WorleyParsons
Consulting

Queensland Government

DEPARTMENT OF STATE DEVELOPMENT

Road Transport Impact Assessment

Abbot Point Growth Gateway Project

301001-01956 – 00-CI-REP-0001

4 August 2015

Level 3, 60 Albert Street
Brisbane
QLD 4000
Australia
Telephone: +61 7 3221 7444
Facsimile: +61 7 3221 7791
www.worleyparsons.com
ABN 61 001 279 812

CONTENTS

ABBREVIATIONS AND ACRONYMS

Abbreviation/ Acronym	Description
AADT	Average Annual Daily Traffic
ALCAM	Australian Level Crossing Assessment Model
APSDA	Abbot Point State Development Area
AUL(S)	Auxiliary Left Turn Lane (Short)
CHR(S)	Channelised Right Turn Lane (Short)
Cwf	The weighted conflict number for flashing lights
Cwb	The weighted conflict number for boom gates
DMCPs	Dredge Material Containment Ponds (includes Primary and Secondary DMCPs)
DOS	Degree of Saturation
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ESA	Equivalent Standard Axles
GARID	Guidelines for Assessment of Road Impacts of Development
Ha	Hectare
HV	Heavy Vehicle
Km	Kilometre
LLDPE	Linear Low Density Polyethylene
LOS	Level of Service
Mm^3	Million cubic meters
Mm	Millimetre
Mt	Million tonnes
ML	Million litres
Mtpa	Million tonnes per annum
MUTCD	Manual of Uniform Traffic Control Devices

Abbreviation/ Acronym	Description
NQBP	North Queensland Bulk Ports
QR	Queensland Rail
RIM	Rail Infrastructure Manager
TIA	Transport Impact Assessment
TMR	Queensland Department of Transport and Main Roads
TMP	Traffic Management Plan
T0	Terminal 0 – coal terminal developed by Adani at Abbot Point
T2	Terminal 2 – coal terminal to be developed at Abbot Point
T3	Terminal 3 – coal terminal developed by Hancock Coal at Abbot Point
Vt	Maximum train speed in km/h
Vv	85th percentile speed of vehicles approaching the railway crossing in km/h

1 INTRODUCTION

This Road Transport Impact Assessment (TIA) has been prepared as part of the assessment of the Abbot Point Growth Gateway Project (the Project) to gain Queensland State approvals to enable construction of the Project.

1.1 Project Overview

The Project involves to dredging of berth pockets and arrival/departure aprons required to provide safe shipping access to the T0 Terminal.

This Project includes:

- Construction of onshore dredged material containment ponds (DMCPs) within the area previously allocated for the development of Terminal 2 (T2) and adjoining industrial land
- Capital dredging of approximately 1.1 million m3 (Mm3) in situ volume of previously undisturbed seabed for new berth pockets and ship apron areas required to support the development of T0
- Relocation of the dredged material to the DMCPs and offshore discharge of return water
- Ongoing management of the dredged material including its removal, treatment, and beneficial reuse within the port area and the Abbot Point State Development Area (APSDA), where appropriate.

A project overview plan is provided in Appendix 1

1.2 Road Transport Impact Assessment Scope

The scope of this Transport Impact Assessment (TIA) is limited to the assessment of road impact and rail crossing impacts associated with the Project's construction activities. The Project does not propose to generate rail transport demand and therefore rail impacts are limited to the assessment of rail-road crossings used by Project generated road traffic.

The Marine Transport Impact Assessment associated with the proposed dredging operations is the subject of a separate report. An air transport assessment has not been considered as any air transport demand generated by the Project is expected to be negligible.

The assessment considers only the construction phase of the Project, as no significant operational traffic will be generated following the construction phase.

This assessment does not consider long-term management and extraction of material within the DMCPs as these works will be undertaken as part of a subsequent phase of works.

The methodology for assessment of impacts is generally in accordance with the Transport and Main Roads (TMR) Guidelines for Assessment of Road Impacts of Development (GARID).

2 PROJECT PROFILE

2.1 Project Description

The Project works assessed by this TIA include:

- Establishment of onshore and offshore pipelines for dredging works
- Construction of DMCPs using on-site and imported materials.

Golder Associates (Technical Memorandum, Response to WorleyParsons Technical Query – Traffic Impact, 27 May 2015) provided the data on the type and number of vehicles, earthworks volumes etc. which has informed the basis of the TIA.

Pipelines for dredging works include approximately 1,200 m of floating pipeline (2000 mm diameter), 5,250 m of dredged material delivery pipeline (1,200 mm diameter) and 4,300 m of return water pipeline (1,200 mm diameter).

DMCPs comprise cells constructed from earth embankments using material sourced from within the footprint of DMCPs. Unsuitable material won from the site which is not suitable for embankment construction will be spoiled within the footprint of DMCPs.

In addition to the earth embankments, the DMCPs will comprise of the following elements:

- A Linear Low Density Polyethylene (LLDPE) or similar preliminary liner on the inside face of DMCP embankments
- Permanent security fencing around the DMCPs
- Access roads paved with 200 to 250 mm of crushed rock material
- Drainage channels / spillways with sections of rip rap for erosion protection

Concept level site plans and sections prepared by Golder Associates are included in Appendix 2

2.2 Project Timing

Construction of DMCPs is proposed to be completed over a period of six months. Following construction of DMCPs, it is assumed that the dredging and placement of dredge material will be completed over a further period of three months.

Including mobilisation and demobilisation activities, this assessment is based on a total construction period of 12 months. A detailed construction program will be prepared by the construction contractor once engaged, however an indicative project schedule is given in

Table 2-1 below.

Table 2-1 Indicative Project Schedule

	Month											
Railway	1	2	3	4	5	6	7	8	9	10	11	12
Mobilisation of DMCP construction contractor												
Construction of DMCPs												
Dredging contractor mobilisation (including pipeline installation)												
T0 dredging												
Demobilisation (including pipe removal)												

For construction activities, traffic generation is generally assumed over shorter durations than those periods identified by the indicative schedule. This approach is considered conservative and reflects the potential for the indicative construction program to be varied by the appointed construction contractor. Such construction program variations may occur from the temporary suspension of construction work during and after wet weather events.

2.3 Site Access

Access to the site is exclusively from the Western Access Road via Abbot Point Road. Both roads are private roads under the control of North Queensland Bulk Ports (NQBP).

From Abbot Point Road, access to the public road network is only via the Bruce Highway / Abbot Point Road intersection. There are no other connections from Abbot Point Road to the public road network.

Access to the project site does not require use of any local government controlled roads.

3 EXISTING NETWORK

3.1 Road

The relevant road network in the vicinity of the Project site is listed in Table 3-1.

Table 3-1 Relevant Road Network

Road	Responsible Road Authority	Width (nominal)	Description	Posted Speed
Abbot Point Road	North Queensland Bulk Ports	7.0m	Sealed, two-way/two-lane	100 km/h (60 km/h at the intersection with Western Access Road)
Western Access Road	North Queensland Bulk Ports	7.0m	Unsealed, two-way/two-lane	60 km/hr
Bruce Highway	Transport and Main Roads	9.0m	Sealed, two-way/two-lane	100 km/hr

Abbot Point Road provides access to the Abbot Point Port and does not provide through access to other destinations.

The Western Access Road serves as an alternative access to the site and is used for the delivery of oversized vehicles to the terminal site.

The Bruce Highway is part of the AusLink national highway network and provides access to regional centres north and south of the Project site.

The Bruce Highway / Abbot Point intersection is a priority controlled T-intersection, with Abbot Point Road the terminating leg of the intersection. The treatment provided at the intersection includes:

- A channelised right turn lane (CHR(S)) with 80m storage lane length plus 40m taper
- A channelised left turn lane (AUL(S)) with 80m storage lane length plus 40m taper.

The Western Access Road intersects with Abbot Point Road at as a priority controlled T-intersection, with priority given to the Western Access Road approach.

Figure 3-1 Abbot Point Road at the access to the Deco Quarry

Figure 3-2 Bruce Highway / Abbot Point Road intersection (view north on Bruce Highway)

Figure 3-3 Abbot Point Road / Western Access Road intersection (northern approach of Abbot Point Road)

3.1.1 Road Traffic Volumes

Traffic survey data for Abbot Point Road was obtained from an intersection traffic survey completed for the transport assessment of the proposed Terminal 0 Project. The traffic survey was completed by TTM Group on 5 March 2013 (5am – 7pm) at the Bruce Highway / Abbot Point Road intersection.

Based on this traffic survey, the daily traffic on Abbot Point Road is in the order of 300 vehicles.

Traffic census data for the Bruce Highway was received from TMR. From traffic census data, Annual Average Daily Traffic (AADT) on the Bruce Highway is 2,867 vehicles north of Abbot Point Road and 3,472 vehicles south of Abbot Point Road, for the year 2013.

TMR traffic census data is included in Appendix 3

3.2 Rail Crossings

To access the Project site, it is necessary to use at-grade road crossings of railways. The road-rail crossings listed in Table 3-2 are proposed to be utilised by Project generated road traffic, locations are identified in Appendix 1 .

Table 3-2 Rail Crossings Utilised by Project Traffic

Railway	Road	Crossing Control	Responsible Rail Authority
North Coast Rail Line	Abbot Point Road (30m from Bruce Highway)	Partially active (flashing lights)	Aurizon
Collinsville – Newlands Rail Line	Abbot Point Road (110m from Bruce Highway)	Partially active (flashing lights)	Aurizon
Collinsville – Newlands Rail Line	Abbot Point Western Access Road	Fully active (flashing lights, boom gates)	Aurizon

Figure 3-4 Abbot Point Road crossing of the Collinsville – Newlands Rail Line (eastern approach of Abbot Point Road)

Figure 3-5 Abbot Point Road crossing of the North Coast Rail Line (western approach of Abbot Point Road)

Figure 3-6 Western Access Road crossing of the Collinsville – Newlands Rail Line (western approach from Abbot Point Road)

Plan layouts of the three crossings are shown in Appendix 4

It is noted that even though the North Coast Rail Line is a Queensland Rail (QR) owned piece of infrastructure, the line from 1157.6 km to 1167.3 km (i.e. at the Abbot Point Road crossing) is the responsibility of Aurizon as the line parallels Aurizon's Collinsville-Newlands Railway over this segment.

3.2.1 Rail Traffic Volumes

Rail traffic volumes for the North Coast Rail Line and Collinsville – Newlands Rail Line were obtained from QR and Aurizon respectively.

QR provided train volumes for North Coast Rail Line over a ten (10) day period from 1 October 2014 to 10 October 2014 as follows:

- Freight – 111 trains
- Passenger – 10 trains
- Livestock – 2 trains
- Maintenance – 1 train.

North Coast Rail Line typical daily train volumes are therefore considered to comprise 11 freight trains and one (1) passenger train.

The average daily train volume on the Collinsville – Newlands Rail Line was advised by Aurizon to be 16 coal trains, comprising 16 movements in the loaded direction (to Abbot Point) and 16 movements in the unloaded direction (from Abbot Point).

4 PROJECT TRAFFIC GENERATION

Project traffic generation is based on the proposed construction methodology and assumptions provided by Golder Associates (Technical Memorandum, Response to WorleyParsons Technical Query – Traffic Impact, 27 May 2015). A detailed calculation table relating to traffic generation and distribution is provided in Appendix 5 . Summary of traffic generation activities are listed in section 4.1below.

4.1 Traffic Generation

Key activities forming the basis of traffic generation are detailed as follows:

- Mobilisation / demobilisation of plant items required for embankment construction
- Importation of crushed rock and riprap from the Abbot Point Deco Quarry located on Abbot Point Road approximately 5km from the DMCPs using semi-trailer vehicles (payload 30 tonne)
- Delivery of dredge pipelines
- Delivery of construction materials (permanent fencing, embankment liner, cement, gypsum)
- Movement of construction workforce
- Servicing of the site (offices, stores, potable water, fuel / oil, waste services).

Key assumptions regarding traffic generation are as follows:

- Construction water is imported from the Abbot Point Deco Quarry with 100 ML of water required for the construction of the DMCPs. The water would be transported in 40,000 kL water trucks.
- No bulk earthworks will be imported or spoiled from the DMCPs
- 1,485,000m^3 of LLDPE liner will be transported to the site by semi-trailer
- 4,500 m of permanent security fencing will be transported to site by semi-trailer
- 500 m^3 of rip rap will be transported to the site from the Deco Quarry by semi-trailer
- 1,500 m^3 of crushed rock will be transported to the site from the Deco Quarry by semi-trailer
- 500 tonnes of gypsum will be transported to the site by semi-trailer
- 1,500 m^3 of cement will be transported to the site by semi-trailer
- 15,450 m of dredge pipeline will be delivered to site in 12 m lengths by semi-trailers

- The construction workforce will consist of 25 persons in Project and quality management, 35 persons to operate /maintain machinery, and 30 persons to form the liner crews. It has been assumed that 80% of the construction workforce will use ten (10) person shuttle buses and 20% of light vehicles (occupancy 1 person / vehicle)
- The dredge is launched and serviced from Bowen
- Workforce transfers to / from the dredge from Abbot Point.

4.2 Traffic Distribution

The directional distribution of traffic to / from the Project site is assumed to be as follows:

- Delivery of plant items – 50% north, 50% south
- Construction materials, servicing – 10% north, 90% south
- Dredge pipelines – 100% north
- Construction workforce - 10% north, 90% south (predominately accommodated in Bowen).

4.3 Traffic Parameters

In determining traffic generation during nominal peak hours, it is assumed that:

- For workforce generation:
  - 80% of trips are completed in a peak hour corresponding with the start and finish of construction shifts
  - 80% of trips are inbound during AM period and outbound during the PM period.
- For all other traffic generation:
  - 10% of trips are completed in a peak hour
  - Inbound and outbound trips are evenly split.

4.4 Program / Hours of Work

A detailed construction program will be prepared by the construction contractor once engaged, however the construction period assumptions has been detailed in Section 2.2 of this report.

The proposed working hours will be from 6 a.m. to 6 p.m., seven (7) days a week.

4.5 Assessment Traffic Volumes

Traffic volumes determined for assessment are based on the highest daily and highest peak hour volumes.

The highest daily Project two-way volumes are calculated to be:

- 164 vehicles on Abbot Point Road, north of the quarry access
- 114 vehicles on Abbot Point Road, between the quarry access and Bruce Highway
- 84 vehicles on the Bruce Highway south of Abbot Point Road
- 30 vehicles on the Bruce Highway north of Abbot Point Road.

Based on Project generated traffic volumes, the Project traffic is less than five (5) percent for the background traffic on both Bruce Highway approaches, which is the threshold limit for assessment according to GARID. Therefore the extent of assessment of the state controlled road network is limited to the Bruce Highway / Abbot Point Road intersection.

Traffic volumes adopted for the assessment are provided in Appendix 6

5 PROJECT IMPACT ASSESSMENT

A detail construction program will be prepared by the construction contractor once engaged, however it is expected that construction works may commence in late 2015.

As there is no significant quantifiable operational traffic associated with the Project, assessment has only been made for the year 2016.

5.1 Road Capacity

The highest Project daily traffic volumes are compared to background daily traffic volumes on the Bruce Highway and Abbot Point Road in Table 5-1.

Table 5-1 Highest Project Daily Traffic

Road		Background Daily Traffic (veh)	Highest Project Daily Traffic (veh)	Highest Daily Traffic (Project + Background)	Change
Abbot Point Road, north of quarry access		341	164	505	48%
Abbot Point Road, quarry access to the Bruce Highway		341	114	455	33%
Bruce Highway	N of Abbot Point Rd	3,133	30	3,143	<1%
	S of Abbot Point Rd	3,794	84	3,886	2%

The addition of Project generated traffic increases the volume of traffic on Abbot Point Road moderately while increases on the Bruce Highway are insignificant and less than the five (5) percent threshold for assessment.

The increase in traffic on Abbot Point Road is primarily caused by the haulage of quarry materials from the Abbot Point Deco Quarry, located on Abbot Point Road. This haulage does not use the Bruce Highway, which explains the lesser increases in traffic on the Bruce Highway.

The minimum road link Level of Service (LOS) for rural roads is specified by GARID to be LOS C. The daily traffic volume of a two-lane two-way road operating at LOS C is in the order of

12,000 vehicles. Therefore with the addition of Project traffic, volumes on Abbot Point Road and the Bruce Highway remain well within LOS C.

5.2 Road Intersection Capacity

The Bruce Highway / Abbot Point Road intersection is a priority controlled T-intersection.

The operation of the intersection was assessed using the Sidra Intersection software program (version 5.0) retaining all program default values. The following cases were analysed:

- Approximated peak hour background traffic (AM, PM)
- Approximated peak hour background traffic plus highest peak hour Project traffic (AM, PM).

Results of analysis are summarised in Table 5-2.

Table 5-2 Summary Bruce Highway / Abbot Point Road Intersection Analysis Results

Case	Period	Degree of Saturation	Level of Service	Critical Queue
2016 Background	AM	0.09	B	1.3m – L/R from Abbot Point Road
2016 Background	PM	0.09	B	1.3m – L/R from Abbot Point Road
2016 Background + Project	AM	0.09	B	1.7m – R from Bruce Highway
2016 Background + Project	PM	0.09	B	2.2m – L/R from Abbot Point Road

Sidra Intersection analysis outputs are provided in Appendix 7 . The maximum Degree of Saturation (DOS) for priority controlled intersections is specified by GARID to be 0.80. As per the analysis, the addition of Project generated traffic has minimal impact on the operation of the intersection with the intersection DOS remaining well below the maximum allowable DOS.

Peak hour traffic volumes were also considered with respect to the warrants for turn treatments as per the Austroads Guide to Road Design Part 4a, Figure 4.9: *Warrants for turn treatments on the major road at unsignalised intersections*. The turn movements are plotted in Figure 5-1 below.

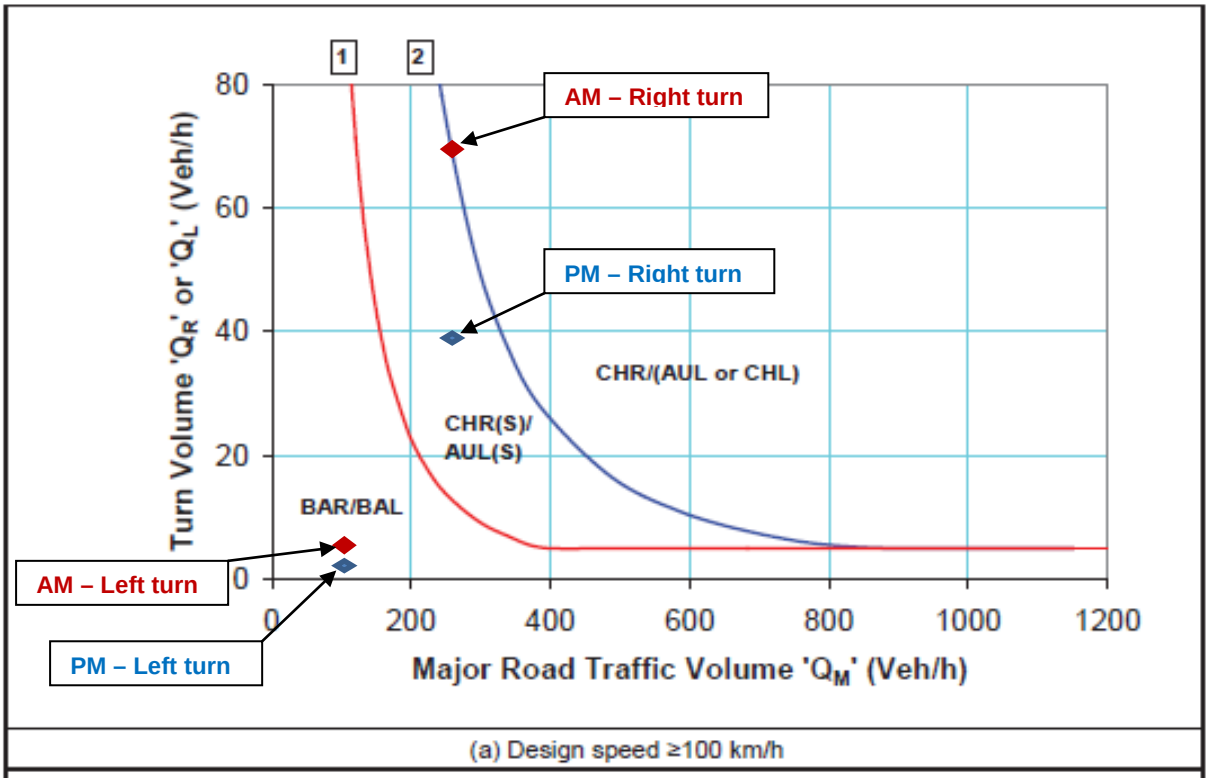


Figure 5-1 Warrants for Turn Treatments

From Figure 5-1, it is noted peak hour traffic volumes approach the warrant threshold for a channelised right turn (CHR) treatment in the AM period. Due the limited period during which construction traffic is expected to operate, the existing CHR (S) treatment is considered appropriate.

The operation of the intersection analysis using Sidra Intersection does not take into consideration the operation of the adjacent rail crossings over Abbot Point Road i.e. analysis assumes no delay associated with rail crossings.

A separate analysis of rail crossings is completed in section 5.3

5.3 Rail Crossing Assessment

The North Coast Rail Line and Collinsville - Newlands Rail Line cross Abbot Point Road approximately 30m and 110m from the Bruce Highway / Abbot Point Road intersection respectively.

The Collinsville - Newlands Rail Line crosses the Western Access Road approximately 30m from the Abbot Point Road / Western Access Road intersection.

An assessment of queuing at rail crossings of Abbot Point Road is necessary given the proximity of these crossings to each other and the Bruce Highway intersection.

For westbound vehicle movements, queues at the rail crossing of the Western Access Road form on Abbot Point Road. While there are no constraints to queuing on Abbot Point Road, it is necessary to assess the delay to northbound through traffic on Abbot Point Road with respect to potential impacts to port and rail operations.

5.3.1 Queue Assessment

Train parameters for queue assessment were adopted as per Table 5-3. Where parameters are noted as assumed, these are to be confirmed by rail authorities.

Table 5-3 Adopted Train Parameters (Queue)

Criteria	North Coast Rail Line	Collinsville-Newlands Rail Line
Maximum train length (m)	1,000m (assumed)	2,071m
Average train speed (km/h)	70km/h (refer note)	30km/h at Abbot Point Road (assumed)
Crossing warning / clearance time (min)	1.0	1.0
Typical trains crossings / day	11	32

Note: As per speed board data in "NORTH COAST LINE SYSTEM - NORTH - INFORMATION PACK (Rockhampton to Cairns) ISSUE 2 - JULY 2007"

To determine the probability of queues occurring during a period of train crossing, a Poisson distribution was applied to arrivals. The known average rate of arrivals was taken to be the rate of arrivals during the calculated highest Project peak hour traffic plus background traffic'.

The following governing peak periods are adopted for queue assessment:

- AM period for eastbound traffic over Abbot Point Road rail crossings
- PM period for westbound traffic over Abbot Point Road rail crossings

A desirable maximum queue length was determined for the approach to each crossing as follows:

- The available storage length of the right and left turn auxiliary turn lanes on the Bruce Highway for east bound traffic at the North Coast Rail Line

- The available storage length between the rail crossings for west bound traffic at the North Coast Rail Line crossing and eastbound traffic at the Collinsville - Newlands Rail Line.

