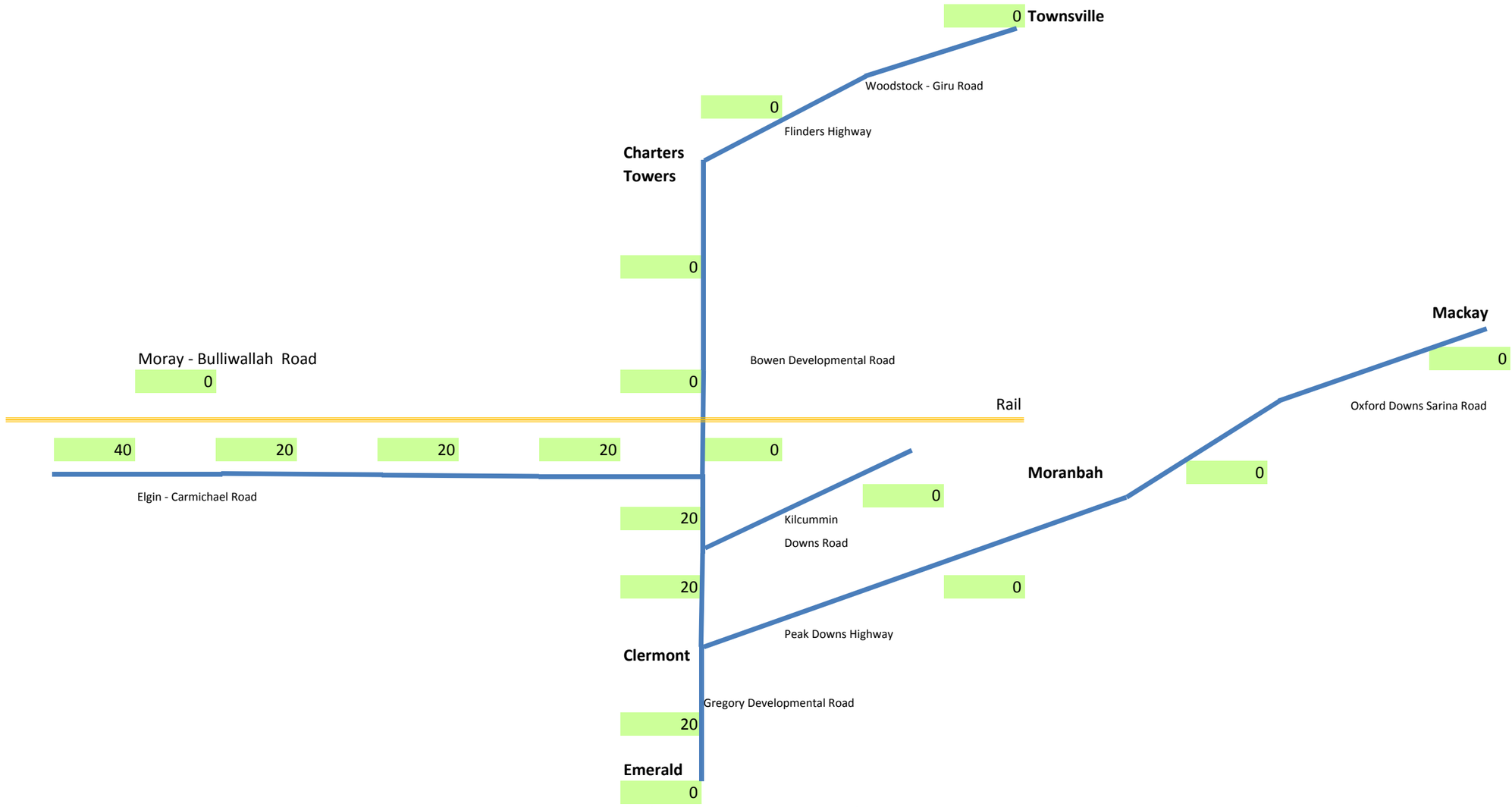
The total is for all of the four camps shown on the one sheet



