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13.1 INTRODUCTION

This chapter examines the impact of the proposed railway on the state and local controlled road network. In particular, it describes the nature, magnitude and significance of traffic and transport impacts associated with the construction and operation of the railway, together with an outline of the developer contribution to mitigate any adverse conditions. The outcomes summarised in this chapter are part of an overall technical report which is provided in Volume 5, Appendix 21.

The assessment is based on the assumption that traffic and transport impacts from the railway will concentrate predominately over a three year construction period. This will result largely from the movement of several million cubic metres of material by truck, from both within the rail corridor and imported externally from quarries. Once constructed, the railway will be largely self-contained through the provision of an internal service road to allow for ongoing maintenance.

Operationally, the train line will cross several major transport corridors, as well as a number of minor roads and private property circulation roads. These public roads are administered by Department of Transport and Main Roads (DTMR) and a number of local councils including BRC, IRC and WRC. The railway will also cross Queensland Rail's North Coast Railway, near Abbot Point at Bowen.

The construction of the railway is expected to employ approximately 1,000 workers, while the long term operation will require an estimated 60 permanent workers. To accommodate construction workers several temporary camps will be provided along the proposed route adjacent to existing infrastructure and townships. This will distribute the workforce and subsequent impacts of construction along the rail line. The overall railway schematic illustrating the major roads to be crossed, together with the proposed locations for the construction camps, is shown in Figure 1 and Figure 2.

The construction activities are expected to temporarily increase the demands on the local transport network. However, where practical, transport of material and staff to the worksites will occur either along a service road parallel to the track, to limit travel distances on the public road network, or alternatively via rail as the track is being constructed. Access to the service track will be from the public road network at rail crossings. Overall, the rail construction and operation is not expected to compromise capacity of the local road network due to the existing low volumes and the provision of internal movements along the service road.

Generally, the use of rail for the bulk transportation of coal over such a large distance is the most appropriate solution with respect to traffic impact, particularly over the full life of the mine. The impacts of construction will be temporary, and these will be managed through the implementation of appropriate mitigation works. The ongoing traffic impacts due to the operation of the railway will also be addressed by providing appropriate crossing facilities for a range of existing transport needs.

This chapter addresses Section 3.9 (Transport) of the ToR for the Galilee Coal Project (Northern Export Facility), as issued by the DIP, August 2009. The ToR as provided in Volume 5, Appendix 1, provides the baseline assessment criteria to be addressed, including the need to outline the existing transport environment, impacts from the proposed developments, and the proposed mitigation measures.

Figure 1. Major Transport Corridors and Proposed Construction Camp Location (North)

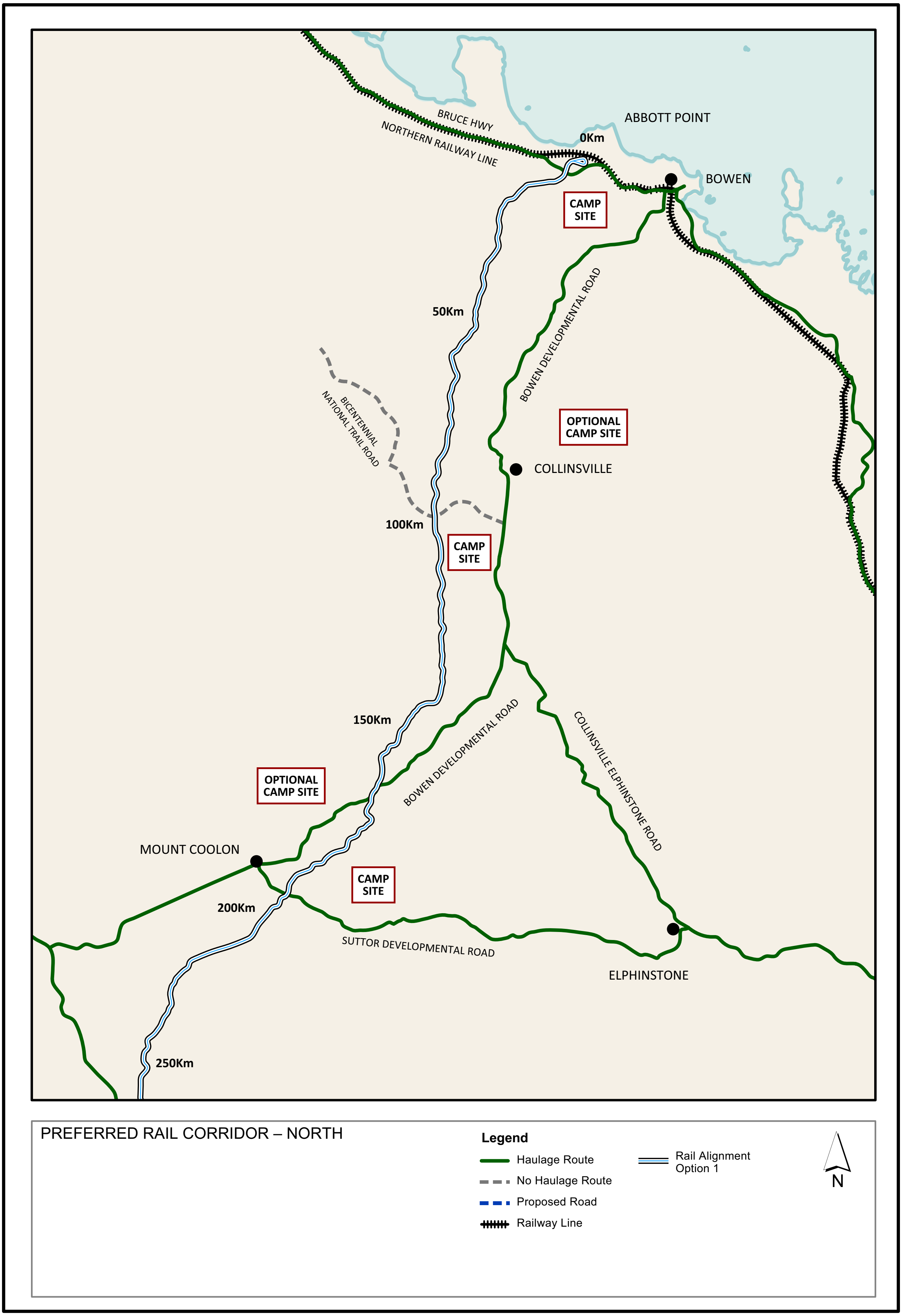
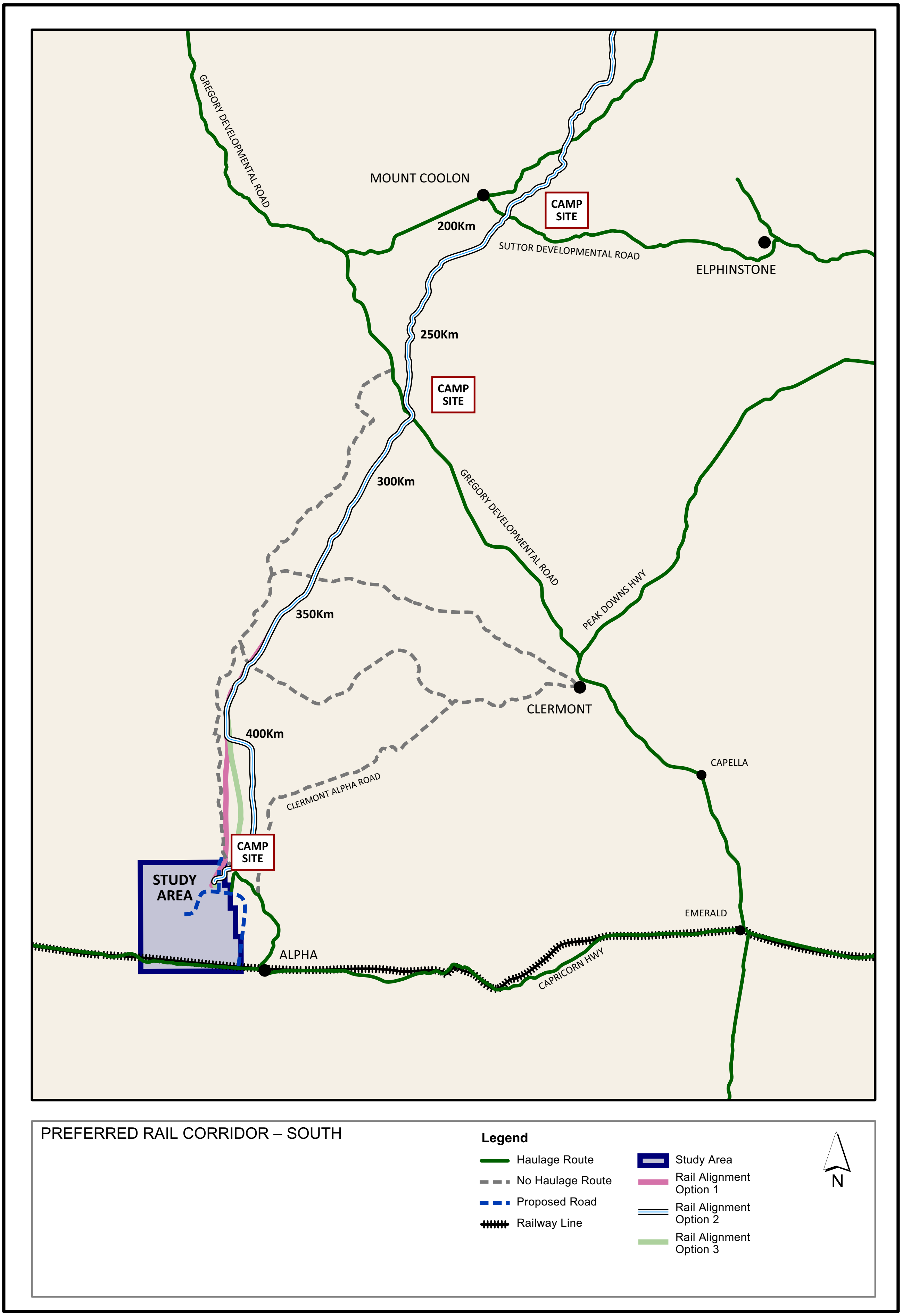