Table 5-4 and Table 5-5 outline the assessment of queues on Abbot Point Road from the North Coast Rail Line and the Collinsville - Newlands Rail Line crossings respectively.

Table 5-4 North Coast Rail Line – Abbot Point Road Crossing Queue Assessment

Direction	Desirable Maximum Queue Length	Probability of Exceedance	
		Background	Background + Project
Eastbound	80m / 8 vehicles - storage available within Bruce Highway turn lanes	0%	0%
Westbound	60m / 6 vehicles - storage available to Collinsville-Newlands Rail Line crossing	0%	0%

Table 5-5 Collinsville-Newlands Rail Line - Abbot Point Road Crossing Queue Assessment

Direction	Desirable Maximum Queue Length	Probability of Exceedance	
		Background	Background + Project
Eastbound	60m / 6 vehicles - storage to North Coast Rail Line	<1%	15%
Westbound	No desirable maximum queue length exists as storage is provided on Abbot Point Road	-	-

Details of rail crossing queue assessments are provided in Appendix 8

At the North Coast Rail Line crossing of Abbot Point Road, the addition of Project generated traffic increases the probability of exceeding the desirable maximum queue length by a negligible amount.

The addition of Project generated traffic increases the probability of exceeding the desirable maximum queue (6 vehicles) from less than 1% to 15%.

As this could be considered a reasonable increase in probability of exceedance, sensitivity tests were completed on the assessment of this eastbound queue considering:

- Train length of 1,396 m (alternative length of Aurizon trains)
- Reduction in peak flow by 30%.

Results of sensitivity tests are given in Table 5-6.

Table 5-6 Collinsville-Newlands Rail Line - Abbot Point Road Crossing Queue Assessment, Sensitivity Testing

Direction	Desirable Maximum Queue Length	Probability of Exceedance	
		Background	Background + Project
Eastbound	60m / 6 vehicles - storage to Collinsville-Newlands Rail Line crossing Sensitivity test – train length 1,396m	<1%	5%
Eastbound	60m / 6 vehicles - storage to Collinsville-Newlands Rail Line crossing Sensitivity test – 30% reduction peak flow	<1%	4%
Eastbound	60m / 6 vehicles - storage to Collinsville-Newlands Rail Line crossing Sensitivity test – train length 1,396m & 30% reduction peak flow	<1%	<1%

As expected, sensitivity testing demonstrates that the probability of exceeding the maximum desirable queue length reduces with decreasing train length and peak flows.

With respect to the train length it is recommended that the train parameters (including timetabling) are confirmed with Aurizon and the queueing potential re-assessed. A request for confirmation of this data has been sent to Aurizon however at the time of writing of this report the data had not been received.

It is further recommended that prior to the commencement of construction every opportunity to spread the Project peak flows into Abbot Point Road is considered in order to minimize the potential for queuing at the rail crossings.

As noted earlier the above queue exceedance assessments were based on desirable maximum queue lengths. For eastbound traffic approaching the Collinsville-Newlands Rail Line this desirable queue length would be the distance between the Collinsville-Newlands Rail Line and the North Coast Rail Line, a distance of 40 m. This would be the appropriate queue length if drivers on the Bruce Highway turning into Abbot Point Road were not regular users of the road and would therefore not readily perceive that an east bound queue has formed at the Collinsville - Newlands Rail Line crossing. However Abbot Point Road is a private road and its only function is to provide access to the Abbot Point terminal. The road would predominantly be used by people associated with the operations of the port, including the quarry. As such the road users would be familiar with the intersection arrangement and the presence of the rail crossings on Abbot Point Road.

As this is the case it is considered appropriate to consider the following additional queue storage lengths when assessing queue exceedance potential for the eastern approach to the Collinsville-Newlands Rail Line:

- An additional 20 m (two vehicles) of storage available between the North Coast Rail Line and the Bruce Highway
- A further 80 m (eight vehicles) within the right turn lane on the Bruce Highway.

This would provide effective queue lengths of 80 m and 160 m respectively. The adoption of these effective storage lengths would result in the addition of Project generated traffic only increasing the probability of exceedance from the current 1% to 3% for the available storage to the Bruce Highway (two vehicles), which is not considered significant. When considering the effective storage within the Bruce Highway right turn lane, there would be no increase in queue exceedance probability.

It is therefore concluded that whilst there would be benefits in the reduction in risk from the peak spreading of trips, the main benefit would be realised by training the Project workforce on the risks associated with the queuing at existing rail crossings. This should be undertaken as part of the Project inductions / journey management plans. This induction should also be communicated to the existing workforce at Abbot Point.

5.3.2 Delay Assessment

The governing period for westbound traffic over the Western Access Road rail crossing (left turns from Abbot Point Road) is the AM period.

Delay is assessed considering that northbound through traffic on Abbot Point Road may be delayed by traffic turning left from Abbot Point Road to the Western Access Road and holding at a closed rail crossing. Vehicle storage of approximately 19m is available between the rail crossing (yellow hatch area) and clear of the northbound through lane on Abbot Point Road. The queue assessment does not consider this potential storage and hence is deemed to be conservative.

Train parameters for delay assessment were adopted as per Table 5-7. Where parameters are noted as assumed, these are to be confirmed by rail authorities.

Table 5-7 Adopted Train Parameters (Delay)

Criteria	Collinsville-Newlands Rail Line
Maximum train length (m)	2,071m
Average train speed (km/h)	20km/h at Western Access Road (assumed)
Crossing warning / clearance time (min)	1.0
Typical trains crossings / day	32

To determine potential delays, a model of the rail crossing was established using the Sidra Intersection software program. The model was established by considering the intersection as a signalised T-intersection with one of the phases replicating the rail crossing closure. The rail crossing closed phase was approximately nine and a half minutes, which is the average closure time per hour based on 32 train movements a day and a seven minute closure time. Modelling found average vehicle delay to be:

- 47 seconds for the northbound through movement on Abbot Point Road
- 56 seconds for the left turn movement from Abbot Point Road to the Western Access Road.

The average delays are equivalent to a LOS D, which is considered an acceptable level of service. Details of crossing delay assessments using Sidra Intersection are provided in Appendix 9

The maximum possible delay to through traffic would equate to the full duration of a rail crossing closure. Based on train parameters in Table 5-7, the full duration of a rail crossing closure is approximately seven (7) minutes. This maximum delay would only eventuate if:

- A vehicle turning left from Abbot Point Road to the Western Access Road arrives at a recently closed crossing and is unable to store clear of the through lane; and
- A northbound through vehicle on Abbot Point Road is immediately following the vehicle turning left to the Western Access Road.

The actual delay to through movements will be highly dependent on the level of concurrent timing of Project generated traffic movements and existing (background) traffic movement associated with port and rail operations.

Should actual delay to existing traffic present an impact to port or rail operations, it is proposed to operate traffic management at the Abbot Point Road / Western Access Road intersection. Section 6 of this report provides more guidance on this traffic management.

5.4 Rail Safety Assessment

Traffic generated by the Project may affect the operational safety of the Abbot Point Road crossings of the North Coast Rail Line and the Collinsville-Newlands Rail Line and the Western Access Road crossing of the Collinsville-Newlands Rail Line.

5.4.1 ALCAM Assessment

A rail safety assessment incorporating comparative Australian Level Crossing Assessment Model (ALCAM) assessments may need to be undertaken for each impacted railway level crossing. TMR will arrange for ALCAM assessments to be undertaken by the appropriate rail infrastructure manager (RIM).

Appendix 10 provides the information requested by TMR for the rail safety and ALCAM assessments.

5.4.2 Bruce Highway / Abbot Point Road Intersection

As required in the Manual of Uniform Traffic Control Devices (MUTCD) – Part 7 Railway Crossings (Figure 3.2), queuing of vehicles should not occur within five (5) metres of the edge of a rail line. As shown on the layout in Appendix 4 , the distance from the give way line on the Bruce Highway to the rail of the North Coast Rail Line is approximately 20.4 m. This would result in Project heavy vehicles (19 m semi-trailers) queuing within five (5) metres of the rail, which would be a significant safety issue. It is noted that this will currently be a potential safety issue for any vehicle accessing Abbot Point with a length exceeding 15.4 m.

In order to mitigate this issue it is proposed to remark the give way line to within two (2) metres of the edge of the Bruce Highway running lane and provide chevron marking to ensure vehicles maximize their sight angles. With the proposed line marking the available storage length clear of the rail line would be 19 m, which is the Project design vehicle length. For vehicles that exceed 19 m, additional traffic management measures as detailed in section 6.0 of this report would need to be implemented.

With respect to the issue of moving the give way line to within two (2) metres of the Bruce Highway traffic lane we have reviewed a number of standards to ensure that the proposed woks are safe and feasible. Section 5.4.2 of the MUTCD – Part 2 states that the give way line shall be used as follows;

(a) *"To indicate the safe position for a vehicle to be held at GIVE WAY sign at an intersection."*

Retaining the give-way line at the current position, where vehicles exceeding 15.4 m could potentially queue within five (5) metes of the North Coast Rail Line, would not meet the MUTCD requirement of indicating a "*safe position for a vehicle to be held*".

Figure 8.2 of the Austroads Guide to Road Design – Part 4A provides guidance on the location of the holding line from the centerline of the major road at rural intersections. The guidance is based on the ensuring that left turning vehicles maintain a maximum observation angle of 120 degrees. For a straight through road the guide indicates that the holding line should be located a distance of seven (7) metres from the through road centerline, i.e. three and a half (3.5) metres assuming a three and a half (3.5) metres traffic lane. The guide however notes that where the "side road is located on the back of a curve, the holding line may be located closer to the road". This would infer that the offset distance from the edge of the through is not the governing factor in the position of the holding line,

but rather the requirement to ensure that a vehicle establishes a suitable sight line angle when held at the give way line.

The proposed line marking is shown on drawing in Appendix 11 and is considered to be a safe location for the location of the give way line for the following reasons;

(i) The location of the give way line (in conjunction with the proposed chevron marking) enables adequate sight lines to be established as demonstrated on the layouts in Appendix 11 . In fact it is considered that the sight lines are improved by relocation of the give way line from its current position.
(ii) The give way line is offset a distance equivalent to the Bruce Highway shoulder width.
(iii) The location of the give way line enables a 19 m long vehicle to turn right into Abbot Point Road and be clear from a vehicle queued at the give way line, as demonstrated by the swept paths contained in Appendix 11
(iv) The location of the give wat line will ensure that a 19 m long vehicle will not queue within five (5) metres of the North Coast Rail Line.

5.4.3 Preliminary Crossing Assessment

A preliminary assessment of the crossings has been undertaken using warrants in various standards and manuals. As the *Manual of Uniform Traffic Control Devices (MUTCD) – Part 7 Railway Crossings* does not provide any guidance with respect to warrants for treatments; reference has been made to the *Railway Crossing Protection in Western Australia – Policy and Guidelines – Issue 4, May 2005*.

The potential hazard at a road/ rail crossing is influenced by the level of conflict between trains and road vehicles. The conflict is normally expressed as the product of the number of trains and road vehicles using the crossing i.e. trains x vehicles. As speed is also a factor, it is necessary to apply weighting factors to the level of conflict based on the speed of trains and vehicles to establish the weighted conflict in order to assess the level of potential hazard at the crossing.

The weighted conflict at crossings is derived as follows:

- Cwf / Cwb = Vt/60 x Nt x Vv/60 x AADT

Where:

- Cwf / Cwb = is the weighted conflict number for flashing lights and booms respectively
- Vt = maximum train speed in km/hr
- Vv – 85th percentile speed of vehicles approaching the railway crossing in km/hr.

- Nt = The average number of trains per week
- AADT = the annual average daily vehicle traffic

The existing weighted conflict numbers would be as shown in Table 5-8 below.

Table 5-8 Existing Level Crossing Weighted Conflict Number

Rail Line	Road	Nt	AADT	Vv	Vt	Cwf/Cwb
North Coast Rail	Abbot Point Road	84	300	60	70	29,400
Collinsville – Newlands Rail Line	Abbot Point Road	225	300	60	30	33,600
Collinsville – Newlands Rail Line	Western Access Road	225	10	60	20	750

The weighted conflict numbers with Project traffic (peak daily) would be as shown in Table 5-9 below

Table 5-9 Level Crossing Weighted Conflict Number with Project Traffic

Rail Line	Road	Nt	AADT	Vv	Vt	Cwf/Cwb
North Coast Rail	Abbot Point Road	84	455	60	70	44,600
Collinsville – Newlands Rail Line	Abbot Point Road	225	455	60	30	51,120
Collinsville – Newlands Rail Line	Western Access Road	225	164	60	20	12,300

The Western Australian guide indicates the following warrants;

- Partially active control (i.e. flashing lights) if Cwf exceed 14,000
- Fully active control (i.e. flashing lights, boom gates) if Cwb exceeds 700,000.

The following conclusions can be made with respect to the control treatment at each crossing and the impact of the development traffic:

- The Abbot Point Road/Newlands Collinsville and Abbot Point Road/North Coast Rail Line crossings currently warrant partially active control with flashing lights as the weighted conflict exceeds 14,000, which is the current standard of the crossing
- The Project development traffic, whilst increasing the weighed conflict by 50 percent at the Abbot Point Road/Newlands Collinsville and Abbot Point Road/North Coast Rail Line crossings, does not trigger a warrant for a higher level of control (i.e. boom gates)

- The Western Access Road/Newlands Collinsville crossing does not currently warrant partially active control with flashing lights as the weighted conflict is less than 14,000
- The Project development traffic increases the weighed conflict significantly at the Western Access Road/Newlands Collinsville crossing, but does not trigger the warrant for a partially active control with flashing lights.

The analysis, whilst preliminary in nature, does indicate that the existing crossing controls should maintain an acceptable level of road - rail safety and the impact of the Project traffic should not warrant an upgrading to the existing crossing treatments.

5.5 Road Pavement Assessment

5.5.1 Abbot Point Road

The existing Abbot Point Road pavement is in very good condition and it is understood that NQBP undertook a major rehabilitation of the pavement in the last five years.

A calculation of daily Equivalent Standard Axles (ESAs) from background traffic on Abbot Point Road was completed based on:

- An AADT of 300 vehicles and a heavy vehicle percentage of 6%, based on the results of the TTM Group survey on 5 March 2013
- Axles groups/heavy vehicle (HV) – 3.06, ESAs/HV axle group – 1.29 i.e. 3.95 ESAs/heavy vehicle (Austroads, Appendix D, WIM Site ID 90042 Bruce Highway – Guthalungra).

A calculation of average daily ESAs from Project generated traffic was completed based on:

- All Project generated traffic excluding workforce traffic being deemed a heavy vehicle
- All HV were assumed as five axle semitrailers at the maximum axle mass limit, resulting in axles groups per heavy vehicle – 3.0, ESAs per heavy vehicle axle group – 1.72
- Load damage exponent (m) – 4 (overall pavement damage).

The calculation of ESAs is summarised in Table 5-10 and Table 5-11. The calculation is conservative in that it assumes all HV movements are loaded.

Table 5-10 Pavement Impact Assessment for Abbot Point Road (Bruce Highway to Quarry Access) Summary

ESAs Source	Average Daily ESAs – Abbot Point Road

	Eastbound lane	Westbound lane
Background traffic	36	36
Project generated traffic	27	27
Project ESAs as a proportion of Background ESAs	75%	75%

Table 5-11 Pavement Impact Assessment for Abbot Point Road (Quarry Access to Western Access Road) Summary

ESAs Source	Average Daily ESAs – Abbot Point Road	
	Eastbound / Northbound lane	Westbound / Southbound lane
Background traffic	36	36
Project generated traffic	64	64
Project ESAs as a proportion of Background ESAs	178%	178%

Details of pavement impact assessments output are provided in Appendix 12

The pavement impact of Project generated traffic results in significant increases to pavement loading based on the average daily traffic over a 12 month period. Over the Project duration, the total Project ESAs per lane would be in the order of 9,700 ESAs (Bruce Highway to the quarry access) and 23,500 (quarry access to Western Access Road). Based on a daily background ESA of 36, the potential reduction in pavement life would be 9 months and 22 months respectively. This reduction would only be potentially on the eastbound/northbound lane as this would be the loaded direction, with the majority of the heavy vehicles in the opposite direction will be unloaded.

Typically, common practice is not to consider reductions in pavement life of less than twelve months. Therefore there would only be a case for a 'bring forward' cost contribution to be applied to the eastbound / northbound lane on Abbot Point Road between the Deco Quarry Access and the Western Access Road (approximately 5 km).

However, it is noted that NQBP are the owners of Abbot Point Road and will be the project proponent and the principal for all construction contracts. As such NQBP cannot contract with itself for pavement impact contributions

The following measures are proposed to ensure the road is maintained and handed back in no worse a state of repair to its condition at the start of construction activities, particularly between the Quarry Access and Western Access Road:

- Prior to construction activities commencing, a video record of the condition of Abbot Point Road will be made to provide a full record prior to use by Project traffic

- The contractor will maintain Abbot Point Road during use of the road for the construction. The maintenance may include pothole patching of the seal or correction of any edge drops or raveling
- A video recording of Abbot Point Road be made at the end of the use of the road for construction and compared to the initial video. If, in consultation with the NQBP, it is agreed that rehabilitation works are required to ensure that the road is in no worse state of repair compared to its condition at the start of construction activities, appropriate arrangements will be put in place to address the pavement impacts.

5.5.2 Western Access Road

With respect to the unsealed Western Access Road, in order to ensure that the road is maintained and handed back in no worse a state of repair compared to its condition at the start of construction activities, the following is proposed:

- Prior to construction activities commencing, a video record of the condition of Western Access Road will be made to provide a full record prior to use by Project traffic
- The contractor will maintain the Western Access Road during use of the road for the construction. The maintenance may include grading or re-sheeting
- A video recording of the Western Access Road will be made at the end of the use of the road for construction and compared to the initial video. If, in consultation with the NQBP, it is agreed that rehabilitation works are required to ensure that the road is in no worse state of repair compared to its condition at the start of construction activities, appropriate arrangements will be put in place to address the pavement impacts.

5.5.3 Bruce Highway

The assessment of pavement impacts was completed separately for each lane of the Bruce Highway north and south of the Abbot Point Road intersection.

The calculation of ESAs is based on the Austroads Guide to Pavement Technology Part 2: Pavement Structural Design.

A calculation of daily ESAs from background traffic on the Bruce Highway was completed based on:

- TMR traffic census data comprising AADT, percentage Heavy Vehicles (HVs)
- Axles groups/HV – 3.06, ESAs/HV axle group – 1.29 i.e. 3.95 ESAs/HV (Austroads, Appendix D, WIM Site ID 90042 Bruce Highway – Guthalungra).

A calculation of average daily ESAs from Project generated traffic was completed based on:

- All Project generated traffic excluding workforce traffic being deemed a heavy vehicle

- All HV were assumed as five (5) axle semitrailers at the maximum axle mass limit, resulting in axles groups per heavy vehicle – 3.0, ESAs per heavy vehicle axle group – 1.72
- Load damage exponent (m) – 4 (overall pavement damage).

The calculation of ESAs is summarised in Table 5-12 and Table 5-13. The calculation is conservative in that it assumes all HV movements are loaded.

Table 5-12 Pavement Impact Assessment Summary - Bruce Highway (North of Abbot Point Road)

ESAs Source	Average Daily ESAs – Bruce Highway	
	Northbound lane	Southbound lane
Background traffic	1,173	1,239
Project generated traffic	16	16
Project ESAs as a proportion of Background ESAs	1.3%	1.3%

Table 5-13 Pavement Impact Assessment Summary - Bruce Highway (South of Abbot Point Road)

ESAs Source	Average Daily ESAs – Bruce Highway	
	Northbound lane	Southbound lane
Background traffic	1,471	1,296
Project generated traffic	11	11
Project ESAs as a proportion of Background ESAs	0.7%	0.8%

Details of pavement impact assessments output are provided in Appendix 12

The pavement impact brought by Project generated traffic results in an increase to pavement loading less than the 5% threshold based on the average daily traffic over a 12 month construction period.

Based on the level of increase and the limited duration of the Project, the impact to the Bruce Highway pavement is considered insignificant. It is additionally noted that the calculation is based on fully loaded heavy vehicles for all movements; hence as not all movements will be fully loaded the impact will be less than reported.

6 TRAFFIC MANAGEMENT MEASURES

An approved Traffic Management Plan (TMP) will be required to be prepared and implemented by the construction contractor.

The Manual of Uniform Traffic Control Devices (MUTCD) shall be used as a basis for developing the detailed TMP relating to all construction activities on or near all State Controlled Roads and roads controlled by NQBP.

The traffic management strategies and measures described below are designed to provide an outline of the minimum conditions that must be met to ensure safe conditions for Project personnel and the public, and to minimise disruption to traffic flow.

6.1 Operating Speed

The proposed speed limits on Project roads should be as follows;

- Bruce Highway, posted speed limit of 100 km/h
- Abbot Point Road, posted speed limit of 100 km/h and 60km/h
- Western Access Road, maximum speed of 60 km/h.

6.2 Vehicle Lengths

The maximum length of Project vehicles should be 19m to ensure that there are no queuing issues at any of the road-rail crossings. If Project vehicles greater than 19m in length are to be employed, additional traffic management measures at the road-rail crossings will be required as detailed below in section 6.7.

6.3 Stopping and Parking

All parking will be at work site. It is not anticipated that any parking will be required along Abbot Point Road or the Western Access Road. Whilst no major impediments were identified in the event that any vehicle had to stop for emergency reasons, all Project vehicles should be instructed to not park on these roads.

6.4 Oversized / Overweight Loads

As part of the mobilisation/demobilisation of the site machinery, there will be a requirement to escort a number of oversized/overweight vehicles to transport the following twenty-eight (28) pieces of equipment:

- 10 No. Cat 637 Scrapers (52 tonnes)
- 3 No. Cat D9 Dozers (49 tonne)

- 6 no. 40kL water trucks
- 2 No. Cat 825 Compactors (32 tonne)
- 2 No. 18 tonne pad foot rollers
- 2 No. 45 tonne dump trucks
- 1 No. Cat 16 grader (32 tonne)
- 1 No. 45 tonne excavator
- 1 No. Cat 965 Front End loader (13 tonne).

All travel will be subject to TMR permit conditions, Queensland Police Service (QPS) approvals, Queensland Rail / Aurizon approvals, and any other authority approvals as required under the Transport Operations (Road Use Management) Act (Qld) 1995.

Typically advice on over-dimensional / overweight vehicle movement schedules should be forwarded to QPS, three months in advance of the movement schedule commencing, or later by arrangement with the Regional Traffic Coordinator, Police Region, Mackay.

The requirements for the escorting of over dimensioned loads are shown below in Figure 6-1.

