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12. Transport

12. Transport

This chapter describes the existing transport network, potential impacts and mitigation measures related to traffic and transport issues associated with the proposed JRYUP.

12.1 Methodology

The transport assessment has been based on a review of existing information, field investigations and discussions with land owners and local council representatives conducted during the early part of 2007. This chapter is largely based on assumptions and traffic count data contained in the Connell Hatch Jilalan Traffic Assessment for Queensland Rail and Sarina Shire Council, February 2007 (refer Appendix I2).

Proposed construction traffic routes have been described, with an analysis of affected routes and intersections, specifically under operational conditions. Construction traffic impacts and their management are also described.

Specific traffic locations under consideration include:

- Bruce Highway at Sarina
- Armstrong Beach Road between Bruce Highway and Gurnetts Road
- Gurnetts Road over the length of the site (approximately 4 – 5 km)
- Oonooie Road between Bruce Highway and Gurnetts Road
- Smyths Road

Trip numbers generated during the construction phase have been assessed by calculating approximate quantities of construction materials, and the capacity of road freight vehicles to haul various load types within likely timeframes. This comparison has allowed an estimation of the number of road vehicle trips required to facilitate the construction phase of the Project.

Traffic generation methods are generally conservative, and assessments are made according to peak numbers of construction vehicles and personnel trips. The number of movements of construction and operational personnel have also been checked against existing background traffic levels to qualify the ongoing effects of operation on the existing network.

Sarina Shire Council has provided traffic counts taken in August and September 2007, during the annual cane season, for Armstrong Beach Road and Gurnetts Road. Counts for Oonooie Road have been delayed due to equipment failure, however figures used in the previous Connell Hatch Jilalan Traffic Assessment have been substituted in the interim. The results of these surveys are analysed below in terms of the construction and operational phases of the Project.

Traffic and transport impacts have been assessed against the following overarching documents:

- Department of Main Roads (DMR) Assessment of Road Impacts of Development (April 2006)
- DMR Road Implementation Plan (RIP) 2007 – 2012 for the Mackay District
- *Transport Infrastructure Act 1994*
- *Transport Planning and Coordination Act 1994*
- *Transport Operations (Road Use Management) Act 1995*

These Acts have been reviewed and the transport methods and infrastructure proposals detailed herein are consistent with the broad requirements detailed in each Act.

DMR Road Implementation Plan

The DMR RIP has been assessed for the Mackay District 2007/08 – 2011/12 (encompassing Sarina Shire). There are no current or future works proposed for DMR roads at the Jilalan site.

Assessment of road impacts according to DMR Guidelines

The DMR assessment process has been followed through a description of the development profile, the surrounding road network, potential traffic generation both for construction and operation, and measures to mitigate against any increased road safety hazards.

The development will involve the movement of heavy vehicles and equipment over the road network over a reasonably short period of time.

12.2 Existing road network

The Jilalan Rail Yard is bound by Gurnetts Road to the east, and the existing rail network to the west. The site is approximately 6.5 km in length.

Principal access points will be via Armstrong Beach Road to the north and Oonooie Road to the south.

The existing road network adjacent to the site is indicated diagrammatically in Figure 12.1, including peak hour traffic counts (where available) for August 2007.