Figure 2. Major Transport Corridors and Construction Camps (South)



13.2 ASSESSMENT METHOD

This section outlines the approach adopted in assessing the potential impacts from the construction and operation of the railway on the local transport network.

A number of desktop studies, supported by field surveys and meetings with relevant councils and key stakeholders, were used to establish baseline conditions. Available traffic count information for the local roads was sourced from DTMR and local councils, while historic data was consulted to ascertain future traffic growth in the region.

The analysis of traffic and transport impacts from the development of the railway relates to the maximum development scenario. This is based on current projections of material requirements, workforce demands, timing and configuration for the worst-case scenario. Future changes to project projections are not expected to increase traffic or transport impacts beyond those reported in this study.

13.2.1 ROAD NETWORK

In assessing potential road impacts, the DTMR publication *'Guidelines for Assessment of Road Impacts of Development (2006)'*, together with Austroads publication *'Guide to Traffic Management (2009)'*, were used as guides for undertaking the traffic analysis.

The following steps were undertaken in preparing the road impact assessment:

Establish existing transport conditions

- review baseline data and mapping to identify existing transport infrastructure;
- collect traffic flow data for state controlled roads from DTMR;
- determine the level of service for existing traffic flows on state controlled roads according to Austroad's *Guide to Traffic Management Part 3: Traffic Studies and Analysis*; and
- review public transport operating within close proximity to the proposed railway.

Assess traffic impacts from the construction and operation of the railway

- approximate the degree and volume of traffic that will be generated from the movement of materials, equipment and personnel throughout the construction and operation of the railway;
- estimate potential heavy vehicle paths and distribution of project generated traffic based on assumed origins and destinations;
- determine the level of service on state controlled roads impacted from the increases in traffic based on Austroads guidelines; and
- assess the impact of project generated traffic on the safety of road / rail intersections according to Austroads assessment guidelines.

The key performance criteria used to assess operating performance on roads and key intersections included Level of Service, Percentage Increase in Average Annual Daily Traffic (AADT) and percent increase in pavements Equivalent Standard Axles (ESAs).

The safety and efficiency of railway crossings with state controlled roads, local authority roads, private access tracks, and existing railways, was assessed through consideration of the location, characteristics and typical safety issues of crossings (e.g. sight distance, intersection separation and angle, etc).

13.2.1.1 Level of Service

Level of Service (LOS) is a qualitative measure describing traffic operating conditions in terms of speed, travel time, freedom to maneuver, comfort, convenience, traffic interruptions and safety. Six classifications are used to describe LOS, designated A though to F. A LOS of A represents the best conditions with vehicles operating freely at or above the posted speed limit, while a LOS of F represents heavily congested flow with traffic demand exceeding the road capacity. Generally a LOS of D or worse would be considered intolerable in a rural road context.

All roads in the vicinity of the railway are to be retained as two-lane, two-way roads. The LOS on this class of road can be defined by the time spent following other vehicles. For a 100 km/h speed road, a LOS of A is achieved when the time spent following a vehicle is less than 40%. According to Austroads guidelines for rural roads, where directional traffic volumes of up to 300 vehicles per hour (VPH) is opposed by traffic volumes of less than 200 vph, the following time will be less than 40% and thus achieves a LOS of A. This equates to a daily traffic volume of approximately 4,000 vehicles.

13.2.2 PERCENTAGE INCREASE IN ADDT

Road capacity was assessed by calculating the growth in AADT on the existing road network as a result of the construction and operation of the mine. According to DTMR guidelines, it is generally acceptable if ADDT increases are within 5% on state controlled roads. Should the project generate increases greater than 5%, then the impacts are considered significant and need to be further addressed.

13.2.3 PAVEMENT IMPACTS

The method for broadly evaluating the structural pavement impacts along haul roads subject to quarry traffic was through an assessment of the increase in ESAs. The ESA is based on a specific axle group configuration, where a standard axle load is comprised of a single axle with two single wheels loaded to 5.4 tonne axle load (or 80KN for an axle with dual wheel configuration). Generally increase in ESAs within 5% is considered acceptable. In order to maintain the local road network at an acceptable standard, the developer is generally obliged to contribute to road preservation proportionally wherever significant impact occurs.

13.2.4 BRIDGE STRUCTURE CAPACITY

The assessment of major road structures that may be subjected to heavy vehicle movements, such as haul trucks from quarries and prefabricated concrete members for bridge and culvert crossings, was through a consideration of suitable heavy vehicle routes between major supply points and the site. Any heavy vehicle route identified as not being able to accommodate the potential loads, or have adequate height and widths to support over dimension vehicles, would need to be assessed further.

13.2.5 ROAD INTERSECTIONS

Assessment of transport impacts to key intersections included identifying those road junctions that are likely to experience a significant growth in rail related traffic beyond existing background levels. Typically, intersections providing for fewer than 100 VPH can be suitably serviced with basic left and right turn facilities without the requirement for auxiliary lanes.

13.2.6 RAIL CROSSINGS

The proposed railway will cross a series of transport corridors and depending on the safety characteristics and suitability of these crossings, may require the rail or conflicting infrastructure to be modified. The assessment of railway crossings involved identifying the appropriate crossing facility for three classes of road infrastructure, namely:

Major State Controlled Roads and Rail Lines – road and rail infrastructure which provides strategically significant connections between regions in Queensland. It is not acceptable for these routes to be severed, significantly re-routed, or experience on-going delays and interruptions.

Minor State Controlled Roads and Local Authority Roads – this class of infrastructure is classified as transport routes which provide local access. It is not acceptable for these routes to be severed as access must be maintained. However, some allowance for these routes to be re-routed or experience temporary interruptions is acceptable.

Private Property Tracks - these transport routes are identified as tracks which allow vehicle and livestock movements within private properties. It is generally acceptable that these routes are removed, on the provision that alternative access is provided. However, it is undesirable to provide these crossings where train priority must be provided. This is due to the need to move livestock across properties. It is highly desirable to keep livestock movements separate from train movements due to the potential for livestock losses and potential delays to trains.