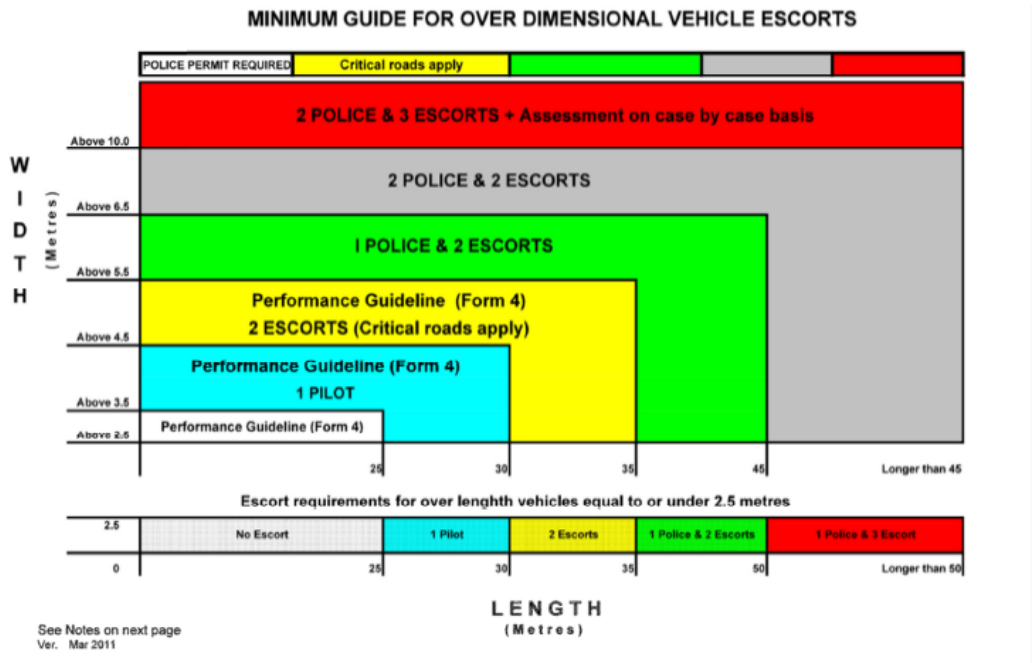


Figure 6-1 Guide for Over Dimensional Loads

6.5 Abbot Point Road/Western Access Road Traffic Control Plan

Should actual delay to northbound thorough traffic at the Abbot Point Road/Western Access Road intersection impact port or rail operations, it is proposed to operate traffic control at the Abbot Point Road/Western Access Road intersection. A schematic layout of a possible traffic guidance scheme is contained in Appendix 13

6.6 Abbot Point Road/Deco Quarry Access

Whist the movement of Project vehicles from the quarry to the site (right-out/left-in) will not trigger any intersection upgrades at the existing Abbot Point Road / Deco Quarry Access intersection, it is recommended that during haulage of quarry materials truck turning signage should be installed on both Abbot Point Road approaches to warn of increased truck traffic.

6.7 Abbot Point Road / Bruce Highway Intersection Treatments

As detailed earlier, there is an existing issue with vehicles turning left out of Abbot Point Road into the Bruce Highway potentially queuing across the Collinsville-Newlands Rail Line due to the location of the existing stop line. In order to mitigate this issue, it is proposed to remark to the stop line to within two (2) metres of the edge of the Bruce Highway running

lane and provide chevron line marking as shown on the plans in Appendix 11 . Detailed engineering plans, based on an engineering survey, should prepared and certified by a registered professional engineer of Queensland (RPEQ) and submitted to TMR for approval prior to any works being undertaken at the intersection.

With the proposed line marking, the available storage length clear of the rail lines would be 19m, which is the Project design vehicle length. For vehicles that exceed 19m in length, traffic control will need to be put into place which would consist of the following measures:

- Implementation of signage to reduce the speed limit on the Bruce Highway to 40 km/h with 'prepare to stop signage'
- Use of traffic controllers to stop the southbound traffic on the Bruce Highway to enable the Project vehicles turning left out of Abbot Point Road to turn without stopping and potentially queuing across the Collinsville- Newlands Rail Line.

It is expected that this traffic control will only be required during demobilisation of the site.

6.8 Project Traffic Inductions / Journey Management Plans

The Project traffic using the Bruce Highway / Abbot Point Road intersection should undertake project inductions to highlight the risks associated with queuing across the rail lines, in particular when executing right turns into Abbot Point Road.

These induction sessions should extend to the existing workforce at Abbot Point as a remainder of the issues present at this intersection.

7 CONCLUSION

This assessment considered the road and rail crossing impacts associated with traffic generation from the Abbot Point Growth Gateway Strategy.

The assessment was generally completed in accordance with GARID.

The assessment found that Project generated traffic resulted in insignificant impacts to:

- The traffic lane capacity of the Bruce Highway and Abbot Point Road
- The capacity of the Bruce Highway / Abbot Point Road intersection
- The Bruce Highway road pavement.

The assessment concluded that there may be some reduction in pavement life of the Abbot Point Road pavement, particularly for the eastbound / northbound lane between the Deco Quarry and the Western Access Road.

An assessment was completed for queuing associated with the North Coast Rail Line and Collinsville - Newlands Rail Line crossings of Abbot Point Road. The assessment found the addition of Project generated traffic did not significantly increase the risk of available queue storages being exceeded, although it was recommended that Project inductions are undertaken to reinforce the risks associated with queuing at the rail crossings of Abbot Point Road.

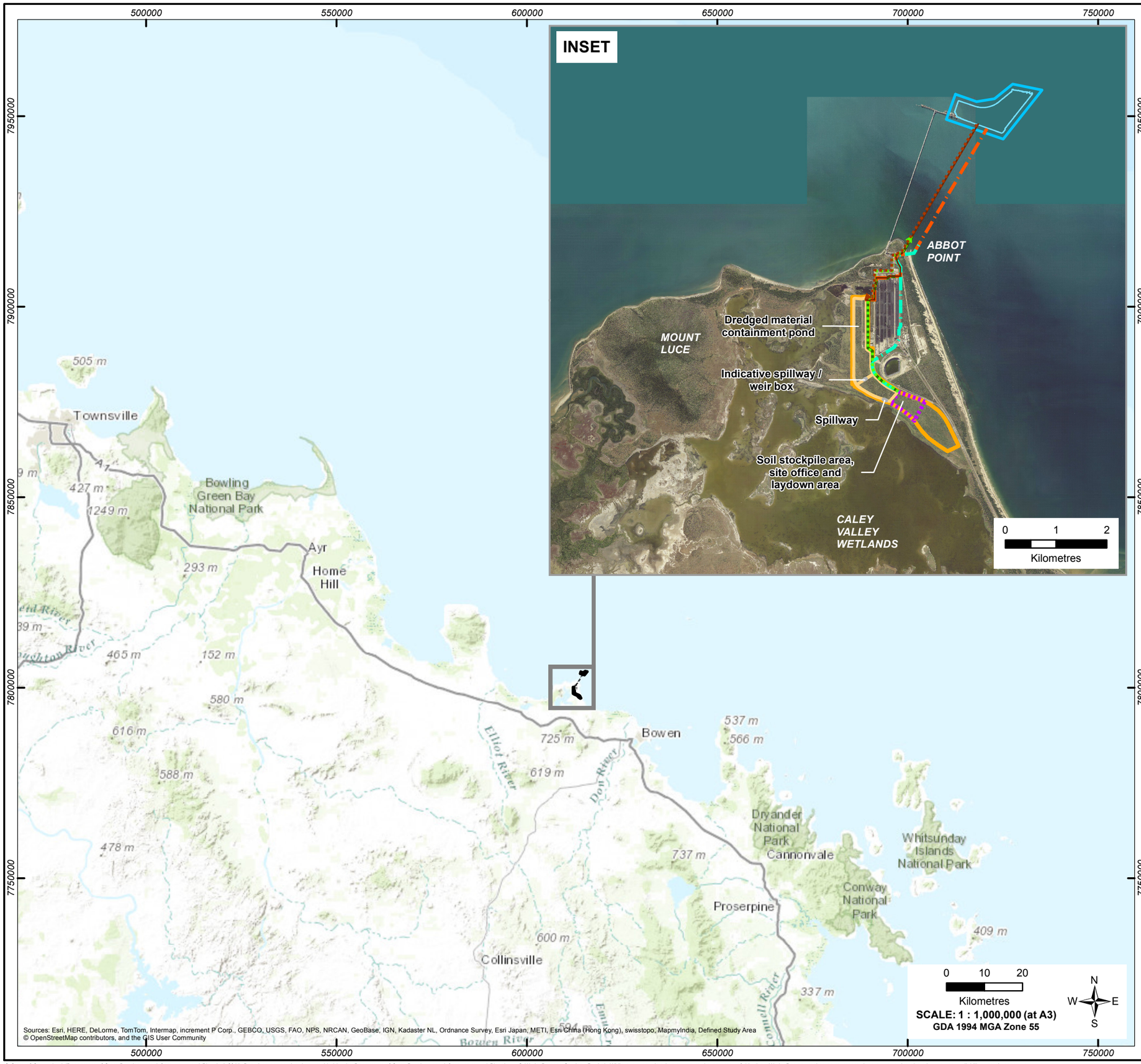
A significant safety issue currently exists at the Bruce Highway / Abbot Point Road intersection where the position of the give way line for vehicles exiting Abbot Point Road could result in vehicles that exceed 15.4 m in length queuing within five (5) metres of the North Coast Rail Line. It is recommended that the give way line be remarked at a location two (2) metres offset from the Bruce Highway traffic lane.

The average delays to background northbound traffic on Abbot Point Road due to queuing of Project traffic turning left across the Western Access Road / Collinsville-Newlands Rail Line is not considered significant. Should actual delay to existing traffic present an impact to port or rail operations, it is proposed to operate traffic control at the Abbot Point Road / Western Access Road intersection. It is expected that such traffic control may only be required during the four week period of haulage of material to the site from the Deco Quarry.

A preliminary assessment of the warrants for rail –road crossing treatments determined that the impact of the Project traffic should not warrant an upgrading to the existing crossing treatments

Information has been provided to TMR in order facilitate ALCAM and safety assessments of rail crossings by the RIM.

Appendix 1 Project Overview Plan



Service Layer Credits: Sources: Esri, DeLorme, HERE, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom

LEGEND

- Dredged material pipeline (Option 1)
- Return water pipeline (Option 1)
- Dredged material pipeline (Option 2)
- Return water pipeline (Option 2)
- Dredged material pipeline (Option 3)
- Return water pipeline (Option 3)
- Dredged material containment pond
- Spillway
- Soil stockpile area, site office and laydown area
- Dredged material containment pond study area
- Dredging footprint
- Dredging study area

Source information:
Dredging study area
Setout points derived from coordinates on NQBP/Aurecon figure 242770-0000-DRG-SK-0021-A supplied by NQBP
Dredged material and return water pipelines (Option 1)
Digitised from BMT JFA Drg. No. BMT JFA 275.02-50-03 A, dated 17/12/2014 and Golder Associates Drg. No. 1525905-027-002A, dated 12/06/2015, with some minor adjustments to avoid clashes with existing infrastructure visible in the 2013 aerial imagery and to avoid any potential clashes with the proposed MOF expansion
Dredged material and return water pipelines (Options 2 and 3)
Developed by BMT JFA 21/07/2015
Soil stockpile, site office and laydown area
General area from Golder Associates Drg. No. 1525905-027-002A, dated 12/06/2015 and extended to include additional area for stockpiling of unsuitable soil.
Dredged material containment pond study area
Department of State Development, Infrastructure and Planning, (DSDIP)
Existing transport network
Physical Road Network - Queensland, Physical Rail Network - Queensland
Queensland Government - Department of Environment and Resource Management
2013 Imagery
Queensland Government - Department of State Development, Infrastructure and Planning 2015

REV	DATE	REVISION DESCRIPTION	DRN	CHK	ENG	CHK ENG	APPD
0	22/07/2015	Issued for information	KM	SL			

Queensland Government

QUEENSLAND GOVERNMENT

ABBOT POINT GROWTH GATEWAY PROJECT

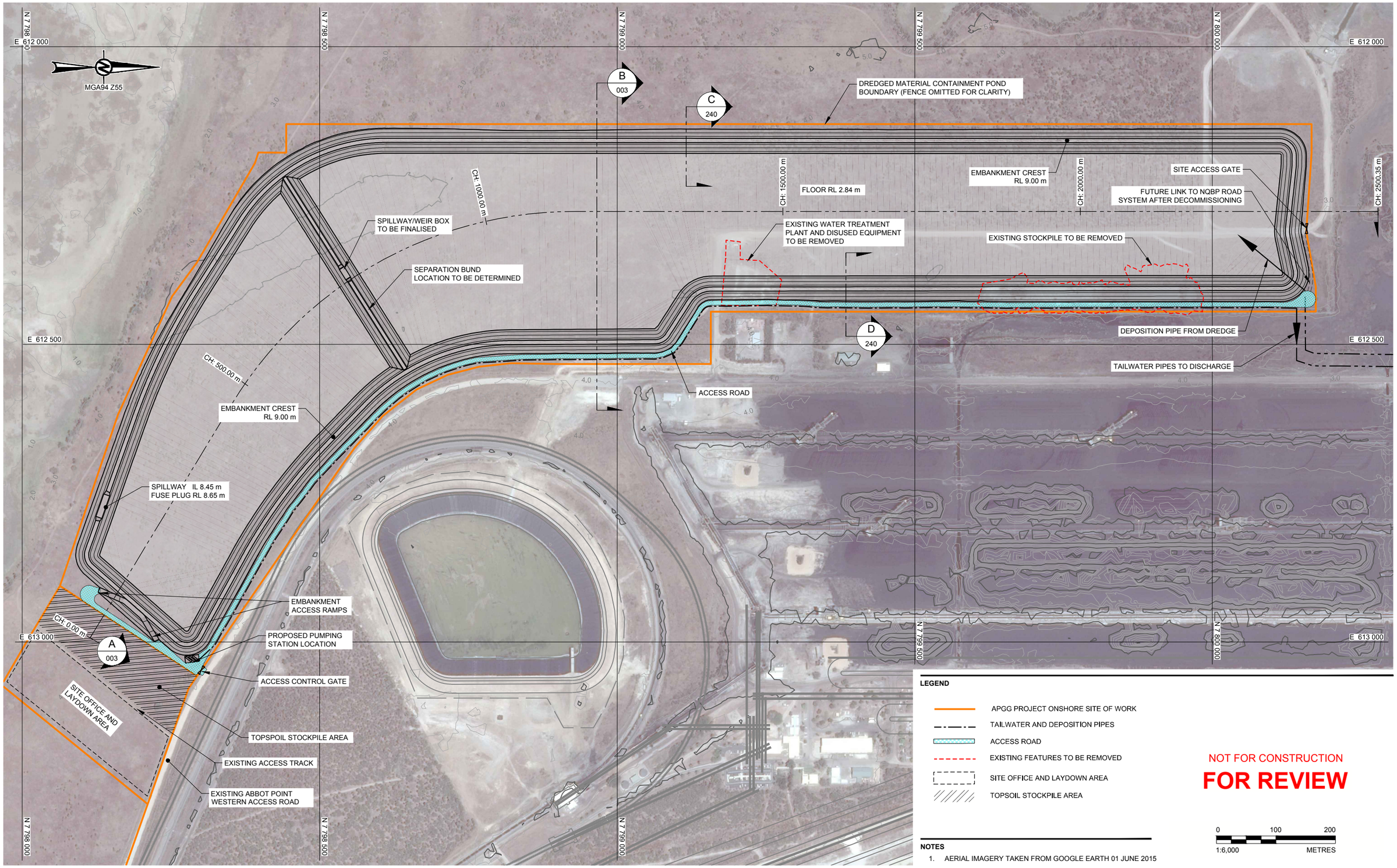
Project Locality

Figure: 301001-01956-00-GM-SKT-0121 | Rev: 0

G:\301001\01956 PROJ - Abbot Point Growth Gateway\10.0 Engineering\10 GM-Geomatics\Output\301001-01956-00-GM-SKT-0121-0 (Appl Project Locality).mxd

Compiled by BRISBANE GEOMATICS

Appendix 2 Concept Site Plan and Sections



LEGEND

- APGG PROJECT ONSHORE SITE OF WORK
- TAILWATER AND DEPOSITION PIPES
- ACCESS ROAD
- EXISTING FEATURES TO BE REMOVED
- SITE OFFICE AND LAYDOWN AREA
- TOPSOIL STOCKPILE AREA

NOT FOR CONSTRUCTION

FOR REVIEW

0 100 200

1:6,000 METRES

NOTES

1. AERIAL IMAGERY TAKEN FROM GOOGLE EARTH 01 JUNE 2015

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	CERTIFIED	RPEQ No.	SIGNATURE
B	2015-07-14	ISSUED FOR REVIEW	DDW	DCR	RDM	AM BARRETT	11375	
A	2015-06-12	ISSUED FOR REVIEW	EJC	DCR	RDM	A M BARRETT	11375	

CLIENT
DEPARTMENT OF STATE DEVELOPMENT

CONSULTANT
Golder Associates

BRISBANE OFFICE
147 CORONATION DRIVE
MILTON, QLD 4064
AUSTRALIA
[+61] (7) 3721 5400
www.golder.com

PROJECT
ABBOT POINT GROWTH GATEWAY PROJECT
DREDGED MATERIAL CONTAINMENT PONDS

TITLE
GENERAL ARRANGEMENT

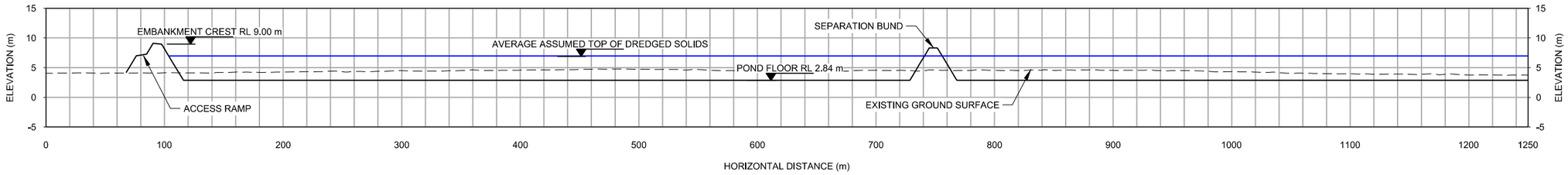
PROJECT No.	DOC No.	Rev.		DRAWING
1525905	027	B	3 of 6	002

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3

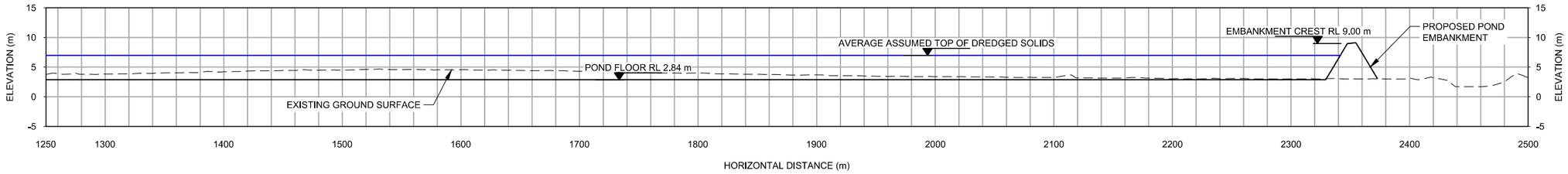
25 mm

0

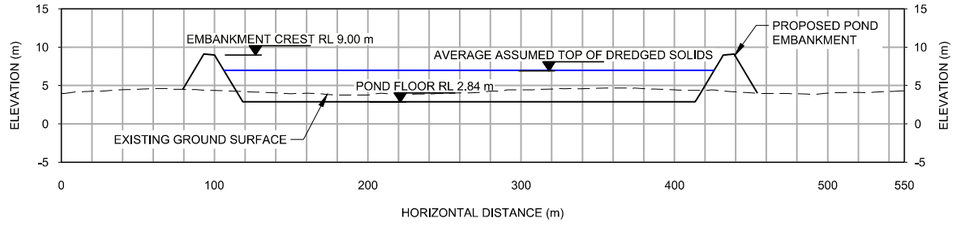
Path: \\golder.gds\gap\Brisbane\Geomatics\DSDIP\abbot_point\99_projects\1525905_abbot_point_ggis\02_PRODUCTION\DWG\DRAWINGS\ | File Name: 1525905-027-D-002-003.dwg



SCALE 1:4,000 m
VERT. SCALE 1:1:800 m
A 002
SECTION - PART 1 OF 2



SCALE 1:4,000 m
VERT. SCALE 1:1:800 m
A 002
SECTION - PART 2 OF 2



SCALE 1:4,000 m
VERT. SCALE 1:1:800 m
B 002
SECTION

NOT FOR CONSTRUCTION

FOR REVIEW

0 100 200
1:4,000 METRES

40 20 0
METRES
1:800

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A3
25 mm

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	CERTIFIED	RPEQ No.	SIGNATURE
B	2015-07-14	ISSUED FOR REVIEW	DDW	DCR	RDM	AM BARRETT	11375	
A	2015-06-12	ISSUED FOR REVIEW	EJC	DCR	RDM	A M BARRETT	11375	

CLIENT
DEPARTMENT OF STATE DEVELOPMENT

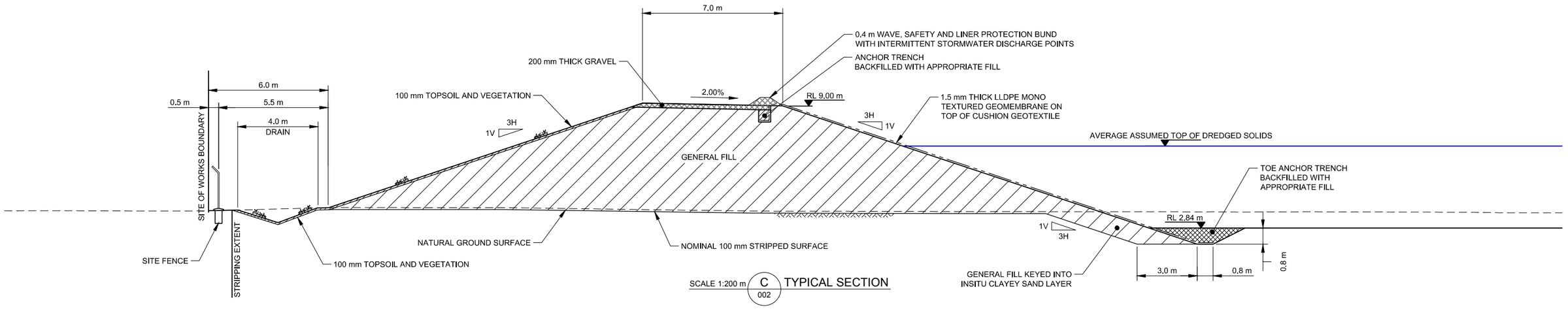
CONSULTANT
Golder Associates

BRISBANE OFFICE
147 CORONATION DRIVE
MILTON, QLD 4064
AUSTRALIA
[+61] (7) 3721 5400
www.golder.com