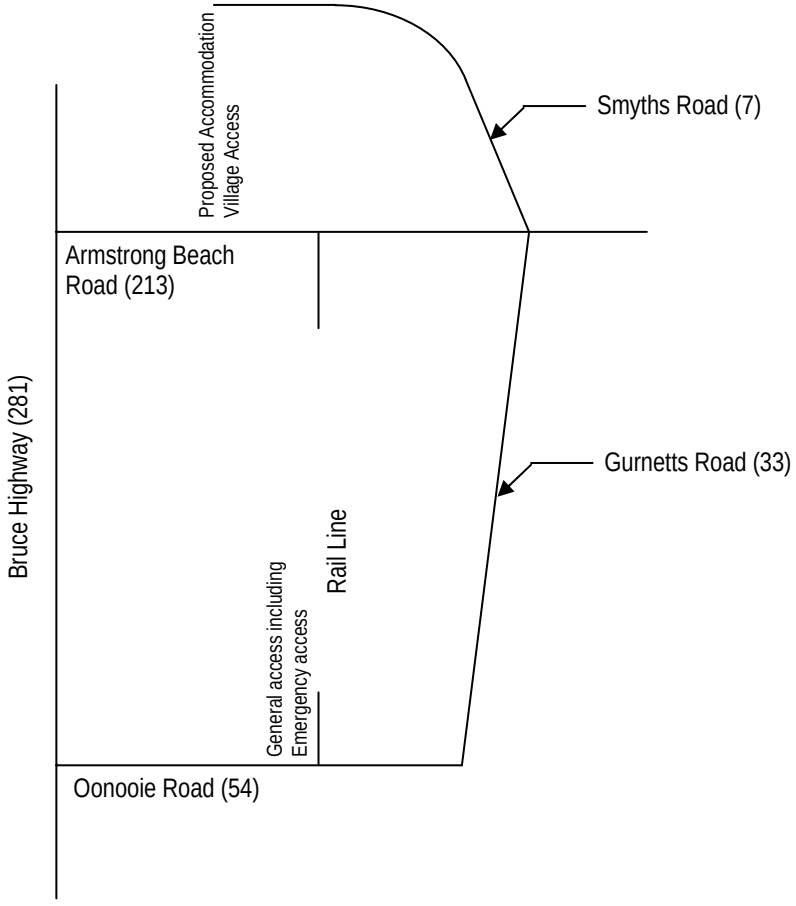

Figure 12.1 Local/state road network (not to scale)

Source: Connell Hatch Jilalan Traffic Assessment (February 2007)

Bruce Highway

The Bruce Highway (the A1) runs approximately 1 km to the west of the project area, and is a high standard two-lane arterial road forming the principal means of access between the townships of Sarina and Rockhampton to the south, and Mackay to the north.

Armstrong Beach Road

Armstrong Beach Road is a sealed two-lane road which forms an important east-west connection between the Bruce Highway and Armstrong Beach to the east. The road is currently grade-separated at the existing Goonyella Branch Line.

The intersection of Armstrong Beach Road and the Bruce Highway is fully channelised with raised medians to provide separation for right turners and through traffic.

Smyths Road

Smyths Road runs between Armstrong Beach Road and Sarina township. The road is currently unsealed and provides access to the cane rail siding on the western side of the Goonyella Branch Line. The road also crosses the Goonyella Branch Line via an existing level crossing to allow access to farm areas on both sides of the rail lines.

Oonooie Road/Gurnetts Road

Oonooie Road forms an east-west link between the Bruce Highway and CSR Ethanol Distillery, Oonooie Facility at the southern end of the site. The intersection with the Bruce Highway is unchannelised with localised pavement widening or 'BAR' treatments (refer to Austroads Part 5, Intersections at Grade) to provide some shelter for left and right turners exiting the Highway.

Oonooie Road is sealed up to rail level crossings with the Goonyella Rail Line and with the North Coast Line. The road then becomes unsealed and deviates north, becoming Gurnetts Road, forming the eastern boundary of the project area.

12.3 Potential construction impacts

Transport activities likely to impact on the road network are summarised in Table 12.1.

Table 12.1 Construction and transport activities

Construction activity	Transport task	Transportation method
Construction of new bypass tracks and bridges	Ballast material will be brought to site by rail during construction, however most material will be transported via the existing road network	Via low loaders (indivisible over-dimensional loads), semi-trailers or rigid trucks Construction staff to arrive on site on buses and private motor vehicles
Construction of a new wagon maintenance facility and associated track work	Pre-cast bridge sections, drainage box culverts, pre-fabricated steel structural members and cladding may be brought to site via the road network during construction	Via low loaders, semi-trailers or rigid trucks Staff to arrive at site with personal vehicles over the operational life of the facility Staff to use vehicles to access points within the site

Construction activity	Transport task	Transportation method
Construction of a new locomotive provisioning facility and associated track work and bridges	Ballast will be brought to site by rail during construction, however most material will be transported by road	Via low loaders, semi-trailers or rigid trucks
Modifications to the existing rail yard and buildings to provide a new locomotive maintenance facility	Various building materials such as concrete, steel and cladding will be brought in via road	Semi-trailers or rigid trucks
Main line diversion at the northern end of the Project	Some heavy plant and fill material will be brought to site by road during construction. Ballast transport will be via rail	Semi-trailers and low loaders
Underpass and overpass structures at rail intersections with existing roads	Pre-cast concrete members, bitumen and fill material to be brought to site by road, with some water, fill and concrete to be sourced or batched on site	Semi-trailers and low loaders
Road diversions and upgrades	Pre-cast concrete members, asphalt and fill material to be brought to site by road, with some water, fill and concrete to be sourced or batched on site	Semi-trailers and low loaders
Temporary accommodation village	Various building materials such as concrete, steel and cladding will be brought in via road	Semi-trailers or rigid trucks