13.2.6.1 Level Crossing Assessment

For level crossings, four main principles were assessed based on a safe and functional rail crossing:

Intersection Separation - a critical safety factor in the operation of rural level crossings is the proximity of the crossing to intersections. Where road crossings are located too close to level crossings, there is the potential for vehicles to queue across tracks. The separation of intersections at level crossings must consider the potential for queuing and design vehicles for the road.

Intersection Angle – a severe skew angle can make the detection of and judgments about potential conflicting vehicles on crossing roadways much more difficult, limit the vision triangle for stopped vehicles, increase the time to cross the through road and potentially increase exposure time to crashes. The preferred angle of approach for level crossings is 90 degrees. However, the angle may be up to 110 degrees to the left of the crossing and 140 degrees to the right.

Sight Distance - the safe operation of intersections requires adequate sight distance so drivers can enter the railway crossing safely. A critical factor in providing these sight distances is the angle of approach, as discussed above. The calculation of intersection sight distance is provided in the DTMR's *Road Planning and Design Manual – Chapter 21*. Generally there are three critical sight distance requirements for level crossings:

- distance from the crossing at which a car is positioned to identify an approaching train;
- distance from the crossing at which a train is positioned to be identified by a car; and
- distance along the line at which a stationary vehicle can identify a suitable gap to allow acceleration and clearing of the line.

Warning Signs – generally, rail crossings require signals and boom gates where the following criteria exist:

- vehicular train exposure at level crossings (veh/day × trains/week) exceeds 50,000;
- where insufficient sight distances are available; and
- where curved rail lines provide inappropriate approach angles.

Therefore, on the provision that adequate sight distance and approach angles are incorporated as discussed above, the appropriate treatment for rail crossings will be signage control.

13.2.7 EXISTING ENVIRONMENT

This section describes the existing transport environment in the vicinity of the proposed railway. This formed the baseline data for the qualitative and quantitative impact assessment of rail generated traffic on the local transport network.

13.2.8 ROAD NETWORK

13.2.8.1 State Controlled Roads

The state controlled road network in the vicinity of the railway corridor that will be subject to construction and operation traffic is illustrated in Figure 1 and Figure 2. These roads are administered by DTMR and include a combination of National Highways, State Strategic Roads, Regional Roads and District Roads. A brief description of the main characteristics of these public roads is as follows:

- Clermont-Alpha Road – a single lane carriageway that connects the Capricorn Highway at Alpha with the township of Clermont. This regional road generally heads in a northerly direction and is sealed for the first 35 km from Alpha, as well as within approximately 7 km of Clermont.
- Gregory Developmental Road – part of the 900 km long Gregory Highway between Charters Tower and Springsure. North of Clermont this route is known as the Gregory Developmental Road and is classified as a state strategic road to Belyando Crossing. It has recently been upgraded to improve its structural integrity and now exists as a dual lane, 6 - 8 m wide bituminized pavement. It is frequently used by road trains.
- Bowen Developmental Road – a district road branching from the Bruce Highway at Delta, to Belyando Crossing, where it links into the Gregory Developmental Road. It is currently sealed between Delta to a point halfway between Mt Coolon and Collinsville. The road provides access to Strathalbyn Road, Strathmore Road and the Suttor Developmental Road, while passes through a number of small localities including Mt Coolon, Collinsville, Almmola, Briaba, Binbee and Armuna.
- Suttor Developmental Road – a gravel state controlled regional road which branches off the Bowen Developmental Road at Mt Coolon and finishes at Nebo where it connects to the Peak Downs Highway.
- Bruce Highway - is a major coastal highway between Brisbane and Cairns. This national highway is a two lane carriageway with passing lanes and is entirely sealed with bitumen throughout.

In addition to the state controlled roads listed above, a number of mostly unsealed council and private roads will be traversed by the proposed railway. The locations and suggested crossing treatment for each of these is described further in Section 13.5.4.3.

13.2.8.2 Traffic Conditions

Traffic volumes for the State Controlled Roads that will be intersected by the railway are presented in Table 1. These have been estimated from DTMR recordings in 2009 and the populations in the region.

13.2.8.3 Flooding

A number of roads that will service the railway travel across water courses and / or floodplains and are thus susceptible to seasonal flooding. Local councils have advised that they have no records of the flood immunity for the roads in the vicinity of the rail corridor but advised that during the 'Dry Season' the local dirt roads typically turn to "Bull Dust" and dust is the main concern. During the 'Wet Season' these roads become muddy, boggy and generally impassable.

13.2.8.4 Public Transport Network

There are several public transport routes in the region, consisting primarily of school bus routes. These bus routes operate along the Bruce Highway and on several roads in the vicinity of Collinsville. Pick-up points are generally adjacent to major roads, near individual property accesses or local road intersections.

13.2.8.5 Stock Routes

Stock routes provide pastoralists with a means of moving livestock (cattle, sheep, etc) along designated reserves of unallocated state land and pastoral leases. This provides an alternative to trucking and other contemporary transport movements. The use of stock routes can present safety concerns for vehicular transport in rural areas. A number of stock routes exist along roads within the vicinity of the railway.

13.2.8.6 Rail Network

The proposed railway will cross the North Coast Railway within the APSDA, near Bowen. This is a narrow gauge, single track, electrified railway with crossing loops. It generally runs parallel to the Bruce Highway in a north south orientation between Brisbane and Cairns. This railway is the principal general and containerise freight and passenger line within the Queensland Rail network.

13.3 PROJECT TRAFFIC

This chapter presents an overview of the proposed rail corridor, staffing operations, construction camp requirements, likely haul routes and the anticipated traffic volumes resulting from vehicles movements.

13.3.1 WORKFORCE

A workforce of approximately 1,000 will be required for the development of the railway over a three year construction period. Works on the railway will generally be undertaken in a single day shift, with the occasional night works, particularly around major transport corridors to minimise disruptions to public services. Once built, an estimated 60 permanent employees will then be required for the ongoing operation of the railway.

Table 1. Existing traffic volumes on state controlled roads.

ROAD CROSSING	RAIL CROSSING	CURRENT TRAFFIC (AADT)
Bruce Highway (west of Bowen)	5 km	2,600 VPD
Bowen Developmental Road (near Suttor Developmental Road)	167 km	40 VPD
Suttor Developmental Road (near Bowen Developmental Road)	195 km	38 VPD
Gregory Developmental Road	285 km	320 VPD
Clermont-Alpha Road (south of Hobartville Road)	445 km	80 VPD
Clermont-Alpha Road (north of Hobartville Road)	445 km	16 VPD

Note: VPD is Vehicles Per Day

The workforce will consist primarily of permanent Drive-in/Drive-out (DIDO) staff. These will be employees whose primary residence is near a regional centre that drive in to undertake several days' work, before returning home for several days leave. This DIDO rotation is typically a seven days on, seven days off roster. However, this can vary based on individual roles and requirements at the site. The DIDO roster will typically result in 70% of staff on site at any time, with 30% rostered off.

Transport between the accommodation camps and the worksite will be mostly via communal transport, likely to be buses with between 16 and 50 seats based on demand. It is estimated that 80% of staff will be transport between the camps and work zones via the bus service, with the remaining 20% expected to be comprised of sub-contractors accessing the site by light vehicles.

The staff not using group transport will be encouraged to exercise carpooling using company vehicles to minimise traffic generation.

13.3.2 CONSTRUCTION CAMPS

Construction of the railway will be undertaken in approximately five sections. Each will be approximately 80 km to 100 km in length and will have its own dedicated workers camp. Approximately 150 to 200 employees will be based at each camp, with additional supervision and design staff located at the northern end of the line.

The indicative construction camp locations, as shown on Figure 1 and Figure 2, include:

- Chainage 5 km to 90 km: a camp to support the north most segment of the rail line. This is likely to be integrated into the construction camp established for the coal terminal workforce;
- Chainage 90 km to 180 km: a camp located adjacent to the Bicentennial Nation Trail Road providing easy access to Collinsville. Another option may be to locate this camp within or immediately adjacent to Collinsville;
- Chainage 180 km to 270 km: a camp located near the proposed rail intersection with the Suttor Developmental Road, providing easy access to Mt Coolon;
- Chainage 270 km to 360 km: a camp located near the intersection of the proposed railway with the Gregory Developmental Road, near Twin Hills mine, with sealed access to Clermont; and
- Chainage 360 km to 468 km: a camp for the southern segment of the rail which will be provided as part of the mine construction camp.