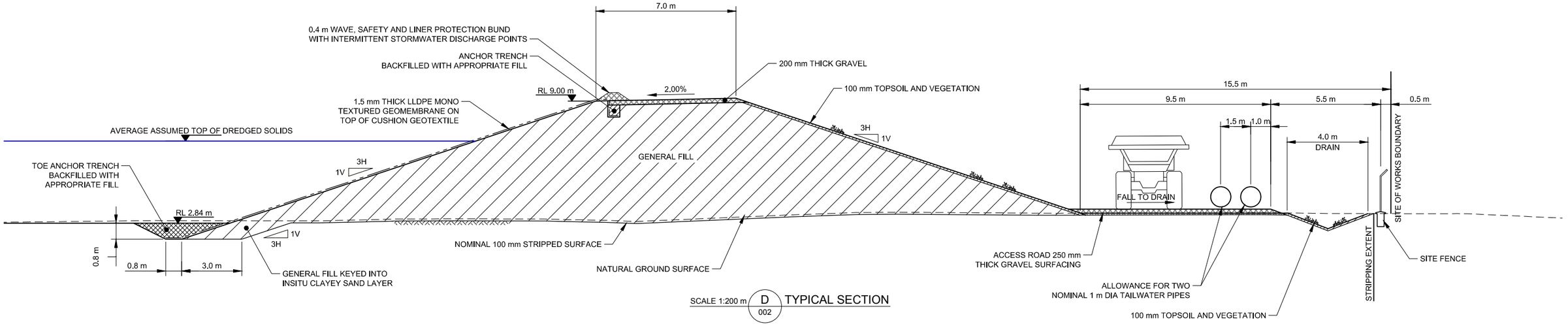
PROJECT
ABBOT POINT GROWTH GATEWAY PROJECT
DREDGED MATERIAL CONTAINMENT PONDS

TITLE
SECTIONS

PROJECT No.	DOC No.	Rev.		DRAWING
1525905	027	B	4 of 6	003



SCALE 1:200 m — C/002 — TYPICAL SECTION



SCALE 1:200 m — D/002 — TYPICAL SECTION

NOT FOR CONSTRUCTION

FOR REVIEW

0 5 10
1:200 METRES

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	CERTIFIED	RPEQ No.	SIGNATURE
B	2015-07-14	ISSUED FOR REVIEW	DDW	DCR	RDM	AM BARRETT	11375	
A	2015-06-12	ISSUED FOR REVIEW	EJC	DCR	RDM	A M BARRETT	11375	

CLIENT
DEPARTMENT OF STATE DEVELOPMENT

PROJECT
ABBOT POINT GROWTH GATEWAY PROJECT
DREDGED MATERIAL CONTAINMENT PONDS

CONSULTANT
Golder Associates

BRISBANE OFFICE
147 CORONATION DRIVE
MILTON, QLD 4064
AUSTRALIA
[+61] (7) 3721 5400
www.golder.com

TITLE
TYPICAL SECTIONS

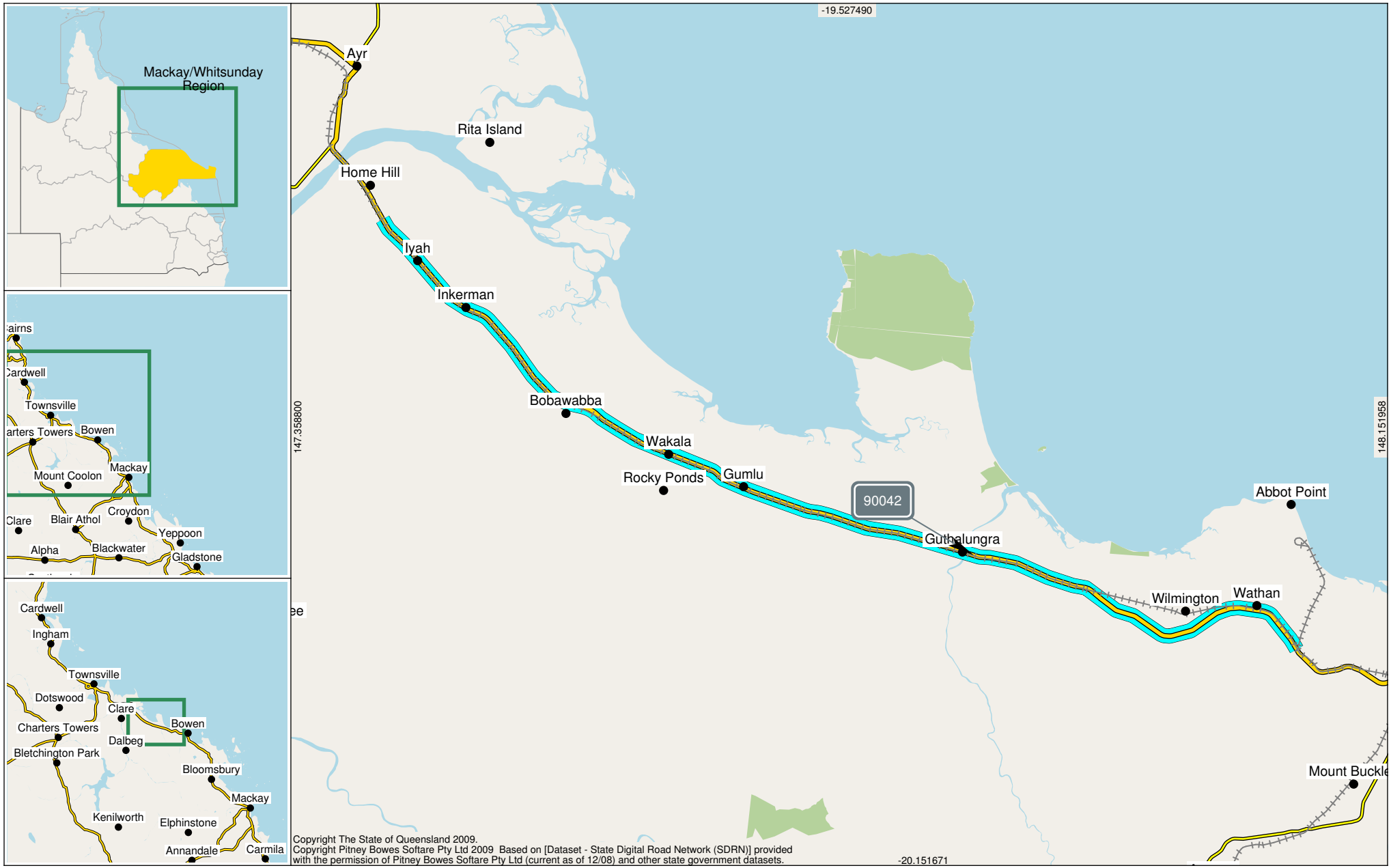
PROJECT No.	DOC No.	Rev.		DRAWING
1525905	027	B	6 of 6	240

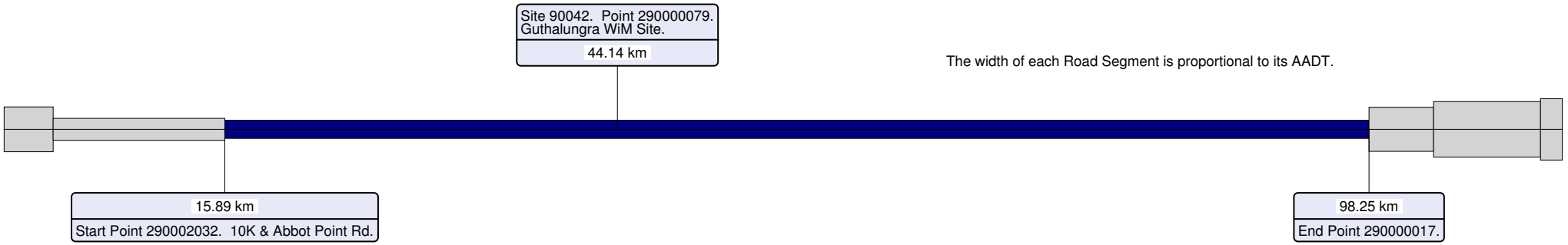
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A3

25 mm
0

Path: \\golder.gds\gal\Brisbane\Geomatics\DSD\Pabbot_point\69_projects\1525905_abbot_point_qgp\02_PRODUCTION\DWG\DRAWINGS\ | File Name: 1525905-027-D-240.dwg

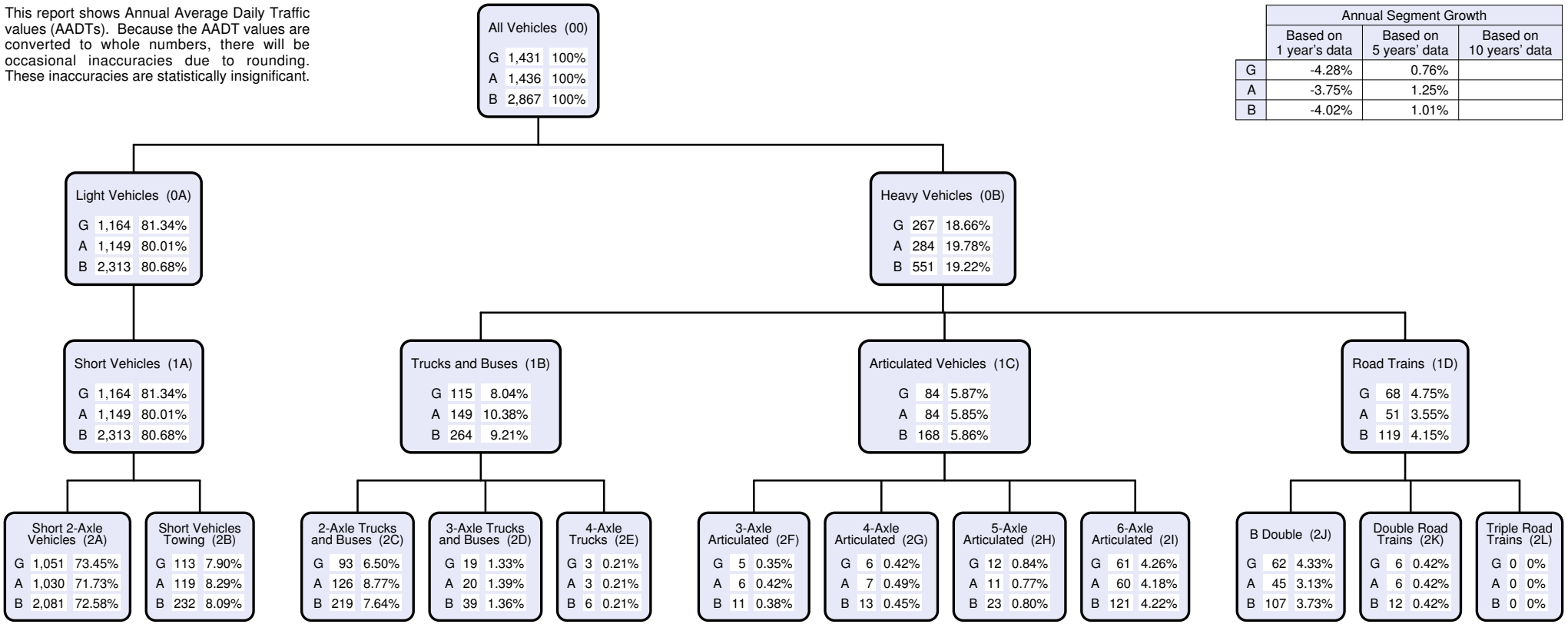
Appendix 3 TMR Traffic Census Data

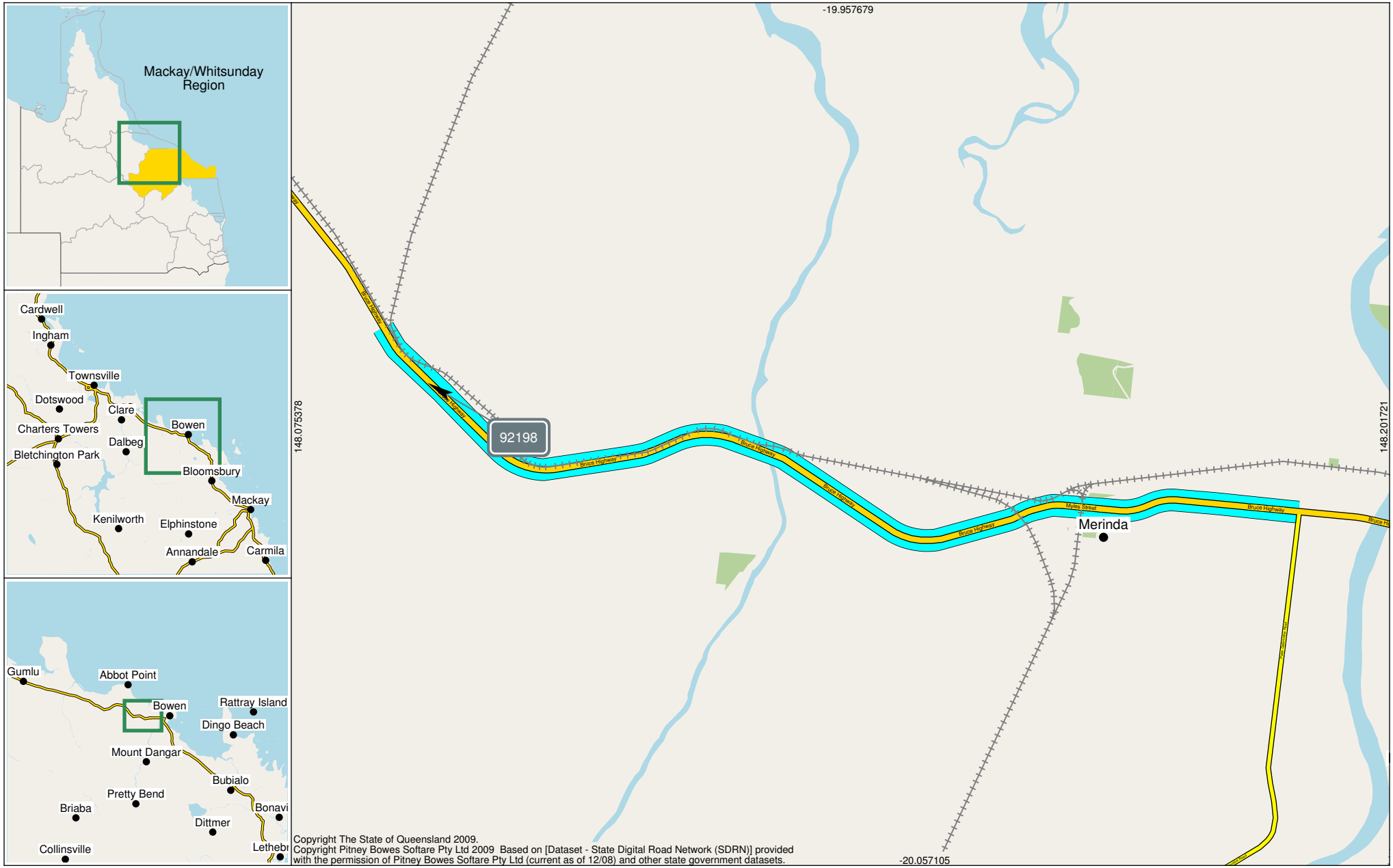




This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	-4.28%	0.76%	
A	-3.75%	1.25%	
B	-4.02%	1.01%	





Site 92198. Point 290002033. North of Little Goodbye Creek.
14.96 km

The width of each Road Segment is proportional to its AADT.

3.53 km
Start Point 290000163. Bruce Hwy from Bowen@ Bowen Dev.Rd.

15.89 km
End Point 290002032. 10K & Abbot Point Rd.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	1.67%	4.59%	
A	1.32%	5.93%	
B	1.49%	5.26%	

All Vehicles (00)

G	1,705	100%
A	1,767	100%
B	3,472	100%

Light Vehicles (0A)

G	1,367	80.18%
A	1,460	82.63%
B	2,827	81.42%

Heavy Vehicles (0B)

G	336	19.71%
A	308	17.43%
B	644	18.55%

Short Vehicles (1A)

G	1,367	80.18%
A	1,460	82.63%
B	2,827	81.42%

Trucks and Buses (1B)

G	130	7.62%
A	109	6.17%
B	239	6.88%

Articulated Vehicles (1C)

G	112	6.57%
A	107	6.06%
B	219	6.31%

Road Trains (1D)

G	94	5.51%
A	92	5.21%
B	186	5.36%

Short 2-Axle Vehicles (2A)

G	1,270	74.49%
A	1,363	77.14%
B	2,633	75.84%

Short Vehicles Towing (2B)

G	97	5.69%
A	97	5.49%
B	194	5.59%

2-Axle Trucks and Buses (2C)

G	66	3.87%
A	78	4.41%
B	144	4.15%

3-Axle Trucks and Buses (2D)

G	55	3.23%
A	27	1.53%
B	82	2.36%

4-Axle Trucks (2E)

G	9	0.53%
A	4	0.23%
B	13	0.37%

3-Axle Articulated (2F)

G	4	0.23%
A	4	0.23%
B	8	0.23%

4-Axle Articulated (2G)

G	13	0.76%
A	10	0.57%
B	23	0.66%

5-Axle Articulated (2H)

G	16	0.94%
A	19	1.08%
B	35	1.01%

6-Axle Articulated (2I)

G	79	4.63%
A	74	4.19%
B	153	4.41%

B Double (2J)

G	88	5.16%
A	90	5.09%
B	178	5.13%

Double Road Trains (2K)

G	5	0.29%
A	2	0.11%
B	7	0.20%

Triple Road Trains (2L)