The construction phase of the Project is likely to occur for approximately two years. During this time, it is expected that all construction materials, pre-fabricated components and personnel will be brought to site by rail and road. The most critical site access road will be the Bruce Highway, which allows efficient access to occur from major centres such as Mackay, Gladstone, Rockhampton, Brisbane and Toowoomba. It is likely that many of these major centres will play a role in the provision of materials and staff for the Project.

Figure 12.2 illustrates the project area in relation to major centres within the region.

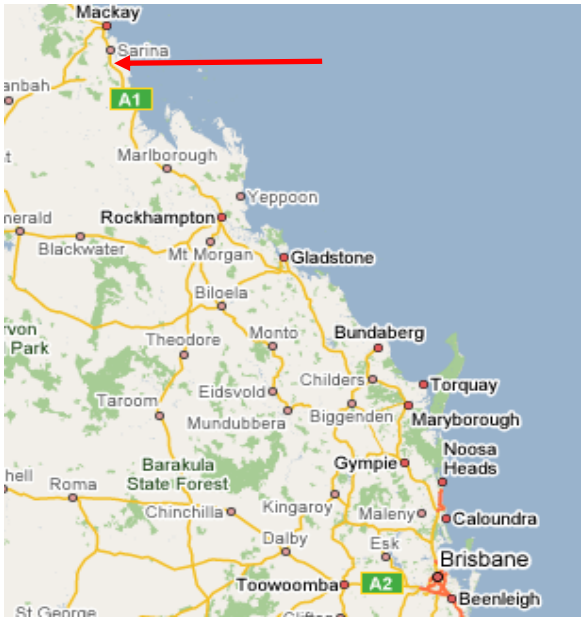

Figure 12.2 Site context

Source: GoogleMap

An estimate of personnel numbers and construction activities over time is provided in the histogram in Figure 12.3.

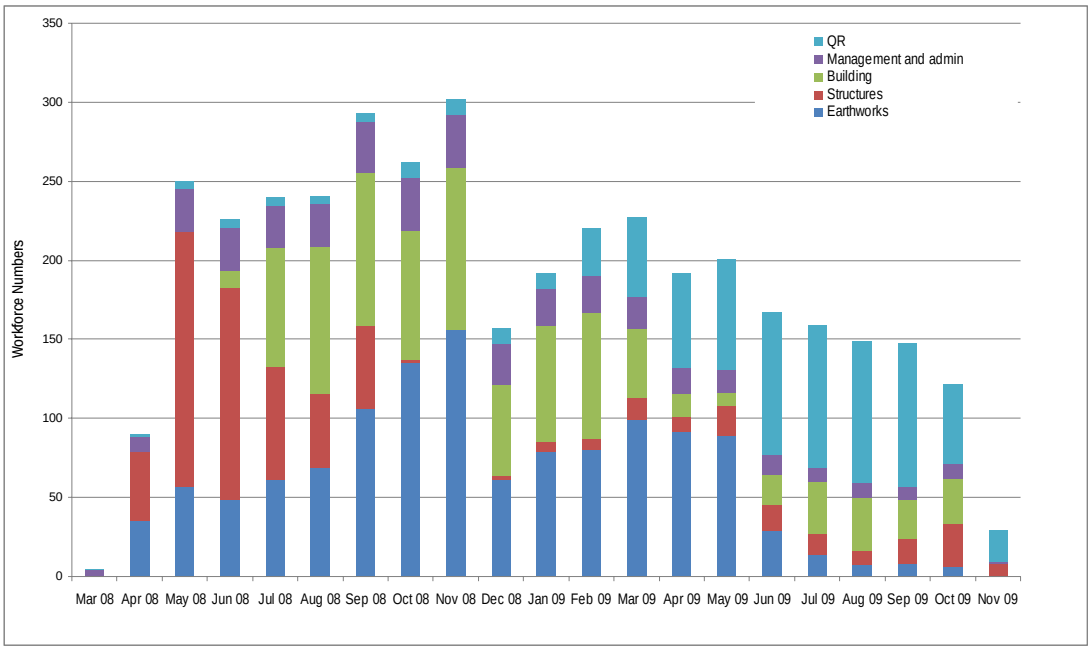

Figure 12.3 Personnel and construction activities for construction phase

Figure 12.3 illustrates that construction activities, and hence traffic flows, will peak approximately six months into the construction phase. This phase will require relatively short term flows of heavy vehicles over the road network, compared to lesser traffic flows over the operational life of the Project. Projected flows during construction and operation are discussed below. The majority of construction personnel will be housed in the Project accommodation village adjacent to the Sarina Golf Course (refer Section 2.5).