Alternatively, a joint construction camp for sections 90 km to 180 km and 180 km to 270 km could be established near the Bowen Developmental Road intersection with the proposed railway.

These indicative camp locations have been selected to provide direct access to the rail corridor, existing infrastructure and regional townships. Where possible, construction camps will be located to take advantage of existing services and to preserve the amenity of any adjacent residences. Where services are not available, as is typical in remote locations, the camps will be designed to be self-sufficient with on-site power generation and package / modular water and sewage treatment facilities.

13.3.3 SERVICE ROAD

An unsealed formed access road will be constructed parallel to the railway track to allow internal movement of traffic throughout the construction period. After the construction phase is completed, the service road will be retained for ongoing maintenance and emergency access, except across major watercourses where it will be diverted along existing crossings.

External access to the service road will be provided for at least every 50 km at locations where the railway intersects public roads. Due to the irregular nature of road crossings, particularly in the southern part of the railway corridor, additional connections may be required through private property.

With regular traffic along the service road expected to only occur during construction, intersections of the service road with local roads are expected to be acceptable. Once operating, vehicle movements will be infrequent for occasional maintenance and servicing requirements.

13.3.4 EQUIPMENT AND SUPPLIES

The bulk equipment and materials items that are likely to be delivered to the site during construction of the railway will include; prefabricated concrete members, structural steel works, fuel, quarry materials (sand, ballast, rock armor), bridge girders, steel rails and concrete sleepers. These will be transported to site either along the built sections of the railway (by train), or alternatively by road transport along designated heavy vehicle routes to the closest access point to the service road.

13.3.5 VEHICLE TYPES

A wide range of vehicle types are expected to deliver equipment and consumables for the construction of the railway facility. These can be generally classified as being:

- light vehicles, mainly for contractor access;
- communal buses to transport workers from accommodation to work sites as groups; and
- haulage vehicles, typically truck and dog configuration, capable of carrying 26 t of material.

Occasional access for articulated vehicles, including b-doubles, b-triples and road trains is also likely.

In addition to this, a number of over dimension or excess load vehicles will be transported to site during mobilisation and demobilisation to undertake bulk earthworks and structure works. These may include pile rigs, cranes, dozers, scrapers, rollers, backhoes, excavators, dump trucks, water carts, mobile batch plants, prefabricated offices, camp facilities and paving machines.

The volume of additional traffic generated during operation of the railway is expected to be confined to maintenance staff driving predominantly light vehicles. This is expected to be minor and thus have a negligible impact on the surrounding road network.

13.3.6 HEAVY VEHICLE MOVEMENTS

The majority of heavy vehicle movements will result from a combination of internal truck movements of bulk earthworks, as well as external movements to and from quarry sites to supply formation materials such as aggregate, sand, capping and ballast.

Preliminary studies estimate that 430,000 truck movements will be required for haulage of bulk earthworks within the site, while the import of rail formation materials from quarries will result in approximately 235,000 truck movements. This is based on the assumption that 26 t trucks will be used for haulage and a material conversion rate of 1.9 t/m^3. Therefore, heavy vehicle haulage of materials from quarries will require approximately 47,400 truckloads (94,800 truck movements) per segment. Assuming a three year construction timeframe, operating seven days per week, haulage from quarries will require an average of 87 truck movements per day in each segment.

Generally most bulk earthwork movements will be along the internal service road and avoid public roads. Where heavy vehicles require external access from the railway corridor, this will be along the most direct route to each of the construction zones, which is suitable for heavy vehicles.

Preliminary planning has identified a number of suitable haul routes, as illustrated in Figure 3 and Figure 4. These also show the routes restricted to heavy vehicle access due to capacity and load constraints on roads and structures. Prior to the establishment of the proposed mine access road from the Capricorn Highway, both the Clermont Alpha Road and Hobartville Road, will need to be used initially for access.

13.3.7 RAILWAY CONSTRUCTION SEQUENCE

The construction of the below rail infrastructure (sleepers, rail and ballast) will be built in sequence by rail based equipment once the rail formation has been sufficiently progressed by the earthworks construction teams. Trains carrying lengths of pre-welded track, concrete sleepers and ballast will be used to transport material to site.

This will allow specialist equipment to lay sleepers in place, followed by 40 m segments of rail which will be automatically clipped into place. Ballast that has been sourced from nearby quarries will be hauled to site on ballast trains, and then dumped, compacted and formed-up around the recently laid track. The trains can then roll forward over the newly constructed track to access the next section.

Ultimately, this will allow the rail materials (sleepers, rail and ballast) to be delivered by train along the railway corridor and thus minimise impacts to the local road network.

Figure 3. Proposed Haul Routes (South)