G	1	0.06%
A	0	0.00%
B	1	0.03%

Appendix 4 Road-Rail Crossing Layouts

NORTH

WESTERN ACCESS ROAD

EXISTING GIVEWAY LINE

EXISTING CONTINUITY LINE

5.0

COLLINSVILLE NEWLANDS RAIL LINE

ABBOT POINT ROAD

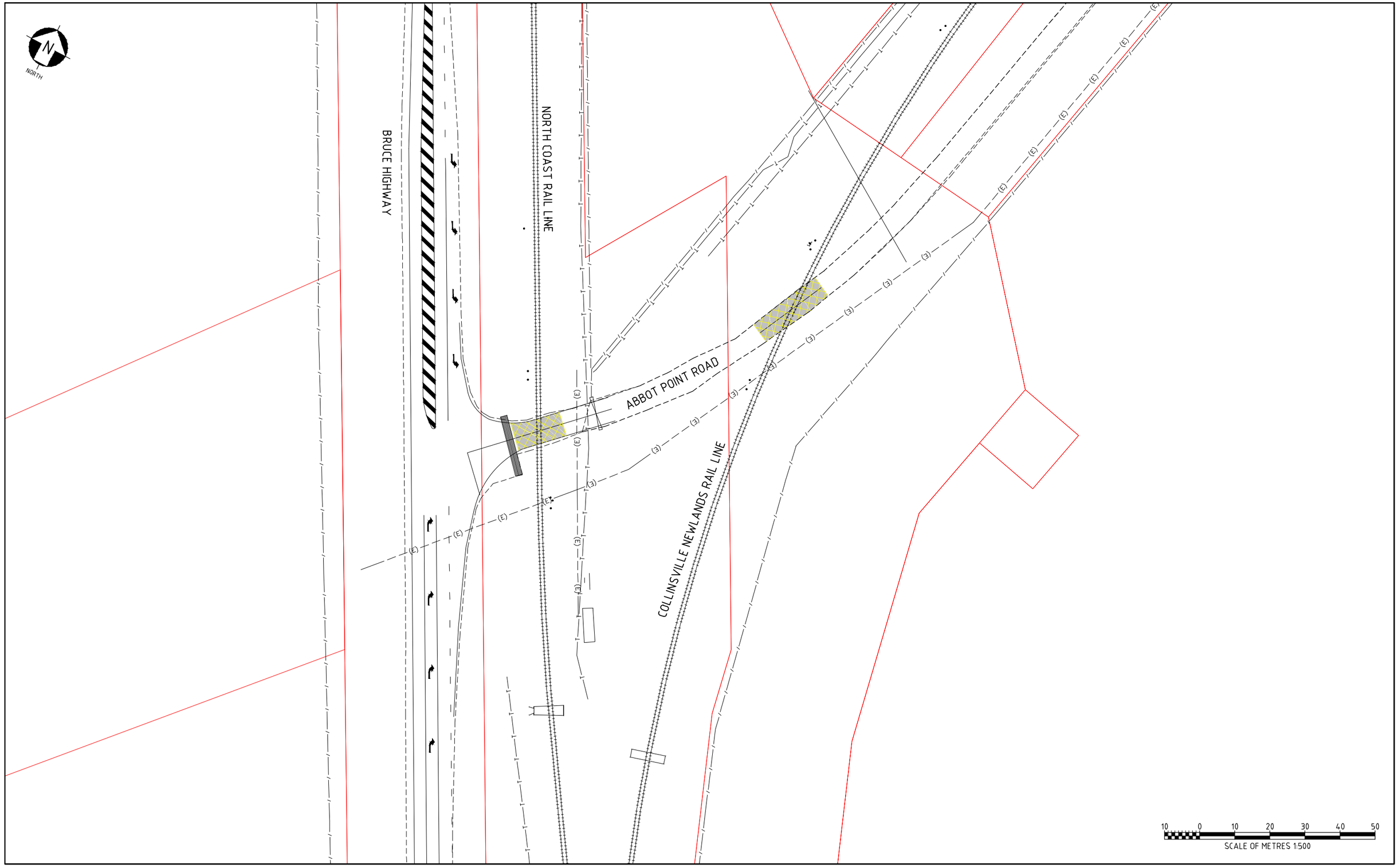
EXISTING GIVEWAY LINE

DESIGN VEHICLE
19.0m SEMI TRAILER

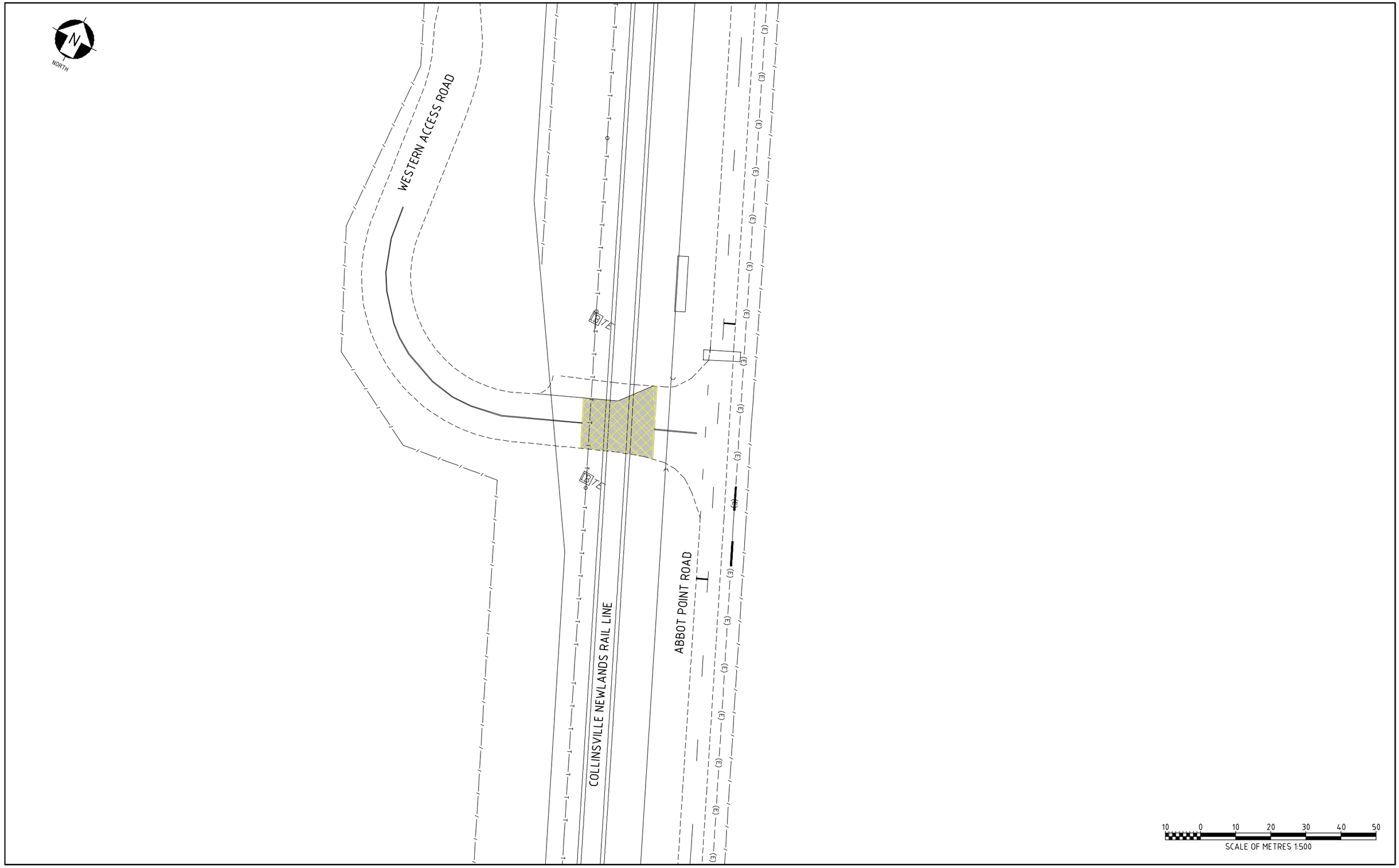
19.0

4 0 4 8 12 16 20
SCALE OF METRES 1:200

ABBOT POINT ROAD / WESTERN ACCESS ROAD INTERSECTION
VEHICLE QUEUING LAYOUT
301001-01956-00-CI-DSK-0002



BRUCE HIGHWAY / ABBOT POINT ROAD INTERSECTION
EXISTING INTERSECTION LAYOUT
301001-01956-00-CI-DSK-0003



ABBOT POINT ROAD / WESTERN ACCESS ROAD INTERSECTION
EXISTING INTERSECTION LAYOUT
301001-01956-00-CI-DSK-0004

NORTH

BRUCE HIGHWAY

NORTH COAST RAIL LINE

ABBOT POINT ROAD

EXISTING GRID

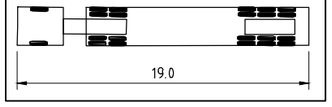
EXISTING GIVE WAY LINE

EXISTING CONTINUITY LINE

COLLINSVILLE NEWLANDS RAIL LINE

DESIGN VEHICLE

19.0m SEMI TRAILER



4 0 4 8 12 16 20

SCALE OF METRES 1:200

BRUCE HIGHWAY / ABBOT POINT ROAD INTERSECTION
EXISTING VEHICLE QUEUING LAYOUT
301001-01956-00-CI-DSK-0005

Appendix 5 Traffic Generation Table

Abbot Point Port Growth Gateway Project

Traffic Generation Table

N

WorleyParsons resources & energy

Activity			Veh.	Movements			Start week (inc.)	End week (inc.)	Days	Avg. Daily Movem.	% - North	% - South	%- Quarry	Daily North	Daily South	Daily Quarry	Daily HV N	Daily HV S	% - Each Peak	In AM, Out PM	Out AM, In PM	AM Peak N In	AM Peak N Out	AM Peak S In	AM Peak S Out	AM Peak Q In	AM Peak Q Out	PM Peak N In	PM Peak N Out	PM Peak S In	PM Peak S Out	PM Peak Q In	PM Peak Q Out	Heavy Daily N	Daily S
Plant - Stockpile management																																		
10 Assorted plant - mobilisation			10	20	h	t	1	2	14	1.4	50%	50%	0%	0.7143	0.7143	0	0.7	0.7	20%	50%	50%	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.7	0.7
10 Assorted plant - demobilisation			10	20	h	t	27	28	14	1.4	50%	50%	0%	0.7143	0.7143	0	0.7	0.7	20%	50%	50%	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.7	0.7
2 D9 dozer																																		
4 40kL water truck																																		
4 Tractor plough																																		
Plant - Embankment construction																																		
31 Assorted plant - mobilisation			31	62	h	t	1	2	14	4.4	50%	50%	0%	2.2143	2.2143	0	2.2	2.2	20%	50%	50%	0.2	0.2	0.2	0.2	0.0	0.0	0.2	0.2	0.2	0.2	0.0	0.0	2.2	2.2
31 Assorted plant - demobilisation			31	62	h	t	27	28	14	4.4	50%	50%	0%	2.2143	2.2143	0	2.2	2.2	20%	50%	50%	0.2	0.2	0.2	0.2	0.0	0.0	0.2	0.2	0.2	0.2	0.0	0.0	2.2	2.2
10 Cat 637 scraper																																		
2 40kL water truck																																		
2 Cat 825 compactor																																		
2 18t pad foot roller																																		
2 Cat 14H graders																																		
1 Cat 16 grader																																		
1 Tractor w laser bucket																																		
2 45t dump truck																																		
1 Front end loader																																		
4 32t excavator																																		
1 45t excavator																																		
1 D9 dozer																																		
2 12t smooth drum roller																																		
Plant - Various																																		
4 Plant, liner installation - mobilisation			4	8	h	t	13	14	14	0.6	10%	90%	0%	0.0571	0.5143	0	0.1	0.5	10%	50%	50%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5
4 Plant, liner installation - demobilisation			4	8	h	t	27	28	14	0.6	10%	90%	0%	0.0571	0.5143	0	0.1	0.5	10%	50%	50%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5
10 Plant, pipe handling, assembly - mobilisation			10	20	h	t	13	14	14	1.4	10%	90%	0%	0.1429	1.2857	0	0.1	1.3	10%	50%	50%	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	1.3
10 Plant, pipe handling, disassembly - demobilisation			10	20	h	t	27	28	14	1.4	10%	90%	0%	0.1429	1.2857	0	0.1	1.3	10%	50%	50%	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	1.3
Dredge Pipeline																																		
Dredge floater - mobilisation			100	200	h	t	12	18	49	4.1	100%	0%	0%	4.0816	0	0	4.1	0.0	10%	50%	50%	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	4.1	0.0
Dredge floater - demobilisation			100	200	h	t	46	52	49	4.1	100%	0%	0%	4.0816	0	0	4.1	0.0	10%	50%	50%	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	4.1	0.0
Floater length	1200	m																																
Pipe length	12	m																																
Lengths / trip	1																																	
Dredge pipeline (sinker, onshore) - mobilisation			146	292	h	t	12	18	49	6.0	100%	0%	0%	5.9524	0	0	6.0	0.0	10%	50%	50%	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	6.0	0.0
Dredge pipeline (sinker, onshore) - demobilisation			146	292	h	t	46	52	49	6.0	100%	0%	0%	5.9524	0	0	6.0	0.0	10%	50%	50%	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	6.0	0.0
On-shore + off-shore	5250	m																																
Pipe length	12	m																																
Lengths / trip	3																																	
Return water pipeline Trips - mobilisation			250	500	h	t	12	18	49	10.2	100%	0%	0%	10.204	0	0	10.2	0.0	10%	50%	50%	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	10.2	0.0
Return water pipeline Trips - demobilisation			250	500	h	t	46	52	49	10.2	100%	0%	0%	10.204	0	0	10.2	0.0	10%	50%	50%	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	10.2	0.0
On-shore + off-shore	9000	m																																
Pipe length	12	m																																
Lengths / trip	3																																	
Construction water																																		
Water - trips			2500	5000	h	t	2	18	119	42.0	0%	0%	100%	0	0	42.017	0.0	0.0	10%	50%	50%	0.0	0.0	0.0	0.0	2.1	2.1	0.0	0.0	0.0	0.0	2.1	2.1	0.0	0.0
Volume	100	Ml																																
Truck capacity	40	kL																																
Construction materials																																		
Liner			109	218	h	t	13	14	14	15.5	10%	90%	0%	1.5542	13.987	0	1.6	14.0	10%	50%	50%	0.1	0.1	0.7	0.7	0.0	0.0	0.1	0.1	0.7	0.7	0.0	0.0	1.6	14.0
Area	1485000	m2																																
Roll width	7	m																																
Roll length	130	m																																
Rolls / trip	15																																	
10 Security fencing (posts, ancillary materials)			10	20	h	t	25	28	28	0.7	10%	90%	0%	0.0714	0.6429	0	0.1	0.6	10%	50%	50%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6
Security fencing (chainwire)			11	23	h	t	25	28	28	0.8	10%	90%	0%	0.0804	0.7232	0	0.1	0.7	10%	50%	50%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7
Length	4500	m																																
Roll length	20	m																																
Rolls / trip	20																																	
Cement stabilised sand			125	250	h	t	17	20	28	8.9	10%	90%	0%	0.8929	8.0357	0	0.9	8.0	10%	50%	50%	0.0	0.0	0.4	0.4	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.0	0.9	8.0
Volume	1500	m3																																
Bulk bags 1m3	1500																																	
Bulk bags / truck	12																																	
Crushed rock			120	240	h	t	12	16	35	6.9	0%	0%	100%	0	0	6.8571	0.0	0.0	10%	50%	50%	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0
Volume	1500	m3																																
Density	2.4	t/m3																																
Truck payload	30	t																																
Riprap			25	50	h	t	12	16	35	1.4	0%	0%	100%	0	0	1.4286	0.0	0.0	10%	50%	50%	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0
Volume	500	m3																																
Density	1.5	t/m3																																
Truck payload	30	t																																
Gypsum			17	33	h	t	12	16	35	1.0	10%	90%	0%	0.0952	0.8571	0	0.1	0.9	10%	50%	50%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9
Mass	500	t																																
Truck payload	30	t																																
Construction workforce																																		
Management and quality	25	pers	14	28		d	1	52	364	28.0	10%	90%	0%	2.8	25.2	0	0.0	0.0	40%	80%	20%	0.9	0.2	8.1	2.0	0.0	0.0	0.2	0.9	2.0	8.1	0.0	0.0	0.0	0.0
Machinery - operate and maintain	35	pers	10	20		d	1	24	168	20.0	10%	90%	0%	2	18	0	0.0	0.0	40%	80%	20%	0.6	0.2	5.8	1.4	0.0	0.0	0.2	0.6	1.4	5.8	0.0	0.0	0.0	0.0
Pipelines - assemble	10	pers	3	6		d	12	26	105	6.0	10%	90%	0%	0.6	5.4	0	0.0	0.0	40%	80%	20%	0.2	0.0	1.7	0.4	0.0	0.0	0.0	0.2	0.4	1.7	0.0	0.0	0.0	0.0
Pipelines - service	6	pers	2	4		d	27	44	126	4.0	10%	90%	0%	0.4	3.6	0	0.0	0.0	40%	80%	20%	0.1	0.0	1.2	0.3	0.0	0.0	0.0	0.1	0.3	1.2	0.0	0.0	0.0	0.0
Pipelines - disassemble	10	pers	3	6		d	45	52	56	6.0	10%	90%	0%	0.6	5.4	0	0.0	0.0	40%	80%	20%	0.2	0.0	1.7	0.4	0.0	0.0	0.0	0.2	0.4	1.7	0.0	0.0	0.0	0.0
Dredge - operate and maintain	6	pers	2	4		d	27	44	126	4.0	10%	90%	0%	0.4	3.6	0	0.0	0.0	40%	80%	20%	0.1	0.0	1.2	0.3	0.0	0.0	0.0	0.1	0.3	1.2	0.0	0.0	0.0	0.0
Liner installation crews	30	pers	9	18		d	13	28	112	18.0	10%	90%	0%	1.8	16.2	0	0.0	0.0	40%	80%	20%	0.6	0.1	5.2	1.3	0.0	0.0	0.1	0.6	1.3	5.2	0.0	0.0	0.0	0.0
Fencing contractor	12	pers	4	8		d	25	28	28	8.0	10%	90%	0%	0.8	7.2	0	0.0	0.0	40%	50%	50%	0.2	0.2	1.4	1.4	0.0	0.0	0.2	0.2	1.4	1.4	0.0	0.0	0.0	0.0
Servicing																																		
Demountable offices - mobilisation			10	20	h	t	1	1	7	2.9	10%	90%	0%	0.2857	2.5714	0	0.3	2.6	10%	50%	50%	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.3	2.6
Stores compound / services - mobilisation			10	20	h	t	1	1	7	2.9	10%	90%	0%	0.2857	2.5714	0	0.3	2.6	10%	50%	50%	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.3	2.6
Demountable offices - demobilisation			10	20	h	t	52	52	7	2.9	10%	90%	0%	0.2857	2.5714	0	0.3	2.6	10%	50%	50%	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.3	2.6
Stores compound / services - demobilisation			10	20	h	t	24	52	203	0.1	10%	90%	0%	0.0099	0.0887	0	0.0	0.1	10%	50%	50%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Potable water	3	trips/w	156	312	h	t	1	52	364	0.9	10%	90%	0%	0.0857	0.7714	0	0.1	0.8	10%	50%	50%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8
Fuel / oil	3	trips/w	156	312	h	t	1	52	364	0.9	10%	90%	0%	0.0857	0.7714	0	0.1	0.8	10%	50%	50%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8
Waste services	3	trips/w	156	312	h	t	1	52	364	0.9	10%	90%	0%	0.0857	0.7714	0	0.1	0.8	10%	50%	50%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8

No allowance for:

1. Assumes that servicing to dredge is undertaken from Bowen, workforce transfers to dredge undertaken to/from Bowen

Appendix 6 Assessment Traffic Volumes

Abbot Point Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

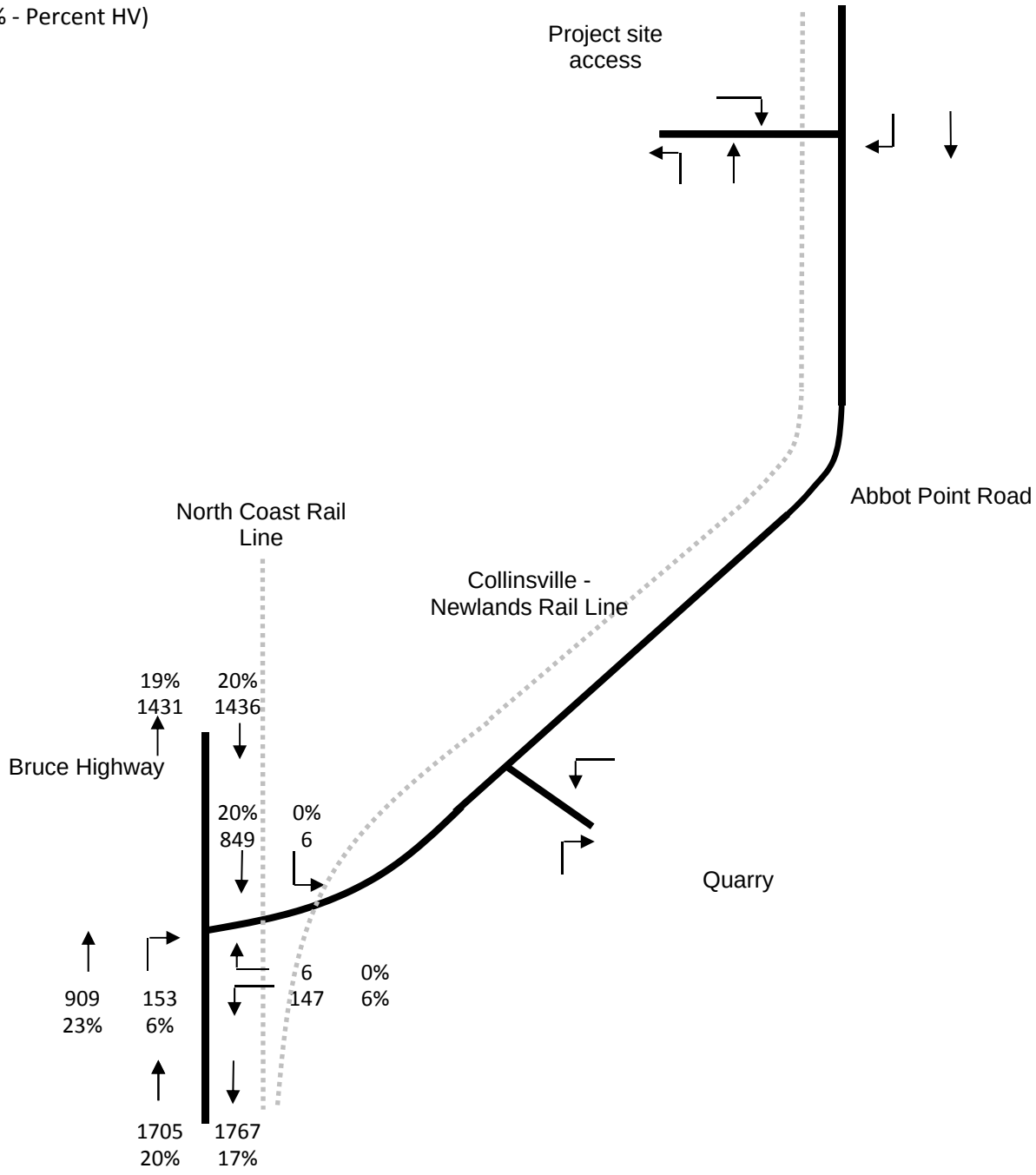
WorleyParsons
resources & energy

Background Traffic, 2013

TMR - AADT Segment Report
Data Collection Year 2013

Turning movements
TTM Consulting
Tue, 5 Mar 2013; 0500-1900

(% - Percent HV)



Abbot Point Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

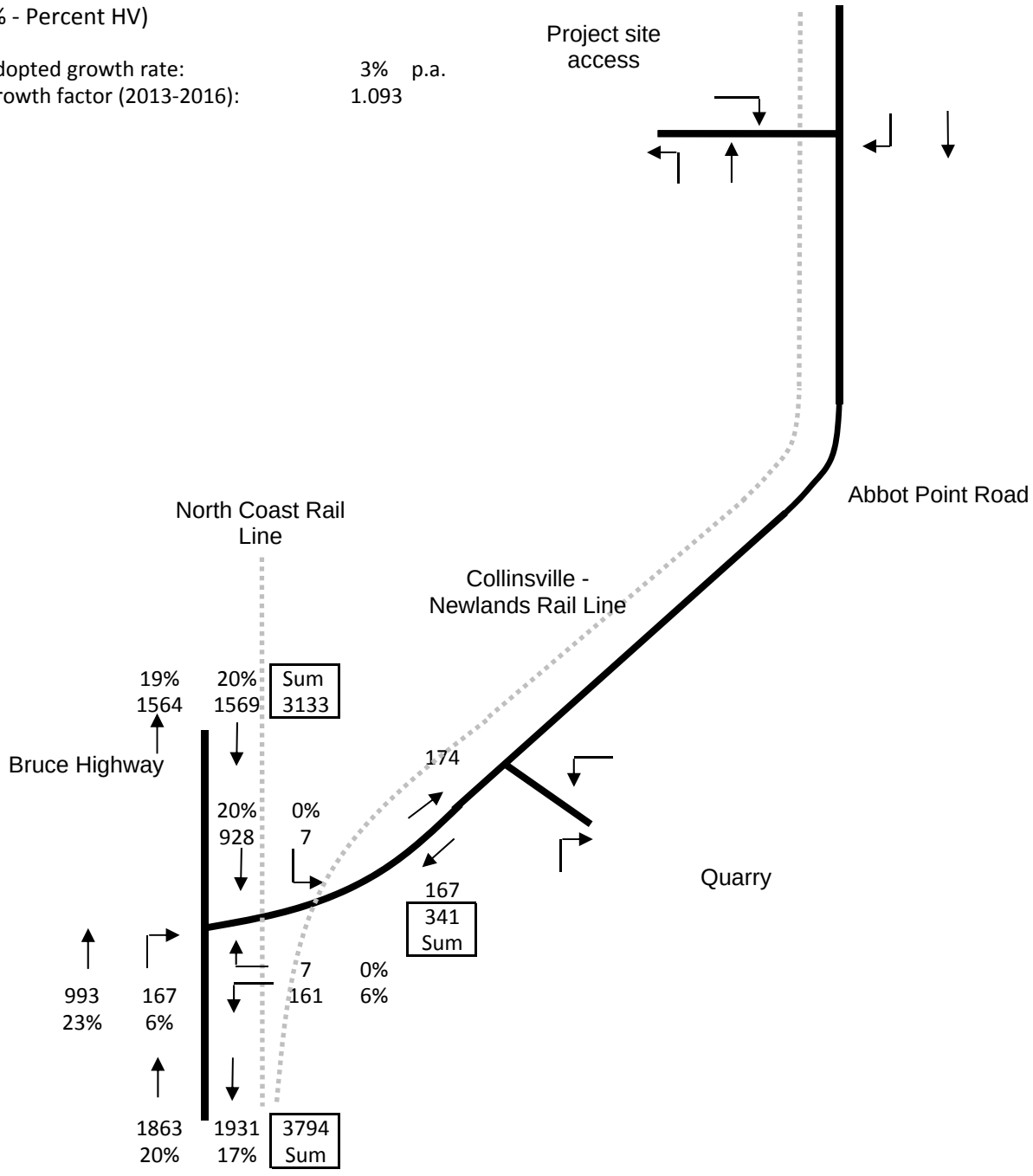
Background Traffic, 2016 (Daily)

TMR - AADT Segment Report
Data Collection Year 2013

Turning movements
TTM Consulting
Tue, 5 Mar 2013; 0500-1900

(% - Percent HV)