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Total Camp Volumes
2014
volumes are total two-way daily volumes
the construction volumes are included in the mine site construction calculations

The total only includes the Mine Camp as the Rail Camps end at the end of 2015
The Mine Camp continues beyond 2015



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Mine Camp Volumes - near mine site and new airport
2014
volumes are total two-way daily volumes
the construction volumes are included in the mine site construction calculations

Table 3-1 Mine Camp - Traffic Generation

Trip Type	Mode	Weekly Volume	Daily Volume	Peak Hour Volume
Fly-in/Fly-out	Coach	10 vehicles in/out	2 in/out	2 in/out
Servicing	AV (semi-trailer)	10 vehicles in/out	4 in/out	2 in/out
Total		20 vehicles in/out	6 in/out	4 in/out

values above are for a 500 bed camp
the main mine camp will be a 3,500 bed camp - the above values are to be multiplied by 7

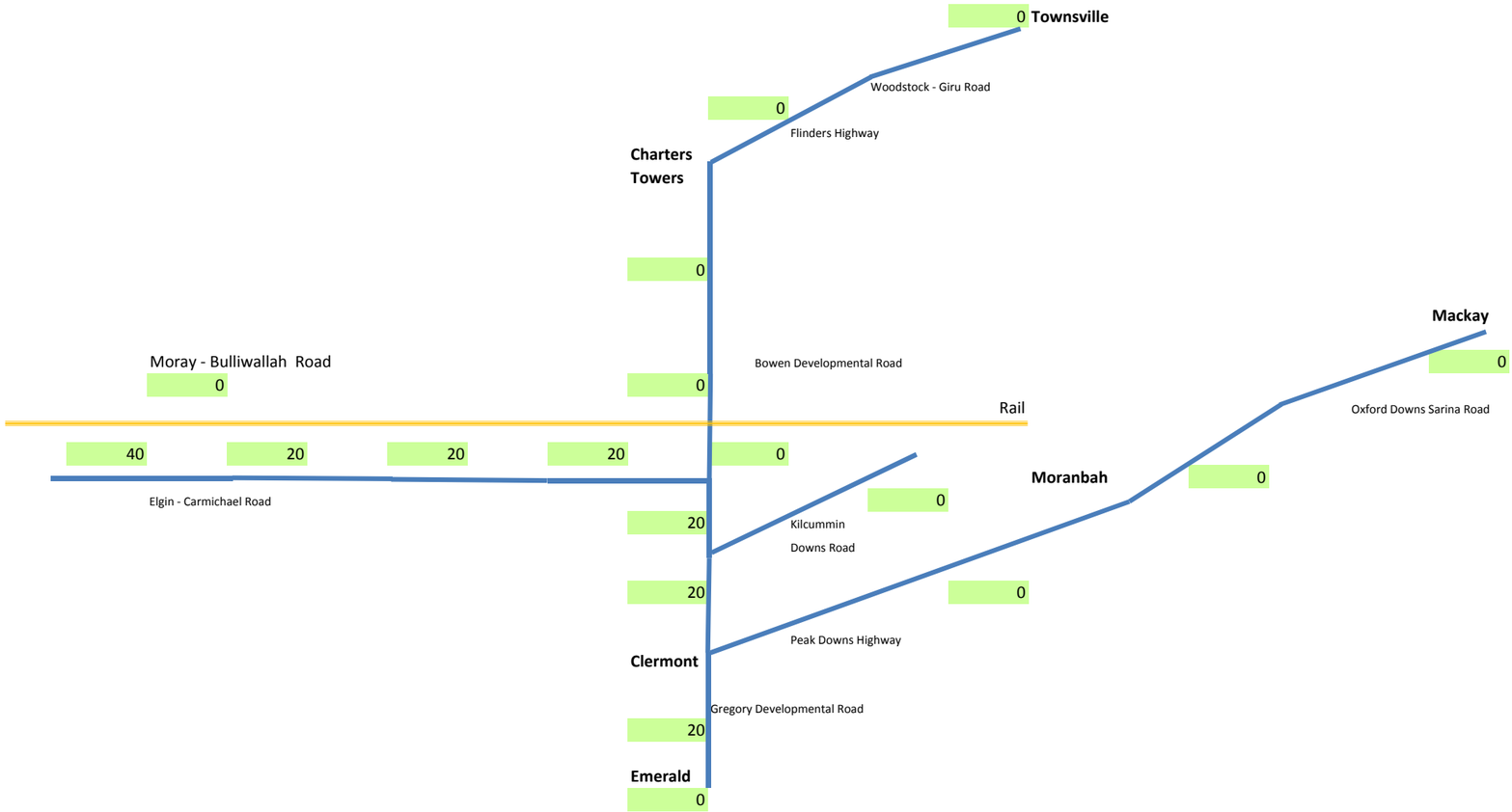
FIFO - from new airport near mine site

From Airport	140	vehicles per week total two way	coach
From Airport	20	vehicles per day total two way	coach

Servicing

From Emerald	140	vehicles per week total two way (AV semi-trailer)	
From Emerald	20	vehicles per day total two way (AV semi trailer)	

(assumed to be consistent with the mine site)



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Rail camp 1 volumes - near Kilcummin Downs Road
2014
volumes are total two-way daily volumes

Table 3-1 Rail Construction Camp 1 - Traffic Generation

Trip Type	Mode	Weekly Volume	Daily Volume	Peak Hour Volume
Fly-in/Fly-out	Coach	10 vehicles in/out	2 in/out	2 in/out
Servicing	AV (semi-trailer)	10 vehicles in/out	4 in/out	2 in/out
Total		20 vehicles in/out	6 in/out	4 in/out