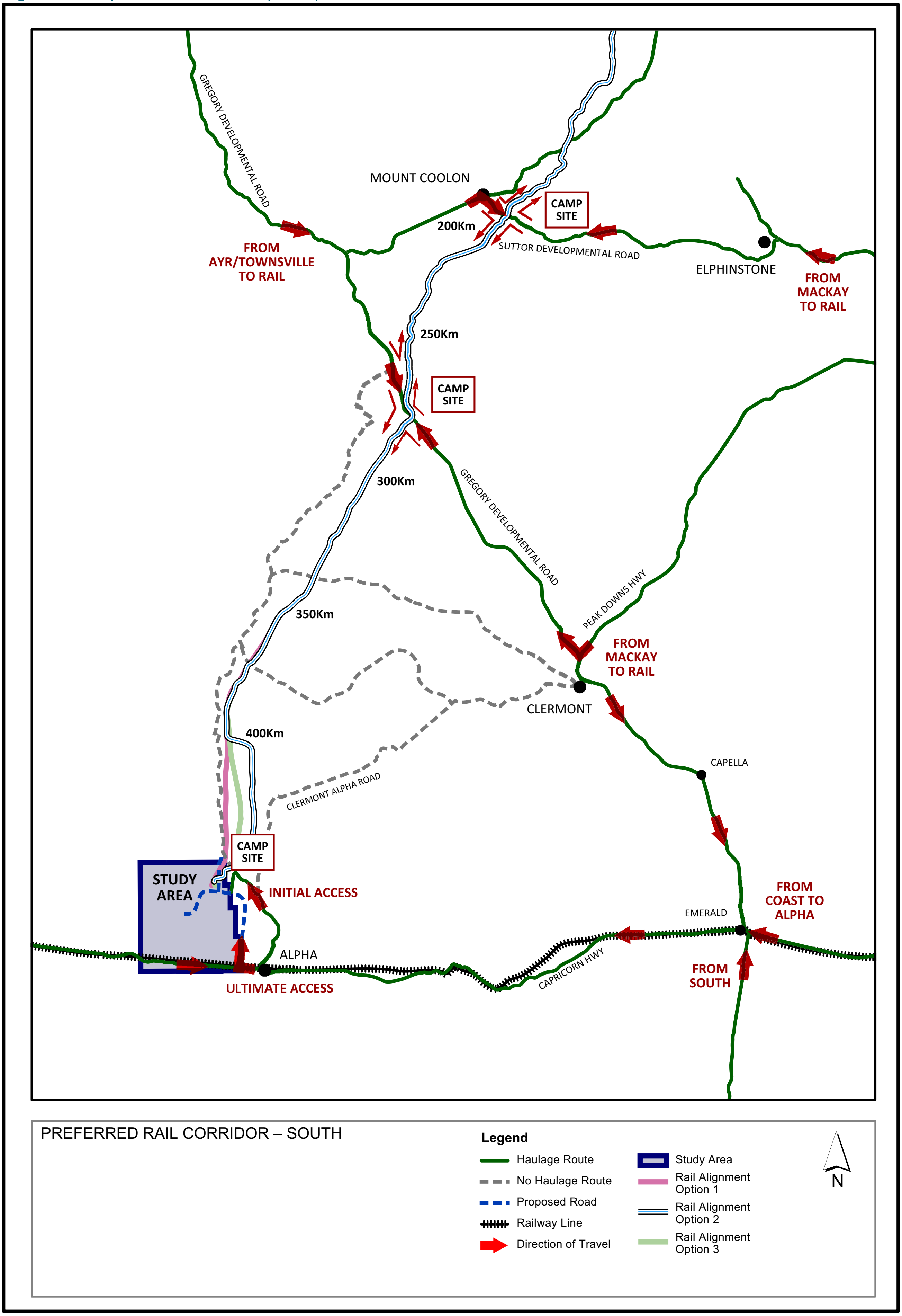
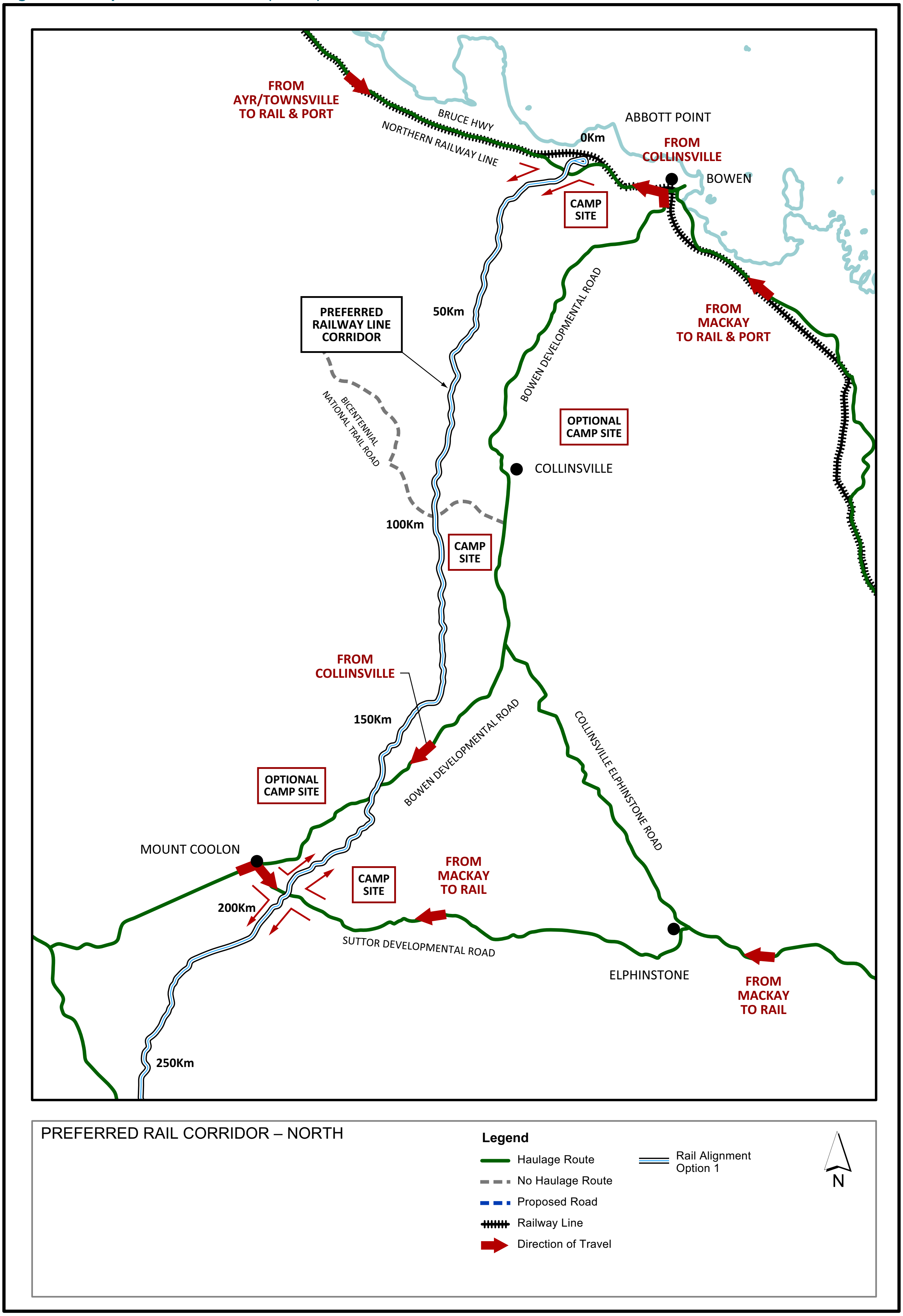


Figure 4. Proposed Haul Routes (North)



13.3.8 ROAD TRAFFIC GENERATED

The daily road traffic generated from the construction of the railway for each of the five segments is estimated as:

- 87 haul vehicle movements;
- 10 additional heavy vehicle movements (including machinery, other deliveries such as concrete and fitting) and water trucks;
- 40 light vehicle movements; and
- 20 group transport movements (five vehicles in and out for each shift).

This will result in a daily total of approximately 157 vehicle movements per section, of which 117 will be heavy vehicles. Where quarry material is sourced from sites adjacent to the rail corridor, external traffic volumes will be reduced by 87 VPD.

13.4 IMPACT ASSESSMENT

This chapter describes the potential transport impacts resulting from the development of the railway on the surrounding road network, intersection safety, pavement capacity and sensitive receptors.

13.4.1 ROAD CAPACITY

The construction of the railway over a three year period is expected to have a temporary impact on the local transport network. Currently state controlled roads intersected by the railway carry light traffic volumes, with the exception being the Bruce Highway (Table 1). Parts of these roads will be used as supply routes for materials from quarries, goods and services from regional townships, as well as for transport of workers from accommodation camps. Consequently, this may increase traffic on these roads by up to 157 VPD. These figures are considered suitable for assessment without considering future traffic growth, as the traffic impacts are only expected to occur during the temporary construction phase.

Heavy vehicle impacts to the external road network will predominately concentrate along haul routes to quarry sites. This will increase traffic by up to 87 VPD and result in a significant proportional increase in traffic on background conditions and a more substantial increase in ESAs, given the high percentage of trucks, albeit from a low base.

In accordance with DTMR guidelines, the capacity of local roads was assessed through consideration of LOS. As outlined in Section 13.2.1.1, for a 100 km/hr two lane rural road, a LOS A is achieved where maximum daily traffic volume is less than 4,000 vehicles. Only the Bruce Highway is expected to carry this magnitude of traffic, with construction traffic expect to marginally increase on current volumes of 2,600 VPD. As such, the provision of adequate two-lane, two-way carriageways will retain a LOS A on all roads used by railway construction traffic, including the Bruce Highway. All other non State controlled roads are expected to operate with less than 60 vph, including development traffic.

13.4.2 ROAD INTERSECTIONS

As with LOS, road intersections are generally not likely to experience any significant congestion where traffic volumes are less than 100 vph. As such, existing configured intersections are expected to be suitable to cater for railway generated construction traffic. The exception to this may be intersections along the Bruce Highway, between the site and traffic sources such as workers villages, quarries and the rolling stockyard.

13.4.3 RAIL CROSSINGS

The proposed railway will impact a number of existing infrastructure transport corridors including:

Major State Controlled Roads and Railway Lines

- Bruce Highway (chainage 5 km); and
- Gregory Development Road (chainage 285 km).

Minor State Controlled Roads and Local Authority Roads

- Strathalbyn Road (WRC) – Chainage 5 km;
- Tabletop Road (WRC) – Chainage 66 km;
- Curringa Road (WRC) – Chainage 71 km;
- Strathmore Road (WRC) – Chainage 75 km;
- Bicentennial Nation Trail Road (WRC) – Chainage 75 km;
- Bowen Developmental Road (TMR) – Chainage 165 km;
- Glenavon Road (WRC) – Chainage 195 km;
- Suttor Developmental Road (TMR) – Chainage 195 km;
- Stratford Road (WRC) – Chainage 215 km;

- Avon Road (IRC) – Chainage 260 km;
- Clermont Laglan Road (IRC) – Chainage 335 km;
- Albro Pioneer Road (IRC) – Chainage 370 km;
- Surbiton Wendouree Road (BRC) – Chainage 415 km;
- Degula Road (BRC) – Chainage 435 km and 428 km; and
- Hobartville Road (BRC) – Chainage 435 km.

Private Property Roads

There are approximately 190 existing tracks that have been identified as crossing the rail line. The general locations of each of these, together with the major and minor state controlled roads listed above, are shown in the technical report at Volume 5, Appendix 21.