Adopted growth rate: 3% p.a.
Growth factor (2013-2016): 1.093



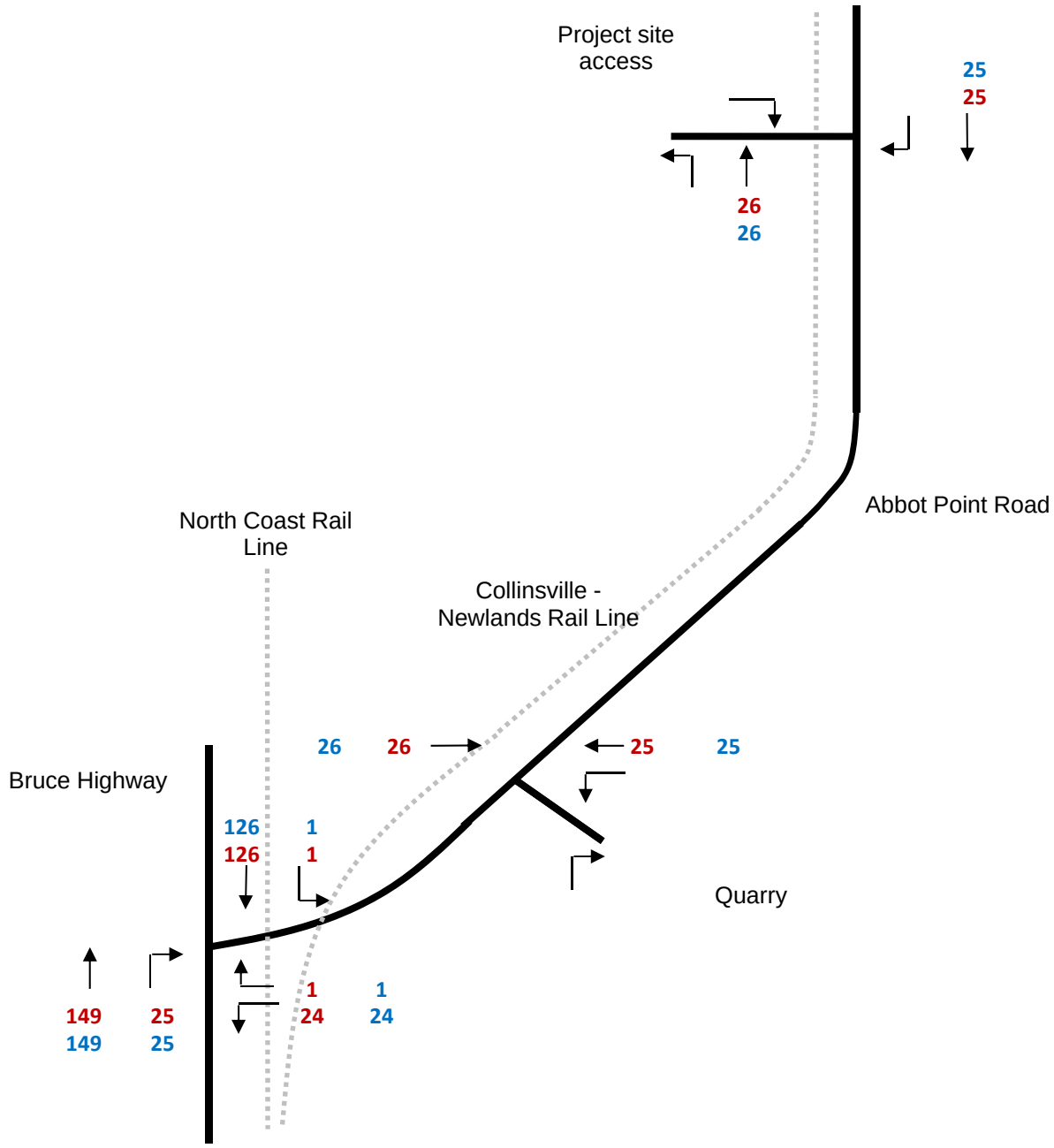
Abbot Point Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

Background Traffic, 2016 (Approximated Peak Hour)

Bruce Highway through traffic % of AADT	8%
Turning movements (AM to Abbot Point, PM from Abbot Point) % of 14-hour survey	15%
Turning movements (AM from Abbot Point, PM to Abbot Point) % of 14-hour survey	15%

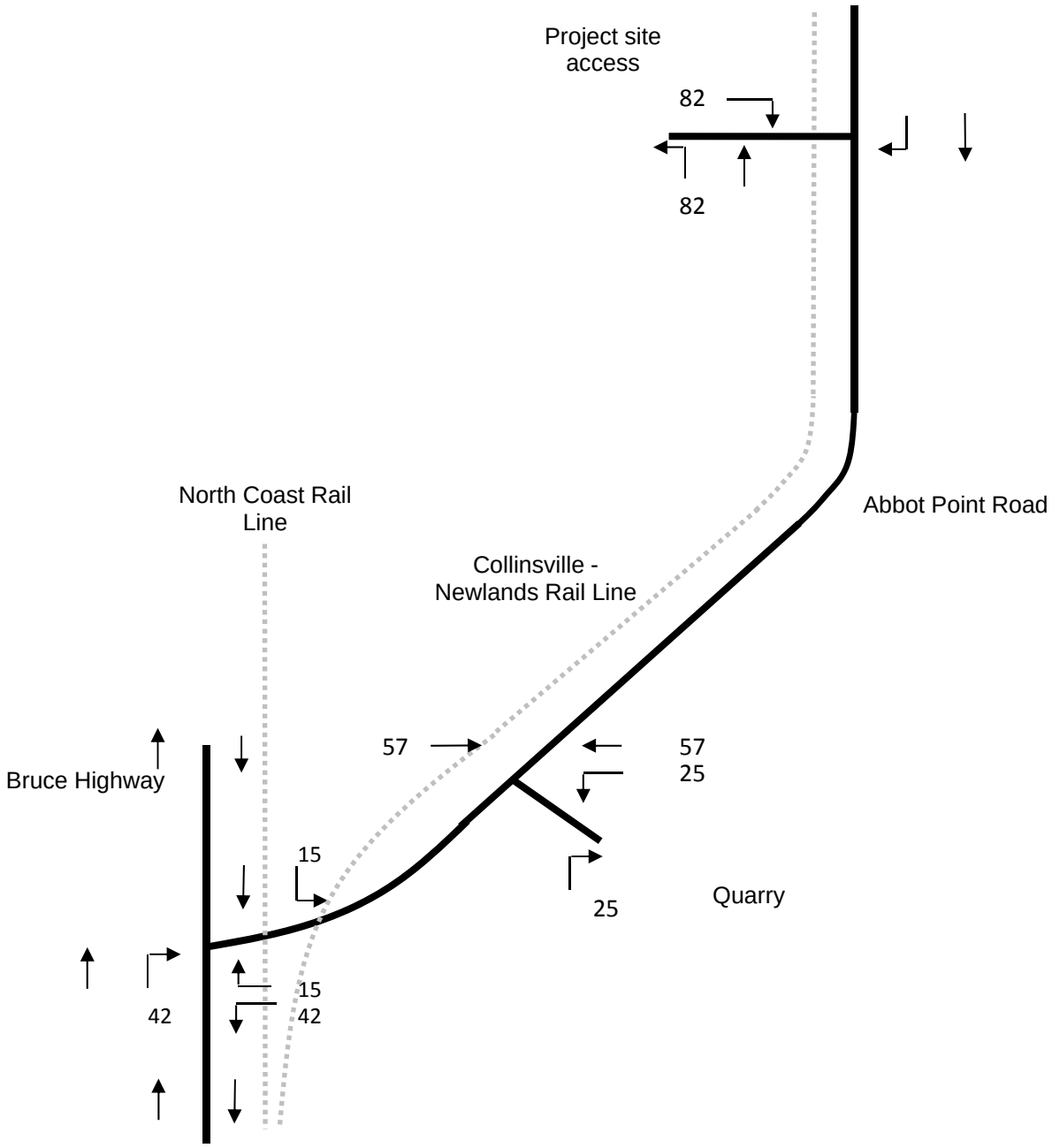


Abbot Point Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

Highest Project Daily Traffic

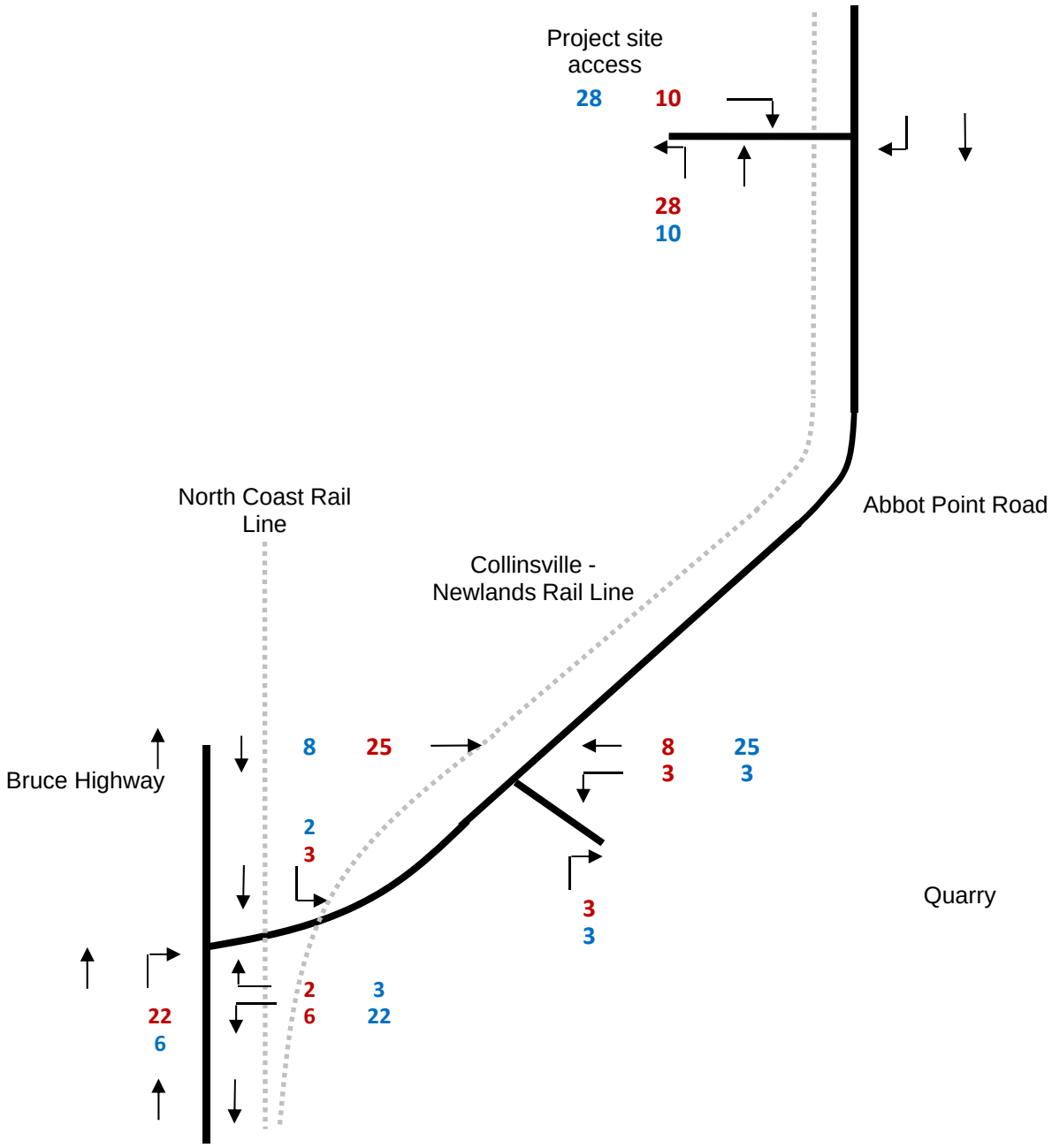


Abbot Point Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

Highest Project Peak Hourly Traffic

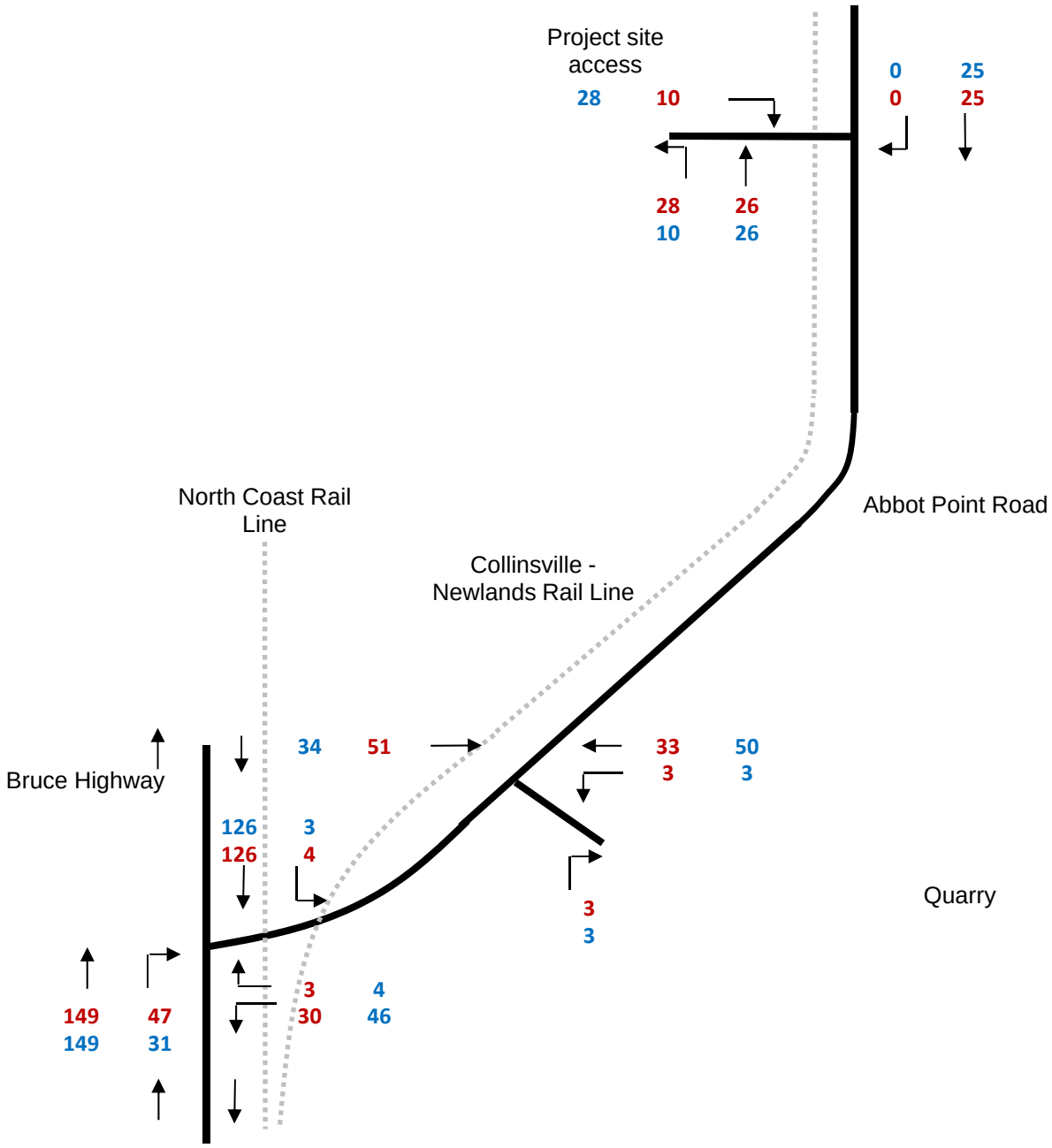


Abbot Point Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

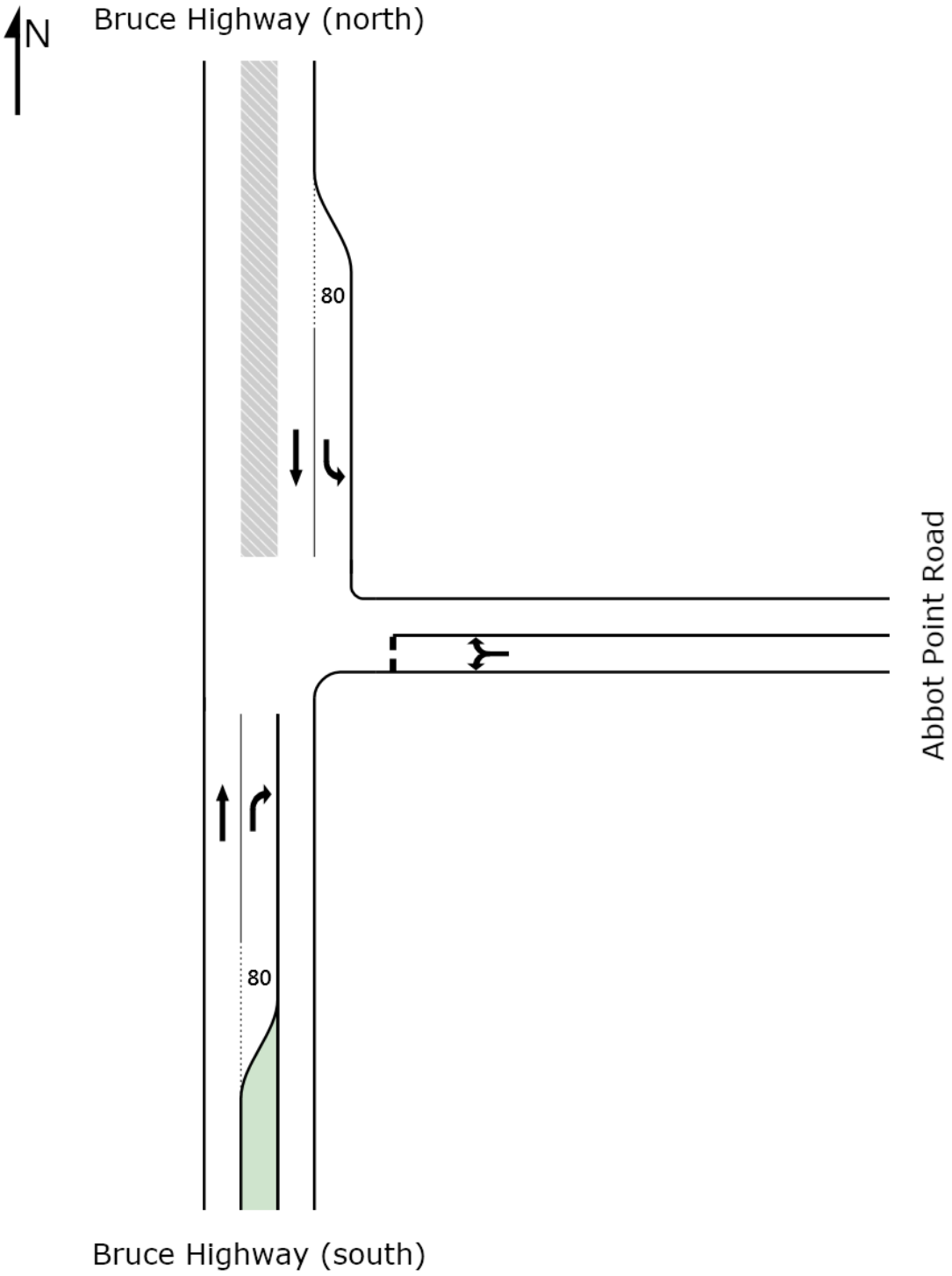
Highest Project Peak Hourly Traffic + Approximated Peak Hour Background Traffic



Appendix 7 Sidra Intersection Outputs

LAYOUT

Bruce Highway / Abbot Point Road
Giveway / Yield (Two-Way)



LANE SUMMARY

Site: 2016AM Background

Bruce Highway / Abbot Point Road
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: Bruce Highway (south)																
Lane 1	0	157	0	157	20.0	1726	0.091	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Lane 2	0	0	26	26	25.0	1008	0.026	100	10.1	LOS B	0.1	0.9	80	Turn Bay	0.0	0.0
Approach	0	157	26	183	20.7		0.091		1.5	NA	0.1	0.9				
East: Abbot Point Road																
Lane 1	25	0	1	26	25.0	793	0.033	100	10.1	LOS B	0.1	1.0	500	–	0.0	0.0
Approach	25	0	1	26	25.0		0.033		10.1	LOS B	0.1	1.0				
North: Bruce Highway (north)																
Lane 1	1	0	0	1	25.0	1576	0.001	100	8.9	LOS A	0.0	0.0	80	Turn Bay	0.0	0.0
Lane 2	0	133	0	133	20.0	1726	0.077	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	1	133	0	134	20.0		0.077		0.1	NA	0.0	0.0				
Intersection				343	20.8		0.091		1.6	NA	0.1	1.0				

Level of Service (LOS) Method: Delay (HCM 2000).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model used.

LANE SUMMARY

Bruce Highway / Abbot Point Road
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: Bruce Highway (south)																
Lane 1	0	157	0	157	20.0	1726	0.091	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Lane 2	0	0	26	26	25.0	1008	0.026	100	10.1	LOS B	0.1	0.9	80	Turn Bay	0.0	0.0
Approach	0	157	26	183	20.7		0.091		1.5	NA	0.1	0.9				
East: Abbot Point Road																
Lane 1	25	0	1	26	25.0	793	0.033	100	10.1	LOS B	0.1	1.0	500	–	0.0	0.0
Approach	25	0	1	26	25.0		0.033		10.1	LOS B	0.1	1.0				
North: Bruce Highway (north)																
Lane 1	1	0	0	1	25.0	1576	0.001	100	8.9	LOS A	0.0	0.0	80	Turn Bay	0.0	0.0
Lane 2	0	133	0	133	20.0	1726	0.077	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	1	133	0	134	20.0		0.077		0.1	NA	0.0	0.0				
Intersection				343	20.8		0.091		1.6	NA	0.1	1.0				

Level of Service (LOS) Method: Delay (HCM 2000).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model used.

SIDRA INTERSECTION

LANE SUMMARY

Bruce Highway / Abbot Point Road
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: Bruce Highway (south)																
Lane 1	0	157	0	157	20.0	1726	0.091	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Lane 2	0	0	49	49	25.0	1004	0.049	100	10.1	LOS B	0.2	1.7	80	Turn Bay	0.0	0.0
Approach	0	157	49	206	21.2		0.091		2.4	NA	0.2	1.7				
East: Abbot Point Road																
Lane 1	32	0	3	35	25.0	742	0.047	100	10.5	LOS B	0.2	1.4	500	–	0.0	0.0
Approach	32	0	3	35	25.0		0.047		10.5	LOS B	0.2	1.4				
North: Bruce Highway (north)																
Lane 1	4	0	0	4	25.0	1576	0.003	100	8.9	LOS A	0.0	0.0	80	Turn Bay	0.0	0.0
Lane 2	0	133	0	133	20.0	1726	0.077	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	4	133	0	137	20.2		0.077		0.3	NA	0.0	0.0				
Intersection				378	21.2		0.091		2.4	NA	0.2	1.7				

Level of Service (LOS) Method: Delay (HCM 2000).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model used.

LANE SUMMARY

Bruce Highway / Abbot Point Road
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: Bruce Highway (south)																
Lane 1	0	157	0	157	20.0	1726	0.091	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Lane 2	0	0	33	33	25.0	1005	0.032	100	10.1	LOS B	0.1	1.1	80	Turn Bay	0.0	0.0
Approach	0	157	33	189	20.9		0.091		1.7	NA	0.1	1.1				
East: Abbot Point Road																
Lane 1	48	0	4	53	25.0	757	0.070	100	10.4	LOS B	0.3	2.2	500	–	0.0	0.0
Approach	48	0	4	53	25.0		0.070		10.4	LOS B	0.3	2.2				
North: Bruce Highway (north)																
Lane 1	3	0	0	3	25.0	1576	0.002	100	8.9	LOS A	0.0	0.0	80	Turn Bay	0.0	0.0
Lane 2	0	133	0	133	20.0	1726	0.077	100	0.0	LOS A	0.0	0.0	500	–	0.0	0.0
Approach	3	133	0	136	20.1		0.077		0.2	NA	0.0	0.0				
Intersection				378	21.2		0.091		2.4	NA	0.3	2.2				

Level of Service (LOS) Method: Delay (HCM 2000).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model used.