Construction traffic

Quantities of construction materials, including concrete bridge sections, box culverts, site huts and consumables are likely to be freighted to site with semi-trailers and large rigid trucks. It is likely that most fill material will be sourced onsite, however this will be subject to the suitability of excavated material. Anecdotal evidence suggests that the fill material from the site will be suitable. Some pavement gravel may be sourced from local quarries.

Oversize loads, such as dozers, excavators and scrapers, may be brought to site on low loaders. It is understood that approximately 100 such vehicles will be required for the construction phase. It is anticipated that most of these vehicles would be delivered to site over several weeks at the commencement of construction.

With construction fully underway, approximately 300 staff (maximum), including management and support staff, will be working on site.

Quantities of required materials and numbers of personnel are shown in Tables 12.2 and 12.3, respectively, with corresponding vehicle types, where transport via the road network is likely to be required. Vehicle numbers are based around typical load capacities for the vehicle type.

Table 12.2 Construction materials and equipment

Material or plant	Quantity (tonnes)	Vehicle type and number	Number of trips overall
Major earthmoving vehicles	100	100 x low loader	200
Pre-cast concrete sections	5,000 t	250 x semi-trailer	500
Consumables	500 t	40 x large rigid vehicle	80
Site accommodation	500 t	25 x semi-trailer	50
Building components	1,000 t	50 x semi-trailer	100
Concrete	30,000 t	2,000 concrete trucks	4,000
Total			4,930

Table 12.3 Construction personnel

Role	Number	Vehicle type and number	Total daily trips
Management staff	30	30 x private vehicles	60
Construction staff and plant operators	250	10 x buses	20
Ancillary staff	20	4 x minivans	8
Total	300		88

Traffic generation

For the purposes of assessing traffic generation, only peak figures are considered. It is assumed that in order for construction to proceed, most or all of the plant and materials listed above would need to be delivered to site over an initial 12 week period. This is a highly conservative assumption, and actual construction delivery time may be in order of six months.

Based on a 12 week assumption, peak vehicle trip numbers can be derived as follows: 4,930 total trips/12 weeks/5 day week = 82 heavy vehicle trips per day.

Heavy vehicle trips are expected to occur throughout the day, however 15% of the daily volume can be adopted for use as a peak hour figure, which equates to 12 trips during the peak hour.

Of the daily heavy vehicle trips, it could be assumed that 80% will use Armstrong Beach Road to access the site (or 66 trips) and 20% may use Oonooie Road (or 16 trips).

Trips for construction personnel will occur on a daily basis and are expected to be concentrated as a tidal flow entirely within the AM and PM peak hours, over two daily 12 hour shifts, from the proposed access on Armstrong Beach Road (refer Section 12.5.1). Therefore it can be assumed that at shift changeover, 44 peak hour trips will occur to and from the site in the morning, and 44 trips will occur to and from the site in the evening.

Total vehicle trip generation during the construction phase is therefore in the order of 56 trips per peak hour.

Table 12.4 indicates daily construction vehicle flows on key roads and approximate increases over existing flows.

Table 12.4 Daily construction vehicle flows

Road	Existing daily volume	Approximate daily volume with Project	Percentage increase
Bruce Highway	2,810 (assumed to be 10 x peak hourly flow)	2,810 + 82 = 2,892	3%
Armstrong Beach Road	2,317 (from Sarina Shire Council count August 2007)	2,317 + 66 + 88 = 2,471	6%
Average percentage increase			5%

It can be seen that traffic flow increases associated with the Project are likely to remain at 5% of existing levels. Whilst these figures will not impact on existing intersection capacity or cause undue delays, infrastructure upgrades may be required to improve road safety. Potential upgrades are detailed in Section 12.5.

It is anticipated that the Bruce Highway, a state controlled road, will cater for the majority of road transport requirements related to the construction of the Project. Given the existing high standard of the road, it is anticipated that the relatively small proportion of construction traffic will not impact on the design life of the road pavement.