13.4.4 ENVIRONMENTAL AND OTHER ROAD IMPACTS

Due to the remote nature of the majority of the railway, environmental impacts to nearby sensitive receivers such as residences, stock and roadside vegetation, is expected to be minimal. The exception to this may be along designated haul routes through townships, such as Collinsville and Mount Coolon. The potential environmental impacts and other roadside issues resulting from rail traffic may include:

- Road Noise – some construction activities may generate elevated noise levels on background levels, mainly resulting from heavy vehicle movements to and from quarries. Excessive environmental noise can be a displeasing annoyance and distraction to the activity and balance of human and stock life. The intensity of roadside noise may temporarily impact residences within 500 m of either the railway, or along construction haulage routes (particularly through townships).
- Dust and Weed Contamination – routes used for construction traffic may contribute to dust contamination, particularly along unsealed roads during the dry season. This may present a health and safety impact to adjoining land uses, stock and roadside vegetation. In particular it can pose a safety concern to motorists travelling along unsealed roads by obstructing sight distance. The movement of vehicles to and from the railway corridor increases the risk of spreading noxious weeds, plant debris and exotic pests.
- Roadworks in a Road Reserves – the construction of the railway will require works to be conducted within existing road and rail reserves. This may include temporary closures to allow construction of bridges, level crossings and associated track works. These may result in interruptions to residents using these routes.
- Over Dimensional Vehicles – the construction of the railway will require over-dimensional vehicles to operate between the site and regional townships. These will predominately supply the railway with large prefabricated items, materials and equipment. Accessibility for over-dimensional vehicles is available at the Bruce Highway intersection with the rail line. Further access will be via the Bowen Developmental Road and Suttor Developmental Road, which are also unrestricted. Currently the only restriction for over-dimension access within the vicinity of the site is through the township of Tambo. There are no excess dimension restrictions for the townships of Alpha, Jericho or Emerald, or for the Capricorn Highway.
- Heavy Mass Vehicles – the construction of the railway is likely to require the transport of heavy materials and equipment to the site. Transport along approved Higher Mass Limit (HML) roads for vehicles with pavement friendly suspension is administered by DTMR. Currently the Bruce Highway and a small part of the Bowen Development Road are the only HML approved routes within the vicinity of the railway corridor, as shown in Figure 5.
- Dangerous Good and Hazardous Materials – the development of the railway will require the transport of dangerous goods and hazardous materials to and from the site. This may include fuel and oils, flammable gas, corrosive materials including solvents, explosives and chemical wastes including sewage. The transport of these goods increases the risk of a chemical spill on route.

13.5 MITIGATION AND MANAGEMENT

The following mitigation measures apply to the construction phase of the railway to address the impacts to the traffic and transport environment. As minimal impacts are expected to result from operating traffic, mitigation measures have not been suggested for this stage of the project.

13.5.1 SERVICE ROAD

The railway is proposed to incorporate the highest degree of self-containment achievable. This is to limit the impact on existing local facilities and the surrounding transport network. As such, the rail easement will contain a service road running parallel to the track to allow internal movements of haul trucks during construction, as well as for use by service vehicles during ongoing maintenance. Throughout construction the built sections of track will also be used to transport equipment and materials along the railway and thus reduce external traffic movements.

13.5.2 SITE ACCESS

Access to the railway will be provided for at each point it intersects the public road network. At each of these locations, gates and fencing will restrict entry to the public. During construction gates would be open to service roads on sections of the railway where construction activities occur. Once the line is operational, gates will remain locked at all times, with access restricted to approved maintenance and emergency vehicles. In some locations, local residents may also utilise sections of the service road for internal movements on private property.

Access to the rolling stockyard will also be controlled through either the provision of a gate, or some other security mechanism. This will generally be shut and only opened for scheduled movements to the yard. To ensure adequate queuing space, the gate will be set back at least 30 m from the intersection with the Bruce Highway.

13.5.3 ON SITE PARKING

Within the workers accommodation villages, the following provisions will be made for on-site parking of various vehicle types:

- 0.35 spaces for each unit in the accommodation centre;
- on-site private vehicle parking for 10% of the total workforce (approximately 15 spaces);
- on-site bus set-down facilities at the accommodation centre and at work sites; and
- on-site turning for haulage vehicles and group transport vehicles.

13.5.4 RAIL CROSSINGS

13.5.4.1 Grade Separated Crossings

Grade separated structure crossings of major roads and existing railway lines is proposed for:

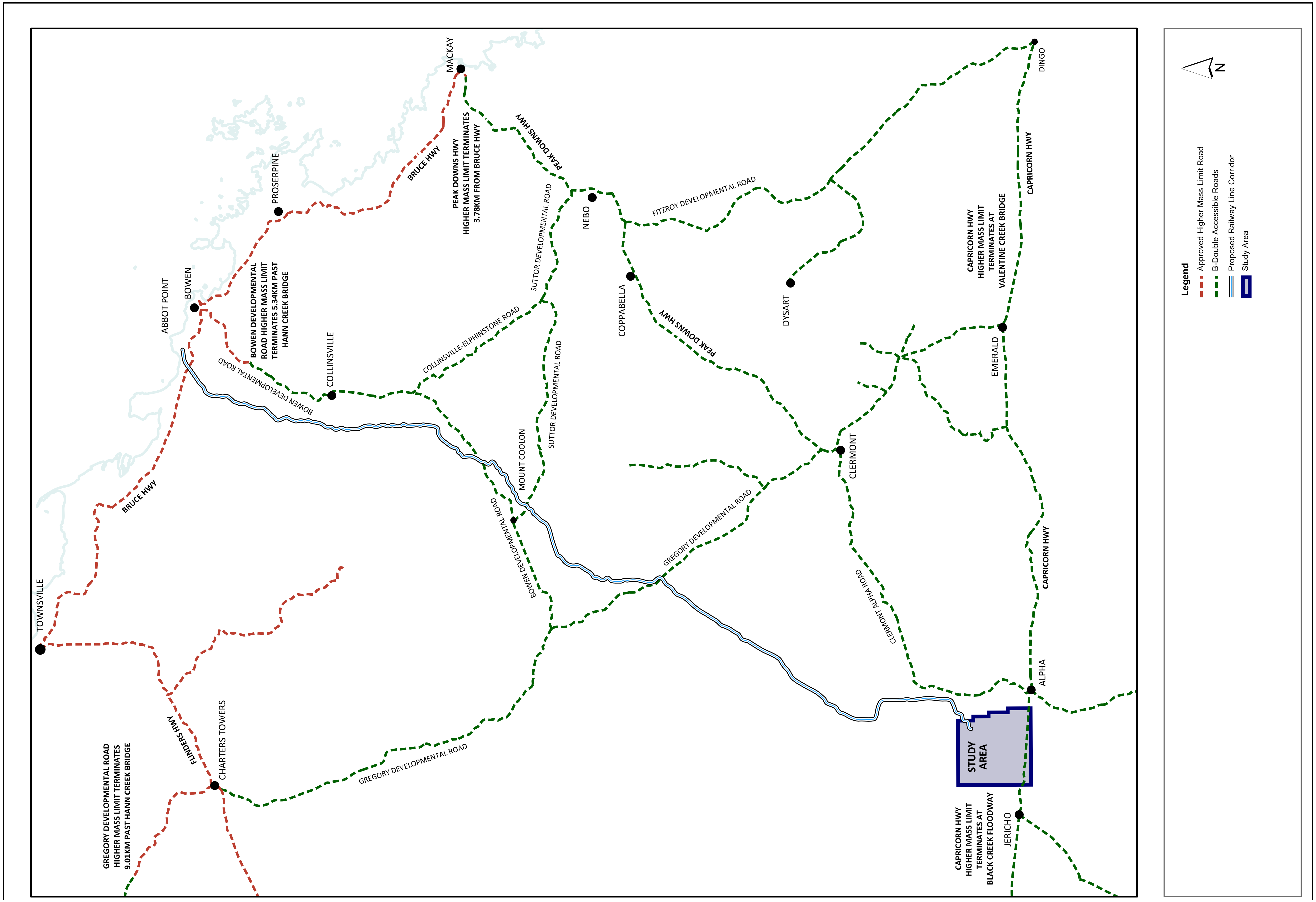
- Bruce Highway; and
- Gregory Development Road.