Appendix 8 Rail Crossing Queue Assessment

Abbot Point Port Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

Queue Assessment - Rail Crossings

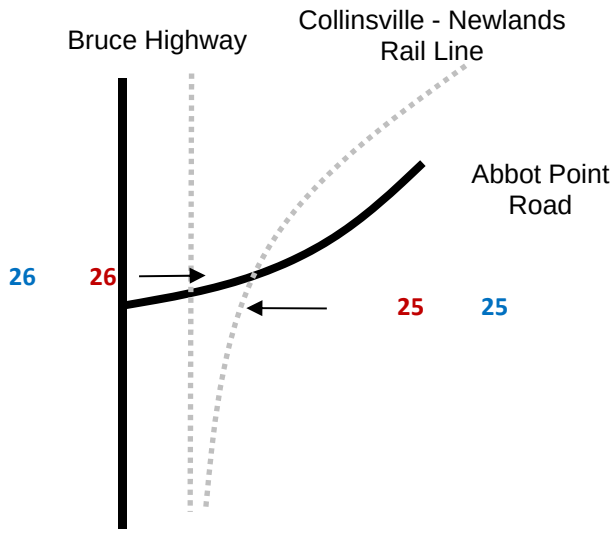
Aurizon Collinsville-Newlands Railway

Maximum train length	2071	m
Average train speed	30	km/h
Crossing time	4.1	min
Warning / clearance time	1.0	min
Total stopped time	5.1	

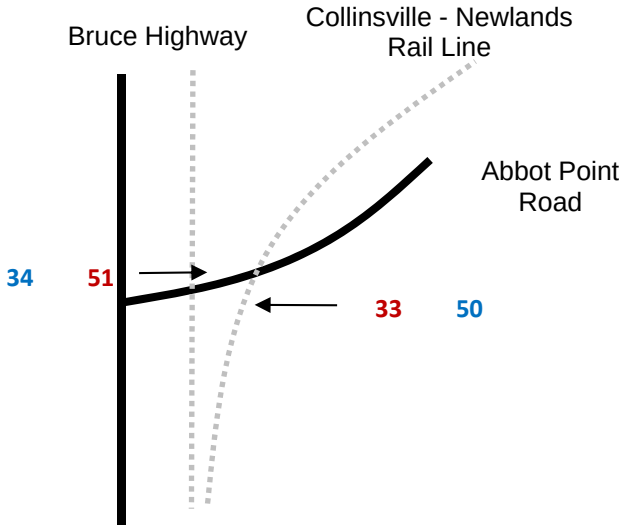
North Coast Rail Line

Maximum train length	1000	m
Average train speed	70	km/h
Crossing time	0.9	min
Warning / clearance time	1.0	min
Total stopped time	1.9	min

Approximated Peak Hour Background Traffic



Highest Project Peak Hourly Traffic + Approximated Peak Hour Background Traffic



Average arrivals during stopped time
Aurizon Collinsville-Newlands Railway

Background	
AM (eastbound)	2.2
Project + Background	
AM (eastbound)	4.4

Average arrivals during stopped time
North Coast Rail Line

Background	
AM (eastbound)	0.8
PM (westbound)	0.8
Project + Background	
AM (eastbound)	1.6
PM (westbound)	1.6

Note

For the Aurizon Collinsville-Newlands Railway, only the eastbound queue is critical. The westbound queue at the Collinsville-Newlands Railway is not constrained.

Abbot Point Port Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

Aurizon Collinsville-Newlands Railway
AM (eastbound)

Arrivals	Background		Project + Background	
0	11%	11%	1%	1%
1	24%	35%	5%	7%
2	27%	61%	12%	19%
3	20%	81%	18%	36%
4	11%	92%	19%	55%
5	5%	97%	17%	72%
6	2%	99%	12%	85%
7	0.6%	100%	8%	92%
8	0%	100%	4%	96%
9	0%	100%	2%	99%
10	0%	100%	1%	99%
11	0%	100%	0%	100%
12	0%	100%	0%	100%
13	0%	100%	0%	100%
14	0%	100%	0%	100%
15	0%	100%	0%	100%

North Coast Rail Line
AM (eastbound)

Arrivals	Background		Project + Background	
0	45%	45%	21%	21%
1	36%	81%	32%	53%
2	15%	95%	26%	79%
3	4%	99%	14%	92%
4	1%	100%	5%	98%
5	0%	100%	2%	99%
6	0%	100%	0%	100%
7	0%	100%	0.1%	100%
8	0%	100%	0%	100%
9	0.0%	100%	0.0%	100%
10	0%	100%	0%	100%
11	0%	100%	0%	100%
12	0%	100%	0%	100%
13	0%	100%	0%	100%
14	0%	100%	0%	100%
15	0%	100%	0%	100%

North Coast Rail Line
PM (westbound)

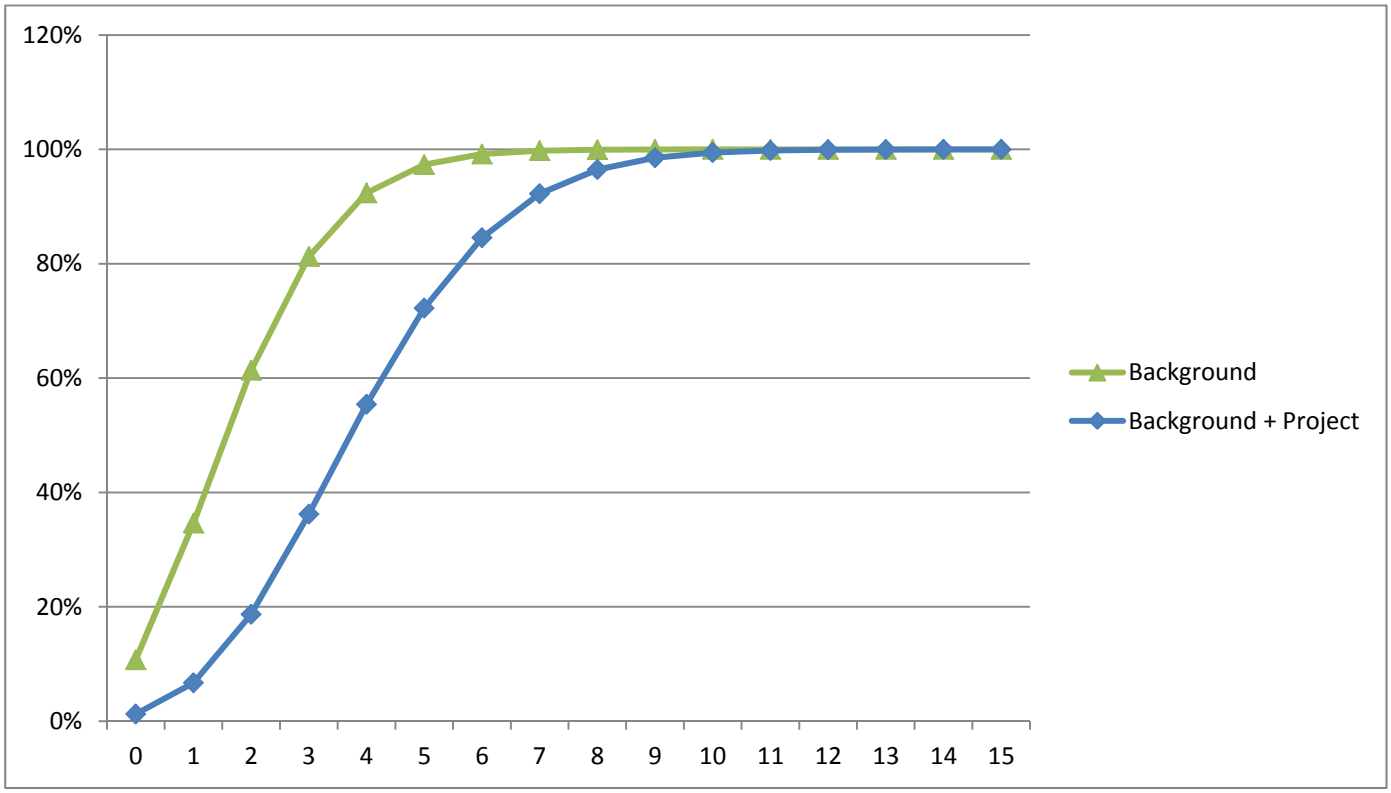
Arrivals	Background		Project +	
0	46%	46%	21%	21%
1	36%	82%	33%	54%
2	14%	96%	26%	80%
3	4%	99%	13%	93%
4	1%	100%	5%	98%
5	0%	100%	2%	99%
6	0%	100%	0%	100%
7	0.0%	100%	0%	100%
8	0%	100%	0%	100%
9	0%	100%	0%	100%
10	0%	100%	0%	100%
11	0%	100%	0%	100%
12	0%	100%	0%	100%
13	0%	100%	0%	100%
14	0%	100%	0%	100%
15	0%	100%	0%	100%

Abbot Point Port Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

Aurizon Collinsville-Newlands Railway

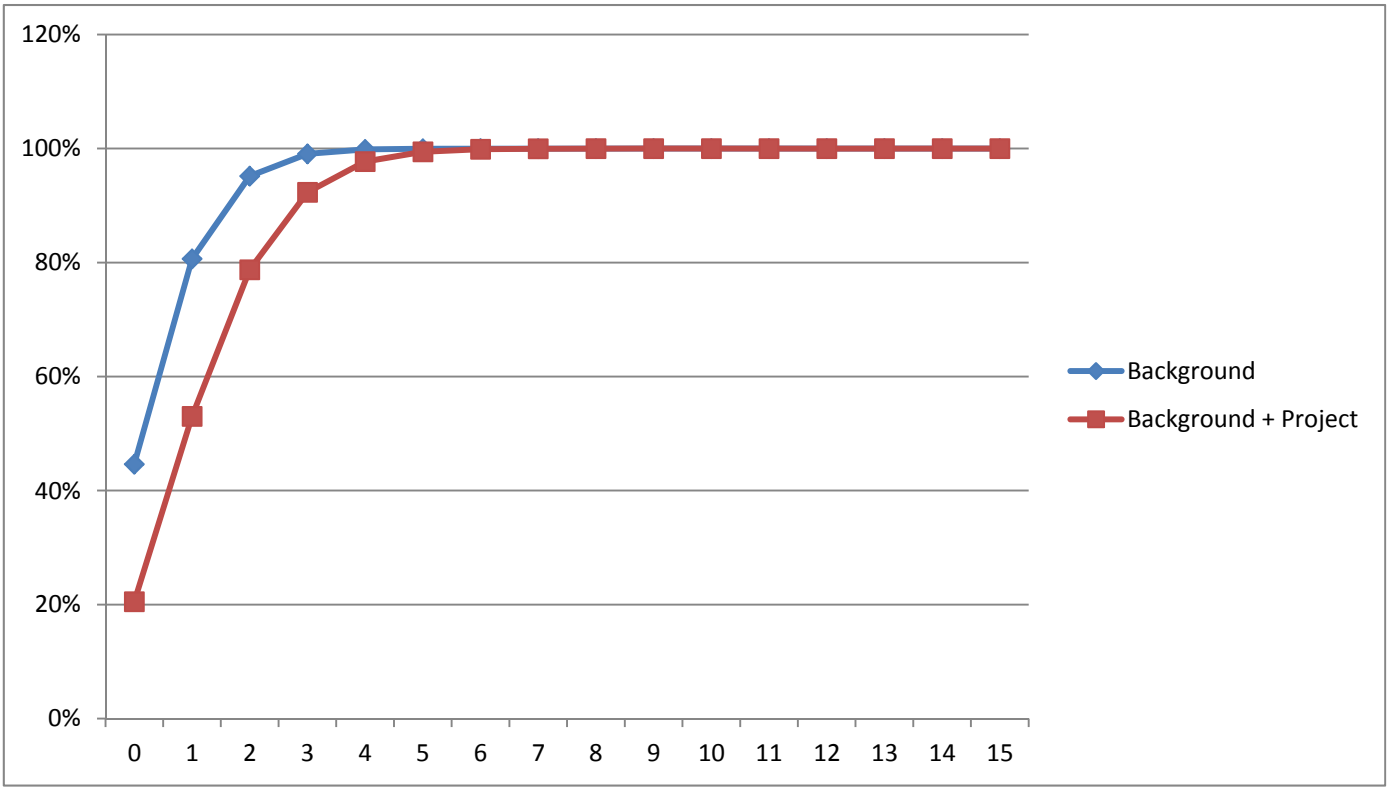


Abbot Point Port Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

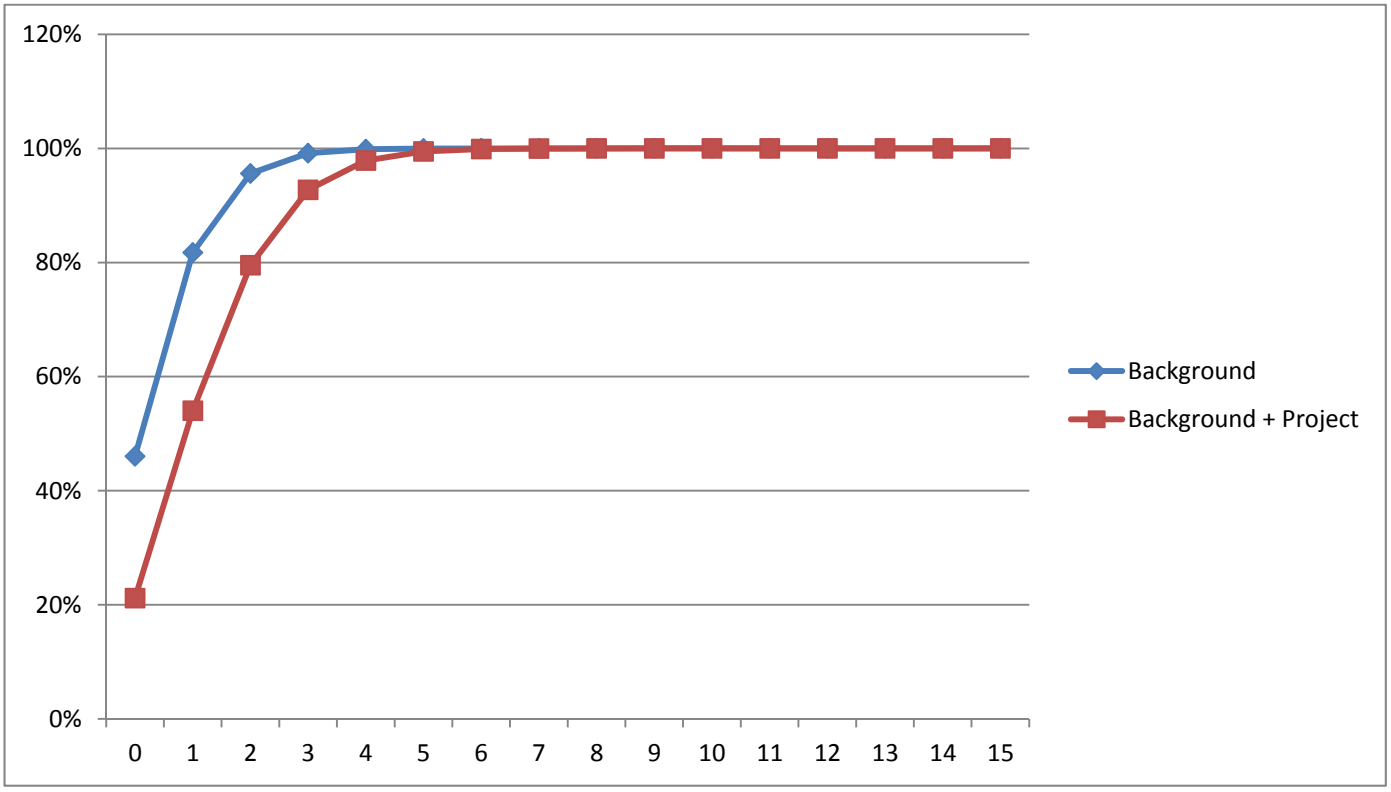
N

WorleyParsons
resources & energy

North Coast Rail Line (eastbound AM)



North Coast Rail Line (westbound PM)



Abbot Point Port Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

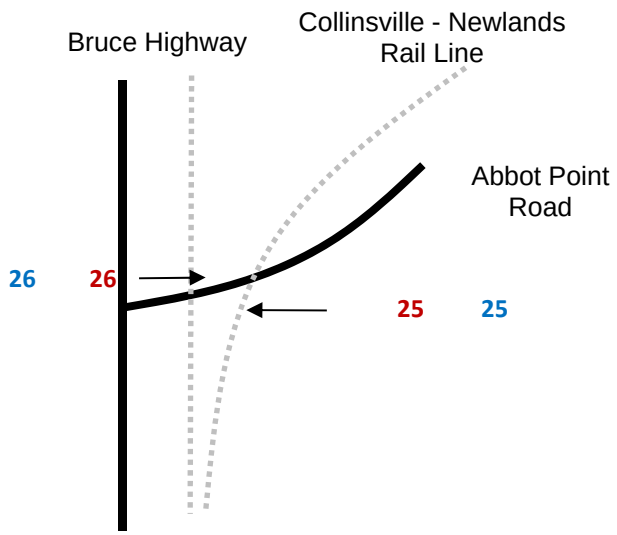
Queue Assessment - Rail Crossings

Aurizon Collinsville-Newlands Railway

SENSITIVITY - TRAIN LENGTH

Train length	1396	m
Average train speed	30	km/h
Crossing time	2.8	min
Warning / clearance time	1.0	min
Total stopped time	3.8	

Approximated Peak Hour Background Traffic



Average arrivals during stopped time

Aurizon Collinsville-Newlands Railway

Background

AM (eastbound) 1.6

Project + Background

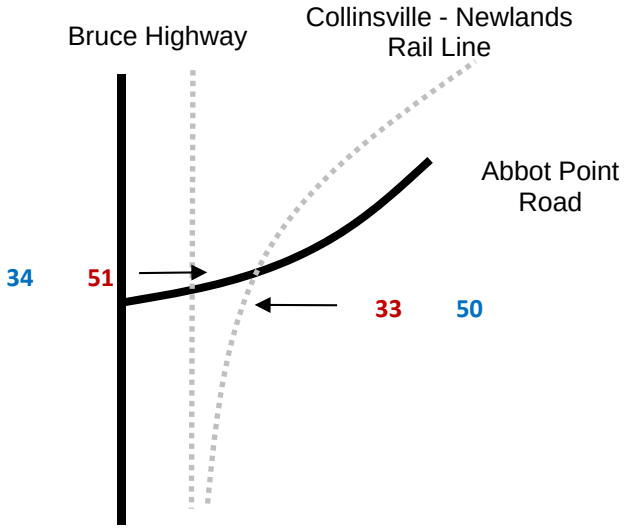
AM (eastbound) 3.2

Aurizon Collinsville-Newlands Railway

SENSITIVITY - PEAK FLOW REDUCTION

Maximum train length	2071	m
Average train speed	30	km/h
Crossing time	4.1	min
Warning / clearance time	1.0	min
Total stopped time	5.1	
Peak flow reduction	30%	

Highest Project Peak Hourly Traffic + Approximated Peak Hour Background Traffic



Average arrivals during stopped time

Aurizon Collinsville-Newlands Railway

Background

AM (eastbound) 2.2

Project + Background

AM (eastbound) 3.1

Abbot Point Port Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

Aurizon Collinsville-Newlands Railway -SENSITIVITY

SENSITIVITY - TRAIN LENGTH

Arrivals	Background		Project + Background	
0	19%	19%	4%	4%
1	32%	51%	13%	17%
2	26%	77%	21%	37%
3	14%	91%	22%	60%
4	6%	97%	18%	77%
5	2%	99%	12%	89%
6	1%	100%	6%	95%
7	0.1%	100%	3%	98%
8	0%	100%	1%	99%
9	0%	100%	0%	100%
10	0%	100%	0%	100%
11	0%	100%	0%	100%
12	0%	100%	0%	100%
13	0%	100%	0%	100%
14	0%	100%	0%	100%
15	0%	100%	0%	100%

Aurizon Collinsville-Newlands Railway -SENSITIVITY

SENSITIVITY - PEAK FLOW REDUCTION

Arrivals	Background		Project + Background	
0	11%	11%	5%	5%
1	24%	35%	14%	19%
2	27%	61%	22%	41%
3	20%	81%	22%	63%
4	11%	92%	17%	80%
5	5%	97%	11%	91%
6	2%	99%	5%	96%
7	0.6%	100%	2%	99%
8	0%	100%	1%	100%
9	0%	100%	0%	100%
10	0%	100%	0%	100%
11	0%	100%	0%	100%
12	0%	100%	0%	100%
13	0%	100%	0%	100%
14	0%	100%	0%	100%
15	0%	100%	0%	100%

Abbot Point Port Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

Queue Assessment - Rail Crossings

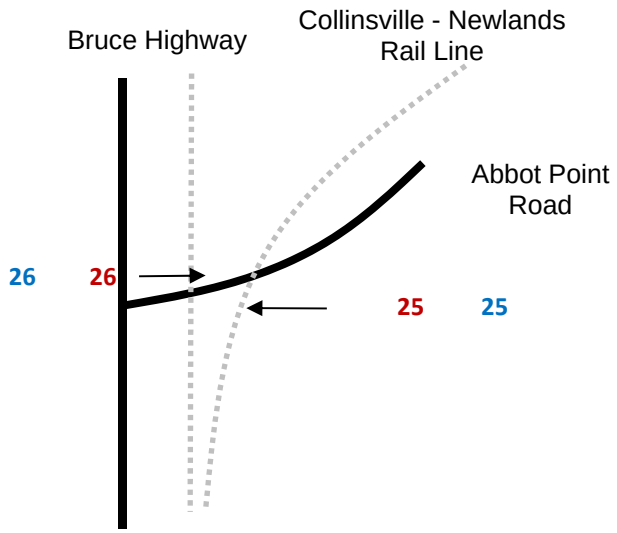
Aurizon Collinsville-Newlands Railway

SENSITIVITY - TRAIN LENGTH + PEAK FLOW REDUCTION

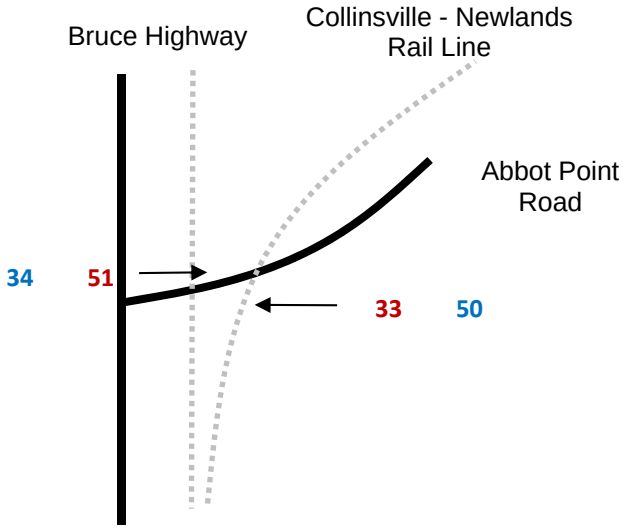
Train length	1396	m
Average train speed	30	km/h
Crossing time	2.8	min
Warning / clearance time	1.0	min
Total stopped time	3.8	