values above are for a 405 bed camp

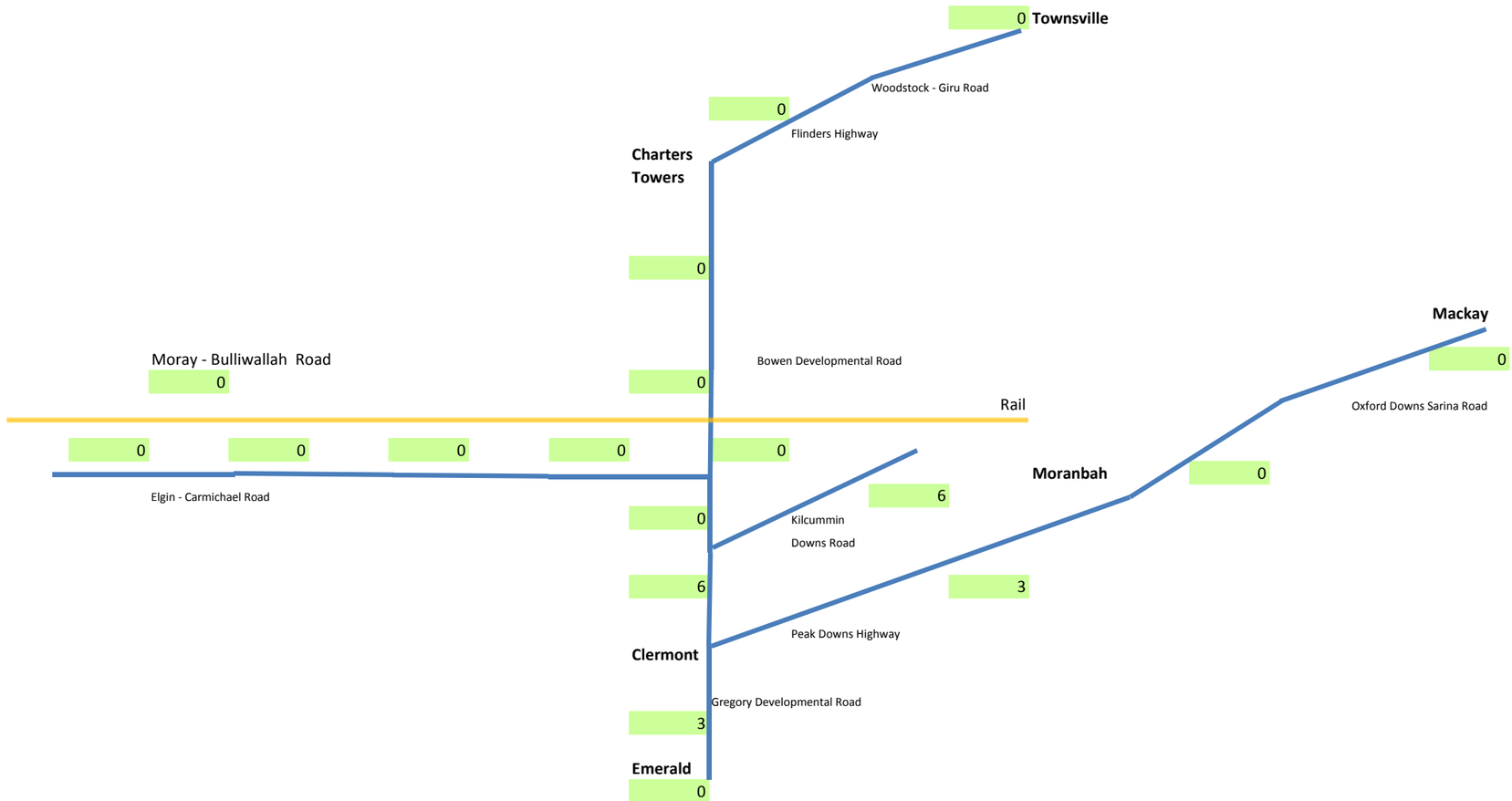
FIFO - from Moranbah as closest airport

From Airport	20	vehicles per week total two way	coach
From Airport	2.86	vehicles per day total two way	coach

Servicing

From Emerald	20	vehicles per week total two way (AV semi-trailer)
From Emerald	2.86	vehicles per day total two way (AV semi trailer)

(assumed to be consistent with the mine site and camps)



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Rail camp 2 volumes - near GDR
2014
volumes are total two-way daily volumes