Typically a rail bridge will be used to cross over the existing infrastructure; however, should the topography and alignment be suitable, the merits of constructing road bridges will be considered, particularly in the case of the Gregory Developmental Road. Each crossing will be investigated further at detailed design in conjunction with the relevant administrative parties including DTMR and regional councils.

13.5.4.2 Level Crossings

Crossings of state controlled roads (minor and local authority roads), as identified in Section 13.4.3, are proposed to be crossed with at grade level crossings. While it is understood that DTMR desires grade separation for all roads crossed by the rail line, this is not considered necessary for minor roads. For example, where the rail line crosses the Suttor Developmental Road and the Bowen Developmental Road, the existing traffic volumes are in the order of 40 VPD. As such, grade separation is not warranted as conflict between trains and vehicles will be very infrequent.

Figure 5. Approved Higher Mass Limit Roads



For each level crossing, the following principles will be addressed to ensure a safe operating environment:

Intersection Separation

To allow for vehicles to slow, come to a complete stop and stand clear of the track in the event of breakdown, a minimum separation of 100 m between intersections and level crossings is proposed. In situations where this is not currently achieved, the railway alignment will be modified to provide the 100 m separation. If this is not possible due to topographic or other constraints, the local road may then be realigned to provide this minimum separation.

Intersection Angle

There are a number of level road crossings with the proposed railway that exceed the maximum crossing angle. During detail design the alignment of the railway will be adjusted to improve the intersection angle to within an acceptable limit, as outlined in Section 13.2.6.1. Alternatively, localised deviations of the approach roads may be required to allow roads to run parallel to tracks, then turn and cross at right angles.

Sight Distance

In conjunction with the assessment of intersection separation and crossing angle, each level crossing will require a detailed field assessment to determine if suitable sight distance is achieved. If this is not the case, measures will be undertaken to improve this before reverting to signals and boom gates, including the clearance of obstructions and providing amended road alignments.

Warning Signs

The maximum daily traffic volume for any road with a proposed level crossing is expected to be less than 100 VPD. The rail line is expected to operate up to seven trains a day at peak operation, resulting in 98 train movements per week. On this basis, the vehicular-train exposure for each road in the network would be less than 10,000, which is less than half the trigger for signals. Therefore, on the provision that adequate sight distance and approach angles are incorporated as discussed above, signage controlled treatment would be acceptable. This would include the need for signage at the crossing and on approaches in accordance with the DTMR's *Manual of Uniform Traffic Control Devices* and relevant local requirements.

Despite this minimal requirement, it is proposed that state controlled roads will have flashing signals. This recommendation is on the basis that there is a level of expectation for users of major and state controlled roads to provide higher order facilities. This accounts for occurrences of irregular users who may not be familiar with the local area and of long distance travelers. The sustained sounding of locomotive warning horns on approach to level crossings will also be enforced.

13.5.4.3 Private Road Crossings

The preferred treatment for private track crossings is to provide grade separation between the rail line and the crossing, via a culvert. This will allow uncontrolled livestock movements to occur without conflict with trains. These culverts should be suitable to allow a large 4WD to move through as well as the free movement of large breed cattle. As such, it is proposed that culverts with at least 2.7 m height clearance and 3.3 m width are provided. The location of culverts will consider the location of existing tracks, together with the localised topography and input from property owners. For existing tracks, a suitable crossing point will be attempted to be provided within 1 km. This may allow several existing tracks to be combined into a single crossing point, as illustrated in Figure 6. This will generally be suitable where all tracks are associated with a single land parcel and topographical features do not limit the amalgamation of tracks.

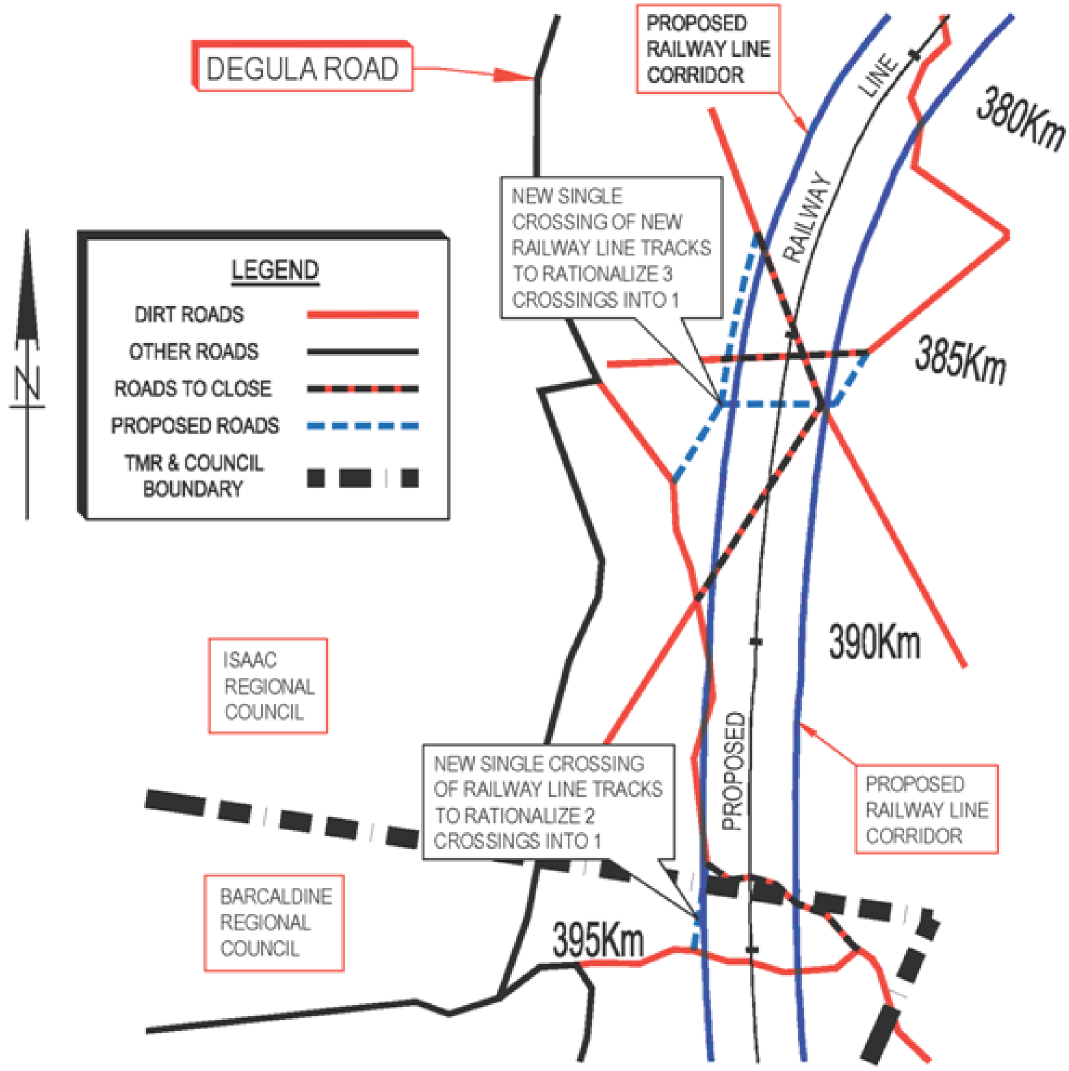
13.5.5 ROAD INTERSECTIONS

Generally existing road intersections along the railway are expected to be suitable to cater for the proposed development traffic. The exception to this may be the Bruce Highway, which will be a designated supply route to the rolling stockyard, workers camps and nearby quarries.

The rolling stockyard is expected to be utilised by very minor volumes (several vehicles per week). At all times, peak traffic generation is expected to be one VPH. This turn volume does not warrant the provision of auxiliary turn lanes. As such, the intersection will be formed as a driveway directly from the through lanes of the Bruce Highway.

Further consideration of intersection configurations with the Bruce Highway will be conducted at detailed design to establish if upgrades are necessary. In addition to this, a more detailed assessment of intersections along quarry haul routes will be conducted, once quantities and haul paths are confirmed.