12.4 Potential operational impacts

Connell Hatch's Jilalan Traffic Assessment (refer Appendix I2) provided an analysis of traffic flows during the operation of the Project, and accounted for increased flows during the cane season by adding a percentage to existing volumes (refer below to seasonal factors).

Operational flows have been re-checked in light of the further definition of the project scope. Total staff numbers are likely to rise from 212 crew members to 263, with maintenance staff rising from 96 to 135.

Peak hour intersection performance at key intersections, for example Bruce Highway/Armstrong Beach Road and Bruce Highway/Oonooie Road, remains satisfactory with increased staff numbers during operation, particularly as staff arrival and departure times will occur at all times of the day and not be concentrated in AM or PM tidal flows. Staff are also expected to arrive from a range of different locations including Sarina and Mackay.

Seasonal factors

The peak cane season, or period of maximum road traffic flow, is considered to be in August/September each year. Traffic data has been provided through Sarina Shire Council, which confirms the cane harvesting season times and any additional traffic numbers on the roads at these times. Counts were undertaken on the following roads:

- Oonooie Road (a re-count will be required due to equipment failure – for the purpose of this report volumes have been used from the previous Connell Hatch report with 10% added to simulate the peak period)
- Gurnetts Road
- Armstrong Beach Road

Staff levels

Total staff numbers are likely to rise from 212 crew members to 263, with maintenance staff rising from 96 to 135, net increases of 51 and 39, respectively.

It is important to note that during operation, staff arrival and departure times will occur at all times of the day and not be concentrated in AM or PM tidal flows. Staff are also expected to arrive from a range of different locations including Sarina and Mackay. Given these factors, the impact of operational staff trips on the road network will be minimal.

12.5 Mitigation measures

12.5.1 Design and construction

General

In general, access points will be designed to minimise impact on the external road network, for example haul roads will be built within the site, so that construction traffic does not create dust on unsealed roads or damage unsealed roads such as Gurnetts Road during wet weather.

A temporary accommodation village will be established to the north of Armstrong Beach Road with an access directly onto this road. The access will be clearly delineated with sufficient sight distance for the speed environment.

The site is expected to be signed to indicate restricted areas. Some fencing may also be used to prevent unauthorised or unintended access to construction areas.

Grade separation at key intersections is proposed to remove conflict between construction/operation traffic and trains.

Emergency access and egress should be possible at the southern and northern ends of the site to provide rapid means of evacuation in an emergency, and so that emergency vehicles such as ambulances or fire tenders can reach the site from either the north or south. This is in addition to access in the middle of the site from Armstrong Beach Road.

Appropriate access will be maintained to provide for rail maintenance requirements.

Bruce Highway/Armstrong Beach Road Intersection

Armstrong Beach Road, which runs between the Bruce Highway and Gurnetts Road, will be subject to the majority of traffic movements. The existing intersection is well channelised and delineated, and alterations to horizontal and vertical geometry are considered unlikely to be required.

Temporary accommodation village entrance on Armstrong Beach Road

An access to the temporary accommodation village will be provided on the northern side of Armstrong Beach Road, at a point which allows adequate sight distance to and from the access. An analysis of peak hour traffic flows and turning volumes of construction traffic has been undertaken to determine the required treatment for the access point.

Based on peak turning and through volumes, only a basic right turn treatment or BAR (refer to the DMR 'Road Planning and Design Manual' Chapter 13) would be required. This consists of localised shoulder widening to allow through traffic to pass right turners.

Armstrong Beach Road

Armstrong Beach Road may be realigned in the vicinity of the Jilalan Rail Yard to allow for the modification to an existing bridge or a completely new structure. This will be done in association with a localised realignment of the northern end of Gurnetts Road.

The existing rail bridge is proposed to be upgraded to improve safety by eliminating the horizontal curve and reducing traffic speeds on the approaches to the bridge. The bridge will be substantially extended in length to allow a straight crossing over all rail lines between Armstrong Beach Road and Gurnetts/Smyths Road.

Vehicle speeds on either approach to the bridge will be regulated with the introduction of two roundabouts, with horizontal geometry designed to ensure safe and consistent traversal speeds. The roundabouts will be clearly signed, line-marked, and will be lit to the standard prescribed in AS1158.