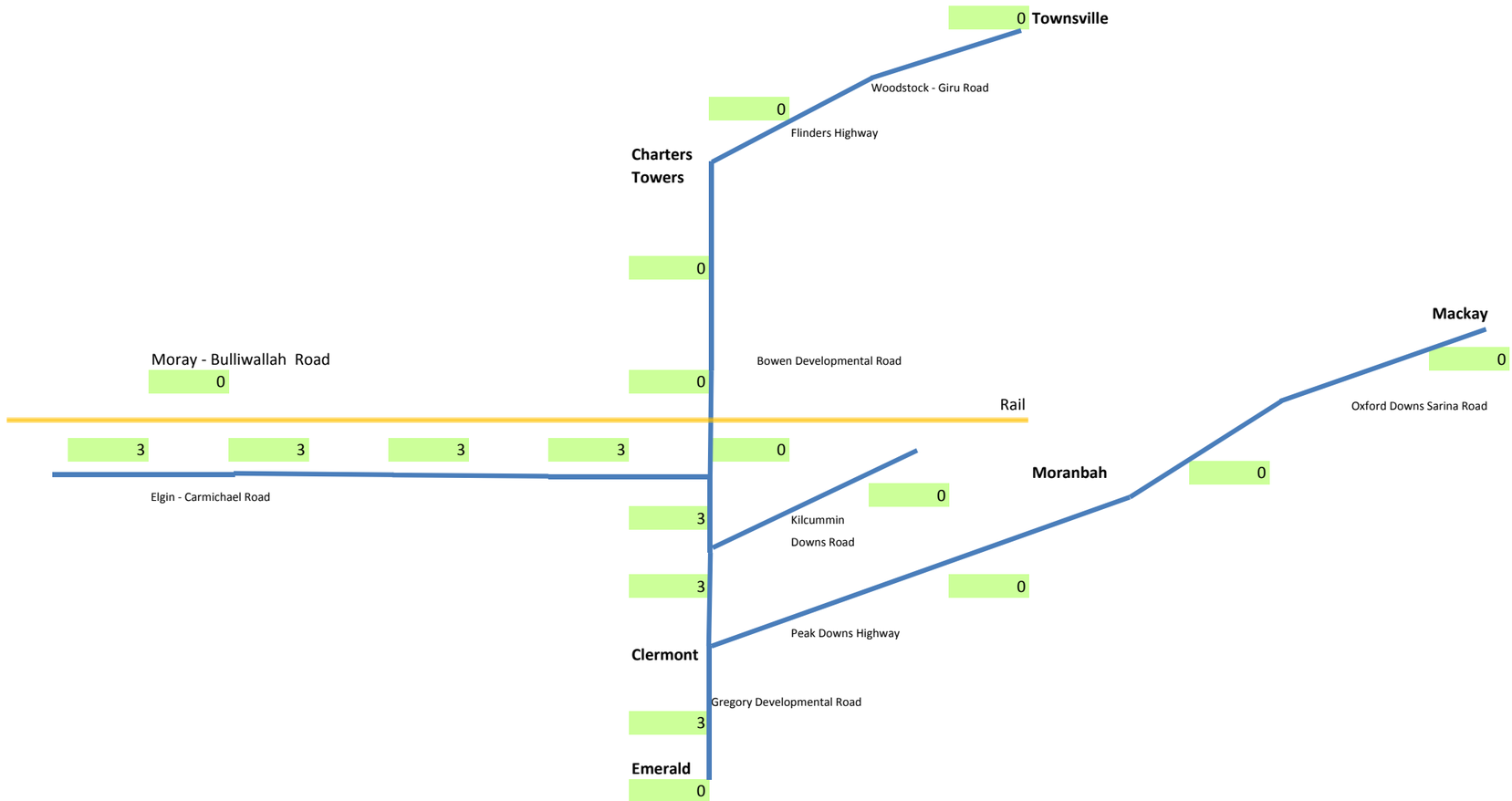
Table 3-1 Rail Construction Camp 2 - Traffic Generation

Trip Type	Mode	Weekly Volume	Daily Volume	Peak Hour Volume
Fly-in/Fly-out	Coach	10 vehicles in/out	2 in/out	2 in/out
Servicing	AV (semi-trailer)	10 vehicles in/out	4 in/out	2 in/out
Total		20 vehicles in/out	6 in/out	4 in/out

values above are for a 405 bed camp

FIFO - from new airport as closest airport (via Elgin Road)
From Airport 20 vehicles per week total two way coach
From Airport 2.86 vehicles per day total two way coach

Servicing
From Emerald 20 vehicles per week total two way (AV semi-trailer)
From Emerald 2.86 vehicles per day total two way (AV semi trailer)
(assumed to be consistent with the mine site and camps)



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)

Network Volumes
Rail camp 3 volumes - on Elgin Road side of GDR
2014
volumes are total two-way daily volumes

Table 3-1 Rail Construction Camp 3 - Traffic Generation

Trip Type	Mode	Weekly Volume	Daily Volume	Peak Hour Volume
Fly-in/Fly-out	Coach	10 vehicles in/out	2 in/out	2 in/out
Servicing	AV (semi-trailer)	10 vehicles in/out	4 in/out	2 in/out
Total		20 vehicles in/out	6 in/out	4 in/out