Figure 6. Rationalisation of Private Property Crossings



13.5.6 BULK EARTHWORKS

The preparation of the railway formation will result in top soil generated from clear and grub activities. This surplus material will be stockpiled along the outer edge of the railway easement and then reused for rehabilitation works and across any bare earth areas for landscaping.

Significant quantities of excess cut may also be generated primarily at the northern end of the railway through the mountain ranges. It is proposed that any material that can't be used as fill material for rail embankments will be hauled back to local quarries adjacent to the railway line. These movements will be the return journey of trucks which have delivered ballast and capping materials. As such, this will not add truck movements; however, will increase pavement impacts as trucks will be loaded in each direction.

13.5.7 FLOODING

The construction of the railway during the wet season may result in some routes becoming impassable during periods of flooding. This will result in limited traffic movements and at worse, could see construction activities temporarily suspended and demobilised. If available, alternate routes that are practical and safe may be used for construction traffic during this period. The use of the railway during construction to transport materials will in part mitigate potential impacts arising from flooding.

13.5.8 BRIDGE CONDITION AND MONITORING

All structures which are subject to loading by the haulage of materials to the site will be actively monitored by Waratah Coal in consultation with DTMR and the relevant authorities for the duration of the rail construction process.

13.5.9 QUARRY HAUL ROUTES

Once quantities of materials and destination of quarries have been ascertained, a pavement impact assessment will be carried out along haulage routes to establish percentage increase in ESAs. This assessment will consider the temporary nature of the proposed haul route, with respect to the life cycle of the subject pavement. It is proposed that these haul links be assessed, in conjunction with DTMR local government authorities or local property owners, on a case-by-case basis to determine the degree of impact, together with an appropriate maintenance and rehabilitation contribution scheme to mitigate this.

13.5.10 ROADWORKS AND CLOSURES

All construction activities within road and rail reserves will be undertaken in accordance with DTMR's Manual of Uniform Traffic Control Devices and relevant local requirements. This will include provision of appropriate barriers, signage and traffic controllers as necessary.

Prior to commencement of any works, Operational Works Approvals will be attained from the relevant authorities and infrastructure agreements entered into. These agreements will define the required scope of works, responsibilities of all parties and timing for completion.

Where possible, roads will allow a suitable level of access and only be temporarily closed to ensure public safety while construction work is undertaken, after sufficient consultation with affected residents. Residents will be advised in advance of these closures and sufficient warning signs will be erected for through traffic. If road sections are to be closed longer than acceptable periods, a side track or suitable detour route will be provided. In this case, the proponent will also provide adequate notice to the local community via advertising using a wide range of media outlets.

Other road features including property fences, access locations and stock crossing points which are impacted by the proposed railway, will be replaced with similar standard facilities where appropriate.

The Bruce Highway and Gregory Developmental Road must not be closed for periods of more than 15 minutes to allow for construction of bridges. These closures would generally be at night. If road sections are to be closed for longer, a side track or suitable detour route will be provided.

Minor roads which provide a through connection may be closed for up to half an hour at a time. Minor roads which are no-through roads may be closed for several hours at a time.

13.5.11 PUBLIC TRANSPORT

The unformed casual pick-up areas used by the local bus services are considered suitable due to the existing low traffic environment. If highway traffic volumes were to increase significantly, provisions for more formalised bus facilities, including shelters, traffic signage and sealed bus stopping areas clear of the highway will be considered. Major roadworks and movement of over dimensional vehicles also has the potential to temporarily impact public transport. Where practical, these movements will be limited during school peak hours.

13.5.12 ENVIRONMENTAL MANAGEMENT

Road Noise. Operationally, it will be communicated to truck drivers that they are expected to conduct themselves with appropriate care towards local residents. This will include limiting the use of air brakes in townships and near residences, restricting the movements of heavy vehicles to within standard business hours when possible, and driving in a safe and responsible manner to limit vehicle noise in general.

Dust Suppression and Weed Control. It is proposed that further environmental assessments are provided for residents likely to be affected by dust from increased traffic on existing unsealed roads. Dust may be controlled through watering the area where dust is generated. Additionally, at exit points along the railway corridor to external roads, all heavy vehicles leaving the site will be subject to a wash-down of tyres or rumble grid to limit loose material and noxious weeds being transported onto sealed access roads.

Over-dimension Vehicles. As suppliers for materials and equipment which require Over-dimension transport to the site are identified, further route assessment and application for appropriate permits will be undertaken.

This will include assessment and applications for any vehicle requiring a pilot escort. Suitable mitigation measures will be developed subject to refinement of freight requirements including haul paths, size, weight and frequency of Over-dimension vehicles.

Excess Mass Vehicles. Excess mass vehicles are to be operated in accordance with the DTMR's Guideline for Operation Excess Mass. Where vehicles exceed the mass limits specified under the guidelines, permits will be attained from DTMR.

Dangerous and Hazardous Goods Movements. All transportation of dangerous and hazardous goods by road will be carried out in accordance with the licensing and vehicles requirements set out by DTMR. This includes operational policies that all drivers transporting dangerous goods are adequately trained, hold valid licenses and that all vehicles are adequate for transport of these materials in accordance with the following legislation:

- *Transport Operations (Road Use Management) Act 1995;*
- *Transport Operations (Road Use Management – DG) Regulation 2008;*
- *The Australian DG Code 7th Edition;* and
- *National Transport Commission (Road Transport Legislation – DG Act) Regulations 2006.*

Stock Routes. Impacts to stock routes will be mitigated in accordance with DERM and council requirements, together with consultation with affected pastoralists, drovers and graziers. Any stock routes to be realigned or severed will be re-established to meet the surrounding conditions.

13.6 CONCLUSIONS

This assessment has found that the construction of the railway has the potential to impact the local road environment. Such impacts are expected to be temporary, generally limited to the three year construction period and managed through the implementation of appropriate mitigation works, as outlined in section 0. Generally the additional construction traffic can be adequately accommodated in the existing state controlled road network at an acceptable level of service. However, there is likely to be some disruption to traffic where the railway crosses local roads resulting in road closures. There may also be pavement impacts along heavy haul routes, particularly those accessing quarries. Once the railway is operational, there are no envisaged changes to the existing road patterns within the surrounding region.

The primary impact mitigation measures for the proposed railway will be to both limit external traffic and to maintain local roads. External traffic will be limited by locating quarries and workers camps adjacent to the railway where practical, through the provision of an internal service road, providing high occupancy vehicle transport for its workforce, as well as by limiting hours of heavy vehicle movements.

Since the majority of the roads in the vicinity of the railway are unsealed, the critical factor for road operation is not pavement capacity, but rather pavement condition. In order to minimise possible structural damage to the existing pavement and a reduction in the pavement life, a pavement condition monitoring and maintenance regime will be considered to maintain roads adjacent to the site to an adequate standard. This would be implemented in three stages:

- assess road condition prior to commencement of works;
- implement a road maintenance regime jointly between Waratah Coal, DTMR and local authorities to provide adequate standard roads throughout construction; and
- once works are complete, ensure all roads are returned to a condition equal to, or better than, the condition prior to work commencing.

By generally limiting constriction traffic to well defined transport corridors and the purpose built internal service road, transport and traffic impacts can be more easily managed and mitigated. The exception to this may be heavy vehicle impacts through townships on route. In these circumstances, further analysis will be undertaken to establish those impacts and recommended appropriate mitigation, monitoring and maintenance strategies if required. These will be established in consultation with DTMR, local councils and other administrative authorities.

13.7 COMMITMENTS

Further to the EIS and subsequent more detailed transport and traffic assessments, Waratah Coal make the following commitments to develop the following documents:

- Road Impact Assessment Report;
- Road Use Management Plan;
- Traffic Management Plans; and
- Traffic Control Plans.

These plans will cover key safety and logistical issues such as:

- signage and traffic control requirements, including requirements for bypasses if necessary;
- development of temporary access routes and intersections to QDRM standards;
- heavy vehicle movements and operating requirements, including appropriate routes, hours of operation, vehicle wash-down and operational restriction;
- mitigation works and monetary contributions to be made to road authorities to provide a safe and efficient road network;
- relevant contacts within the project;
- issue identification and responses;
- planning and permit requirements including those needed for over-dimensional vehicles and transport of dangerous goods; and
- processes for community information and responses.