A direct access may be proposed from Armstrong Beach Road into the Jilalan site between the existing railway line and the proposed provisional tracks. Peak hour turning volumes/opposing traffic volumes indicate a requirement for the provision of a protected right turn lane (as per the warrant contained in DMR Chapter 13 Intersections at Grade) for the site access.

The access geometry will be sufficient to accommodate a B-Double or standard low loader vehicle.

Oonooie Road

Queuing of vehicles is reported to occur at the Oonooie Road level crossing. Queues appear to be mainly associated with CSR traffic accessing the CSR Ethanol Distillery, Oonooie Facility at the eastern end of Oonooie Road during peak cane harvesting times.

The Oonooie Road level crossing will be grade separated to allow for the efficient movement of existing coal trains and road freight at the crossing. This is designed to remove any conflict between trains and road traffic, and therefore prevent vehicles queuing.

Smyths Road

Smyths Road provides access to the cane rail siding for cane farms on the east of the Goonyella Branch Line. It also provides a short cut for Sarina town traffic travelling to Armstrong Beach. This access is impeded by a causeway, which is closed during periods of high tide and minor flooding.

The existing Smyths Road level crossing (north of Armstrong Beach Road) is expected to be grade separated, with the crossing constructed under a new embankment between the existing rail and Plane Creek.

Again the potential conflict between road and rail traffic will be removed with no impediment to traffic flow, resulting an operational improvement.

Traffic Management Plan will be prepared and implemented during construction to minimise potential traffic impacts.

12.5.2 Summary

In summary, during the construction phase, alterations to Council roads will be carried out to improve the safety and efficiency of traffic flows associated with construction and operation of the facility. A summary of proposed alterations is shown in Table 12.5.

Table 12.5 Summary of key proposed road network alterations

Road or intersection	Upgrade	Purpose
Armstrong Beach Road/Bruce Highway	No upgrade considered necessary, however sight distances on all legs to conform to Austroads Chapter 5	Confirm satisfactory visibility on all approaches
Armstrong Beach Road Rail Overpass/Site Access/Gurnetts Road	Bridge realignment, roundabouts to slow speeds, and potential addition of a right turn lane to provide protected direct site access	Roundabouts to slow speeds across rail bridge and on site approaches, and improvement to road alignment by easing existing curve on Gurnetts Road, access provided for workforce and trades
Temporary accommodation village entrance on Armstrong Beach Road	Access point with BAR treatment	To allow safe access for construction personnel to and from the temporary accommodation village
Smyths Road level crossing	Grade separation	Operational improvement by improving traffic flow and removing conflict between road and rail traffic
Oonooie Road level crossing	Grade separation	Remove existing queuing issue and conflict between road and rail traffic

12.5.3 Operation

Operational personnel are expected to cause minimal impact on the road network. Approximately 100 additional staff will be required to run the upgraded facility, however staff may live in a number of different local areas, and will commence shifts throughout the day, with the distribution of road trips occurring over each day.

Increased staff numbers during operation are therefore unlikely to significantly impact on existing traffic flows on roads and intersections adjacent to the site.

12.5.4 Coal haulage

Coal trains run between the Goonyella coalfields and ports at Dalrymple and Hay Point. This haulage pattern will continue with an increased rate of throughput resulting from the Jilalan Rail Yard upgrade.

Current exportable coal extraction rates from mines operating in the area are in the order of 92 Mtpa. This rate may increase to 130 Mtpa at the end of 2009.

The current rate of haulage equates to 120 wagons per train with 85 tonnes of coal per wagon. This equates to approximately 10,200 tonnes of coal per train, equating to approximately 60 train movements per day (assuming operation over 300 days a year) rising ultimately to approximately 80 train movements per day, including return trips.

This represents a high rail traffic flow, and further reinforces the requirements for the mitigation measures outlined above, including the grade separation of key intersections.

12.6 Conclusion

An analysis has been carried out of construction and operational traffic flows for the upgrade of the Jilalan Rail Yard, and proposed mitigation measures designed to improve road safety at the approaches to the site.

Quantities of construction materials have been estimated with corresponding numbers of vehicle trips required for haulage. Traffic impacts at both construction and operation are expected to be minimal.

Existing conflict points between road and rail are expected to be removed by grade separation, improving safety and traffic flow around the site and its access points. Impact to the road network will be further mitigated through the construction of internal haul roads. Access will be regulated with signage, gates and fencing where practicable.