values above are for a 405 bed camp

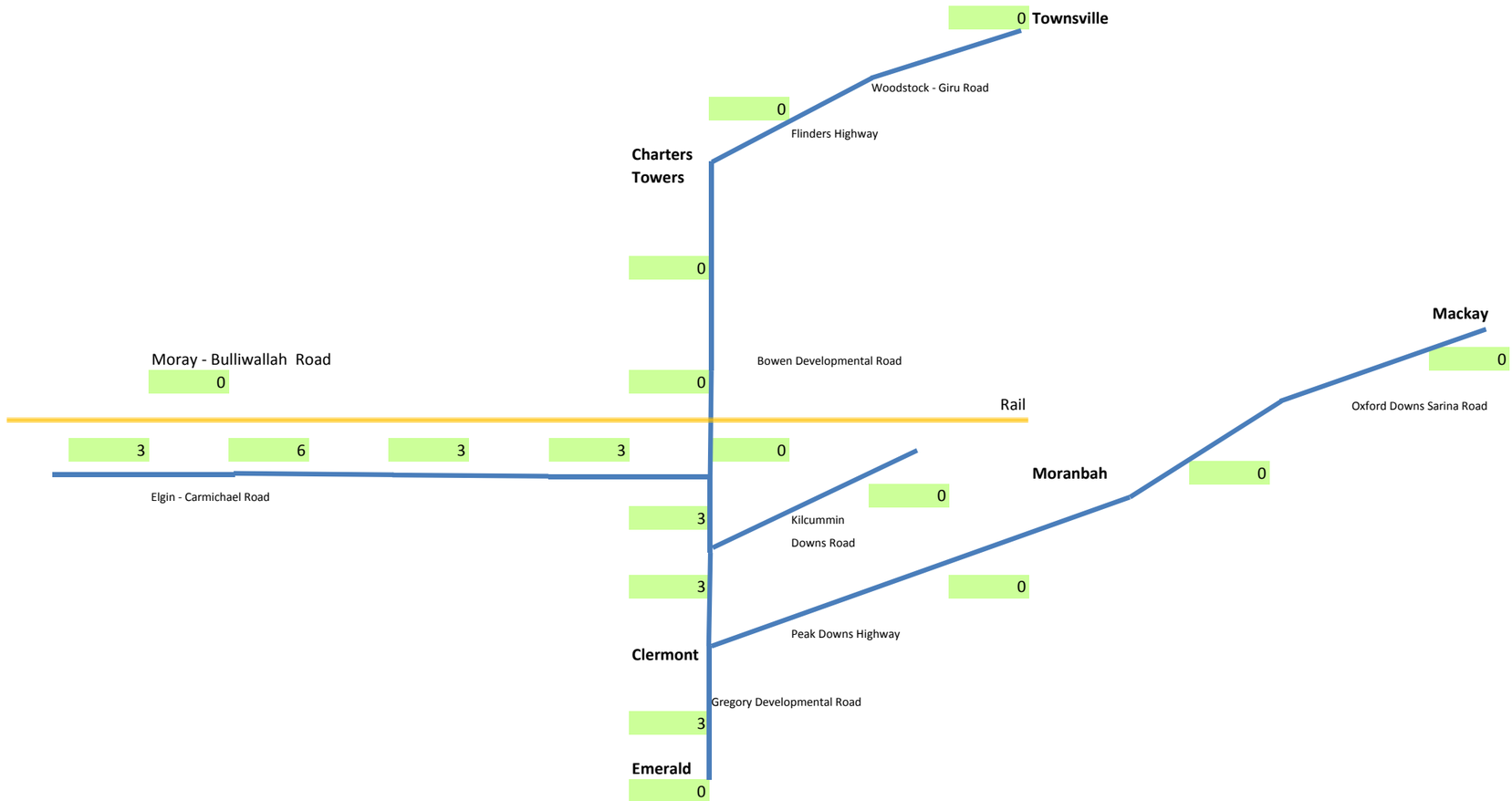
FIFO - from new airport as closest airport (via Elgin Road)

From Airport	20	vehicles per week total two way	coach
From Airport	2.86	vehicles per day total two way	coach

Servicing

From Emerald	20	vehicles per week total two way (AV semi-trailer)
From Emerald	2.86	vehicles per day total two way (AV semi trailer)

(assumed to be consistent with the mine site and camps)



(To/From Emerald includes trips from Brisbane and Rockhampton as it assumed they will use the western road network rather than the coastal (Bruce Highgway) route)