Peak flow reduction 30%

Approximated Peak Hour Background Traffic



Highest Project Peak Hourly Traffic + Approximated Peak Hour Background Traffic



Average arrivals during stopped time

Aurizon Collinsville-Newlands Railway

Background

AM (eastbound) 1.6

Project + Background

AM (eastbound) 2.3

Abbot Point Port Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

Aurizon Collinsville-Newlands Railway -SENSITIVITY

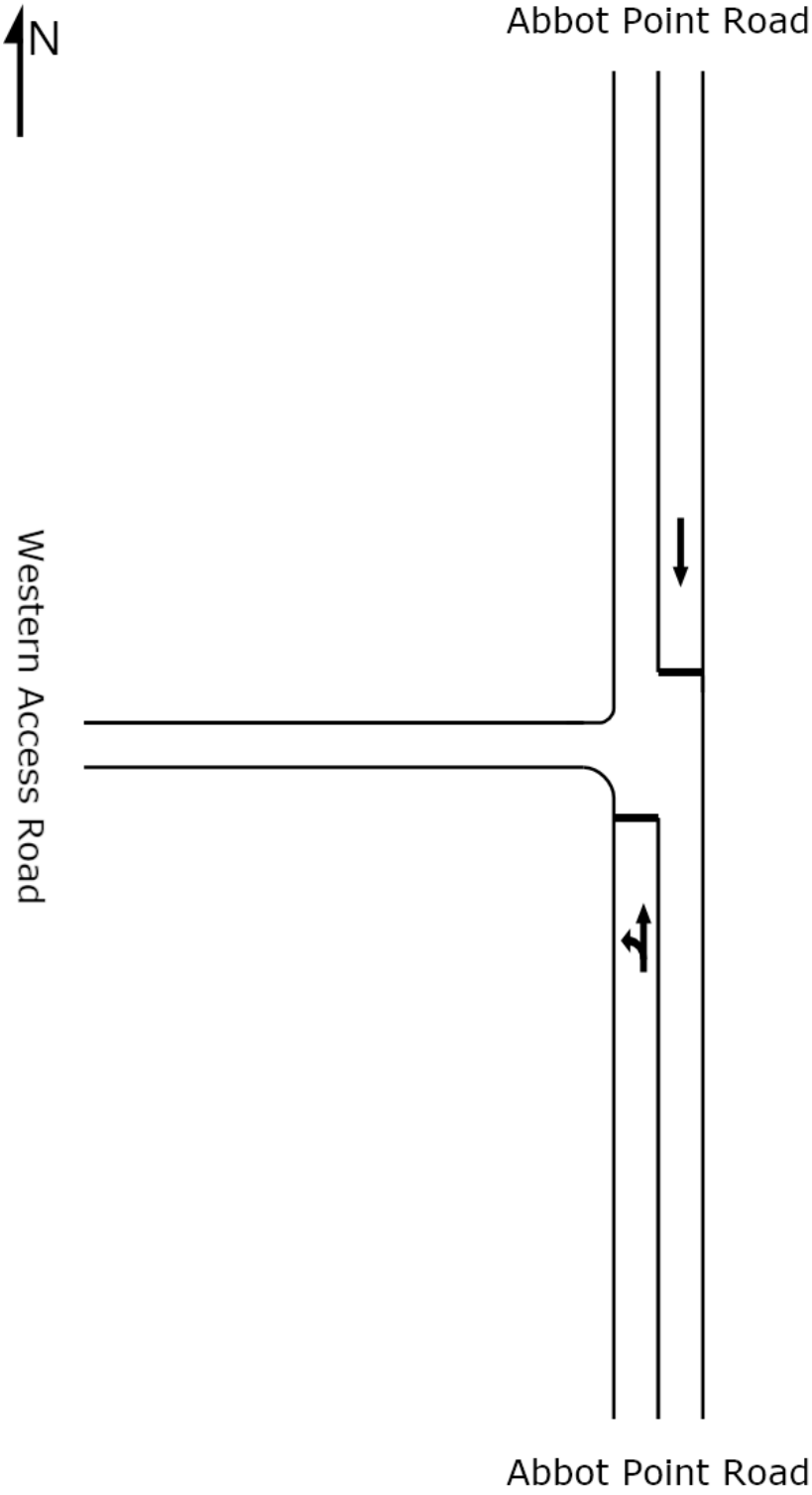
SENSITIVITY - TRAIN LENGTH

Arrivals	Background		Project + Background	
0	19%	19%	10%	10%
1	32%	51%	24%	34%
2	26%	77%	27%	61%
3	14%	91%	20%	81%
4	6%	97%	11%	92%
5	2%	99%	5%	97%
6	1%	100%	2%	99%
7	0.1%	100%	0.6%	100%
8	0%	100%	0%	100%
9	0%	100%	0%	100%
10	0%	100%	0%	100%
11	0%	100%	0%	100%
12	0%	100%	0%	100%
13	0%	100%	0%	100%
14	0%	100%	0%	100%
15	0%	100%	0%	100%

Appendix 9 Rail Crossing Delay Assessment

LAYOUT

Abbot Point Road / Western Access Road
Signals - Fixed Time Cycle Time = 3600 seconds (User-Given Phase Times)



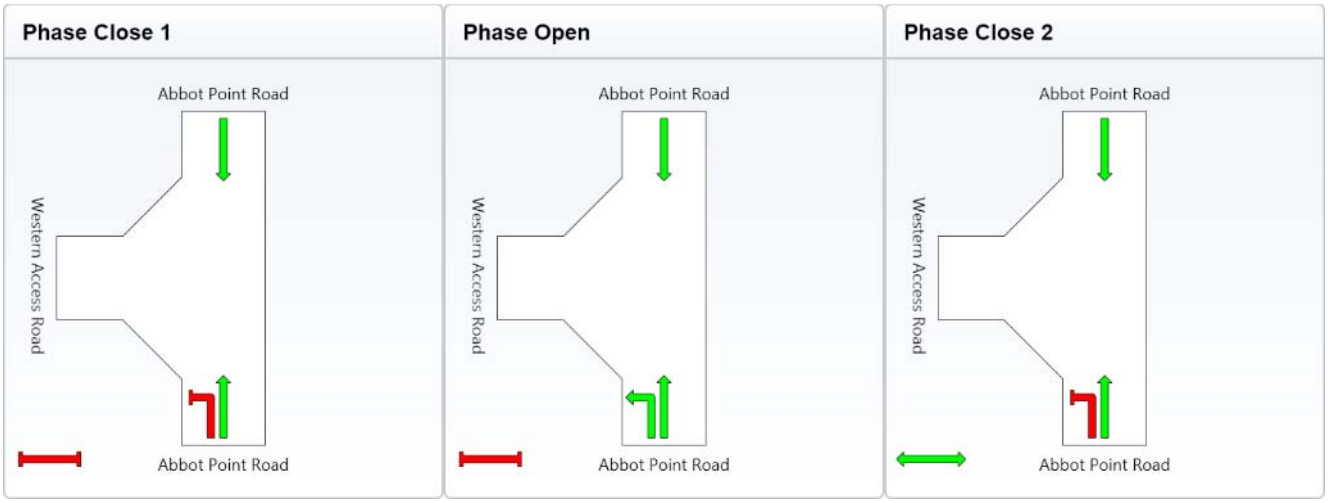
PHASING SUMMARY

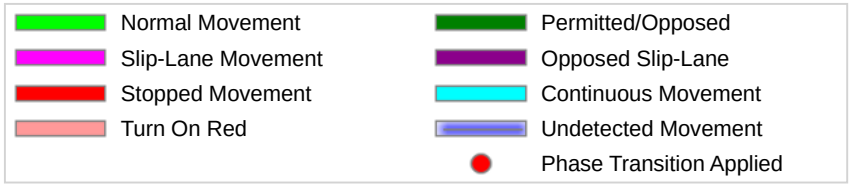
Abbot Point Road / Western Access Road
Signals - Fixed Time Cycle Time = 3600 seconds (User-Given Phase Times)

Phase times specified by the user
Sequence: Rail crossing
Input Sequence: Close 1, Open, Close 2
Output Sequence: Close 1, Open, Close 2

Phase Timing Results

Phase	Close 1	Open	Close 2
Green Time (sec)	432	3024	144
Yellow Time (sec)	0	0	0
All-Red Time (sec)	0	0	0
Phase Time (sec)	432	3024	144
Phase Split	12 %	84 %	4 %





MOVEMENT SUMMARY

Site: 2016AM CN Railway - Western Access Road

Abbot Point Road / Western Access Road
Signals - Fixed Time Cycle Time = 3600 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbot Point Road											
1	L	28	20.0	0.038	56.1	LOS E	14.6	119.5	0.18	0.83	23.8
2	T	26	20.0	0.038	47.3	LOS D	14.6	119.5	0.18	0.15	25.8
Approach		54	20.0	0.038	51.9	LOS D	14.6	119.5	0.18	0.50	24.7
North: Abbot Point Road											
8	T	25	20.0	0.014	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		25	20.0	0.014	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
All Vehicles		79	20.0	0.038	35.4	LOS D	14.6	119.5	0.12	0.34	30.4

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

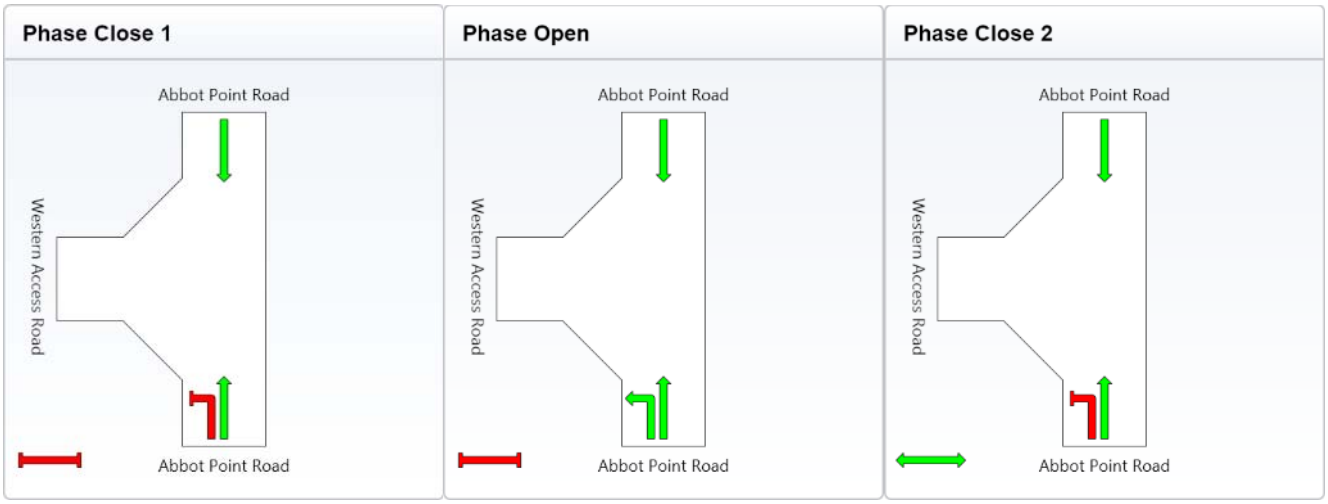
PHASING SUMMARY

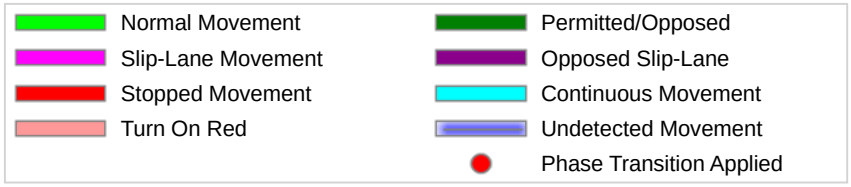
Abbot Point Road / Western Access Road
Signals - Fixed Time Cycle Time = 3600 seconds (User-Given Phase Times)

Phase times specified by the user
Sequence: Two-Phase
Input Sequence: Close 1, Open , Close 2
Output Sequence: Close 1, Open , Close 2

Phase Timing Results

Phase	Close 1	Open	Close 2
Green Time (sec)	432	3024	144
Yellow Time (sec)	0	0	0
All-Red Time (sec)	0	0	0
Phase Time (sec)	432	3024	144
Phase Split	12 %	84 %	4 %





MOVEMENT SUMMARY

Site: 2016PM CN Railway - Western Access Road

Abbot Point Road / Western Access Road
Signals - Fixed Time Cycle Time = 3600 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abbot Point Road											
1	L	10	20.0	0.025	54.4	LOS D	9.5	77.8	0.17	0.92	24.3
2	T	26	20.0	0.025	45.6	LOS D	9.5	77.8	0.17	0.14	26.4
Approach		36	20.0	0.025	48.1	LOS D	9.5	77.8	0.17	0.36	25.7
North: Abbot Point Road											
8	T	25	20.0	0.014	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		25	20.0	0.014	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
All Vehicles		61	20.0	0.025	28.4	LOS C	9.5	77.8	0.10	0.21	33.6

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Appendix 10 Required Information - ALCAM Assessment

Railway Level Crossing Safety

Item Number	Details of Information Requested by TMR	Response
1	The expected traffic distribution on the road network as a result of the proposed development;	Attachment 1A provides details of the expected project traffic (peak hour, daily and totals by vehicle type over the construction period)
2	Identification of railway level crossing/s likely to be impacted on by development generated traffic;	A total of three (3) at grade railway level crossings will be impacted by the development traffic. These will be as follows; • The Abbot Point Road crossing of the North Coast Rail Line (adjacent to the Bruce Highway Intersection) – Aurizon Crossing Identification no. 5159 • The Abbot Point Road crossing of the Collinsville-Newlands Rail Line (adjacent to the Bruce Highway Intersection) • Abbot Point Western Access Road crossing of the Collinsville-Newlands Rail Line – Aurizon Crossing Identification no. 843 Attachment 2 is a locality plan showing the locations of the three (3) crossings
3	The expected timeframe for the delivery of the proposed development including the commencement of works, and any stages;	The construction schedule adopted to determine the Project traffic generation was as follows; • Months 1 to 2, mobilization of DMCPs • Months 2 to 7, construction of DMCPs • Months 3 to 7,Dredging contractor mobilization including pipeline installation • Months 8 to 11, Dredging • Months 11 to 12, Demobilization Assessment is therefore based on a total construction period of 52 weeks. A detailed construction program is yet to be prepared however construction works may commence as early as late 2015. Operational traffic would be negligible.
4	Existing traffic flows (expressed as vehicles per day) and train movements over the impacted railway level crossing/s, including	Attachment 1A provides details of the existing traffic flows over the impacted railway level crossings, both daily flows and

	daily (peak hour) fluctuations, and number and percentage of heavy vehicles;	peak hour. Note that the background traffic on the Abbot Point Western Access Road crossing of the Collinsville-Newlands Rail Line is negligible as the crossing is not the main access into the Abbot Point Port Area.
5	The expected background traffic growth (expressed as vehicles per day) over the impacted railway level crossing/s, including the number and percentage of heavy vehicles, and expected future train movements. This should include background traffic growth to a ten year horizon from the anticipated commencement of the works, and any stages;	The project construction traffic will impact on the railway crossings over a fifty two (52) week period. On completion of the construction period the project traffic will be negligible, therefore the assessment of background growth over a ten year horizon is not applicable to this project.
6	The expected development generated traffic (expressed as vehicles per day), including daily fluctuations (peak hour) and percentage of heavy vehicles, that will pass over the impacted railway level crossing/s from the commencement of works, and any stages, to a ten year design horizon;	Attachment 1B provides a graph of the project traffic movements over the 52 week construction period. Project traffic following the construction will be negligible.
7	The maximum size and type of vehicle (including length, width, height and weight) anticipated over the railway level crossing/s as a result of the development (including over dimensional vehicles);	Typically the maximum size vehicle used on the project will be a 19m semi-trailer. During mobilisation and demobilisation of the site construction plant there will be 28 over dimensional vehicles transporting the following equipment; • 10 No. Cat 637 Scrapers (52 tonnes) • 3 No. Cat D9 Dozers (49 tonne) • 6 no. 40kL water trucks • 2 No. Cat 825 Compactors (32 tonne) • 2 No. 18 tonne pad foot rollers • 2 No. 45 tonne dump trucks • 1 No. Cat 16 grader (32 tonne) • 1 No. 45 tonne excavator • 1 No. Cat 965 Front End loader (13 tone) The majority of the loads will be over dimensional loads due to the width / length of the loads. It is not anticipated that any of

		the loads would be overweight. It is expected that all axle loads will be within the allowable road axle loads.
8	Demonstrate how the development generated traffic will not worsen vehicular queuing (short stacking) issues over the impacted railway level crossing/s. In particular, demonstrate that there is sufficient clearance to allow the maximum size of vehicle used in the operation to queue from the railway level crossing of the North Coast Line at Abbot Point Road to the give way pavement marking to the Bruce Highway; and between the railway level crossing of the North Coast Line and the railway level crossing of the Abbot Point Branch Railway on Abbot Point Road. The minimum clearance should be 5m from the edge running rail (of the closest railway track) as per Figure 3.2 of *AS1742.7 Manual of Uniform Traffic Control Devices, Part 7: Railway* plus the length of the maximum design vehicle. A plan should be submitted accurately showing the available clearance from the railway level crossing to the give way line / opposing railway crossing and demonstrating how the maximum vehicle length can be accommodated with the 5m setback from the closest track of each railway level crossing;	Attachments 3A and 3B provide plans of all crossings and how the 19m design vehicle is accommodated. With respect to the Abbot Point Road crossing of the North Coast Rail Line, the layouts in Attachment 3A show that the existing queue length available from the existing give way line to the clear zone on the railway crossing for vehicles turning onto the Bruce Highway is only in the order of 15.4 metres. This would result in project heavy vehicles (19m semi-trailers) queuing within five (5) metres of the rail centreline, which would be a significant safety issue. In order to mitigate this issue it is proposed to remark the give way line to within two (2) metres of the edge of the Bruce Highway running lane. With the proposed line marking, the available storage length 5m clear of the rail lines would be 19m, which is the Project design vehicle. For vehicles that exceed 19m, traffic control will be required in order to ensure that queuing across the rail line does not occur. The proposed line marking is shown on drawing in Attachment 3B.
9	Confirmation of sight distances on each side of the impacted railway level Crossing/s.	As the existing crossings are either actively controlled (with flashing lights and boom gates) or partially active (flashing lights), the sight distance to the approaching trains is not considered a design issue. All crossings have adequate road approach sight distances.

Name: Stephen Joughin,
RPEQ 4672
Date 28/07/2015

AADT over the Abbot Road railway level crossing ID5159 of the North Coast Line			
Year/Timeframe	Without development (background growth in vpd)	With development (vpd)	No. and proportion of heavy vehicles (vpd)
2015 (current scenario)	341	N/A	6%
			20
Construction of Dredge Material Containment Ponds (initial 14 weeks)	N/A	454	13%
			61
Dredging and placement of dredge material (subsequent 12 weeks)	N/A	401	11%
			45
AADT over the Abbot Road railway level crossing of the Collinsville-Newlands Line			
Year/Timeframe	Without development (background growth in vpd)	With development (vpd)	No. and proportion of heavy vehicles (vpd)
2015 (current scenario)	341	N/A	6%
			20
Construction of Dredge Material Containment Ponds (initial 14 weeks)	N/A	454	13%
			61
Dredging and placement of dredge material (subsequent 12 weeks)	N/A	401	11%
			45
AADT over the Abbot Point Western Access Road railway level crossing ID843 of the Collinsville-Newlands Line			
Year/Timeframe	Without development (background growth in vpd)	With development (vpd)	No. and proportion of heavy vehicles (vpd)
2015 (current scenario)	Minor	N/A	Minor
Construction of Dredge Material Containment Ponds (initial 14 weeks)	N/A	164	56%
			92
Dredging and placement of dredge material (subsequent 12 weeks)	N/A	60	43%
			26

Notes

1. Abbot Point AADT based on 2013 survey from 0500-1900 (14hr), 3%p.a. growth.
2. Peak DMCP construction traffic generation occurs in week 13 of 52 (12 month) program and includes a component of traffic generated by mobilisation of dredge pipeline
3. Peak dredge construction traffic occurs in week 52 of 52 (12 month) program i.e. demobilisation

ATTACHMENT 1A

Abbot Point Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

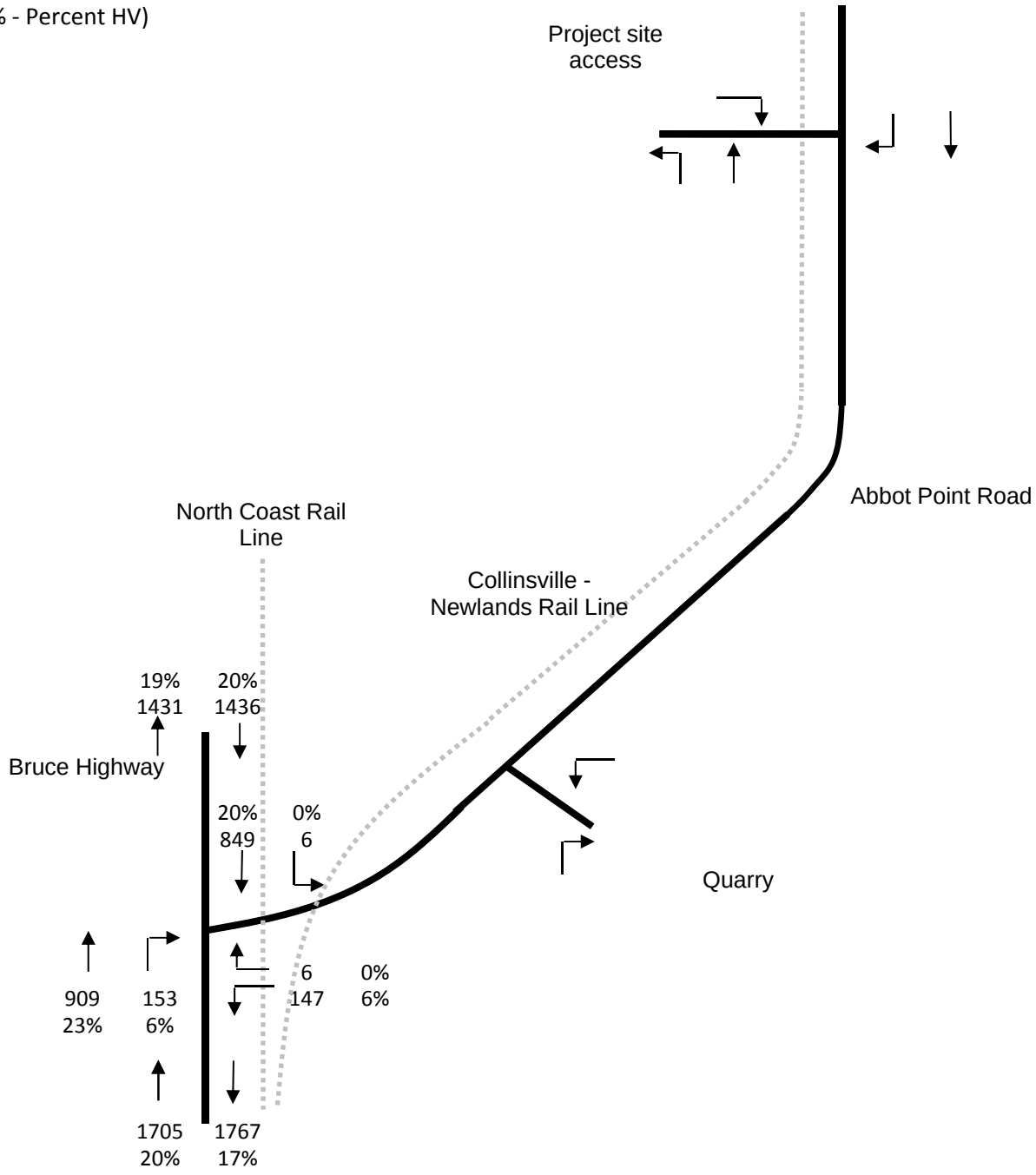
WorleyParsons
resources & energy

Background Traffic, 2013

TMR - AADT Segment Report
Data Collection Year 2013

Turning movements
TTM Consulting
Tue, 5 Mar 2013; 0500-1900

(% - Percent HV)



Abbot Point Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

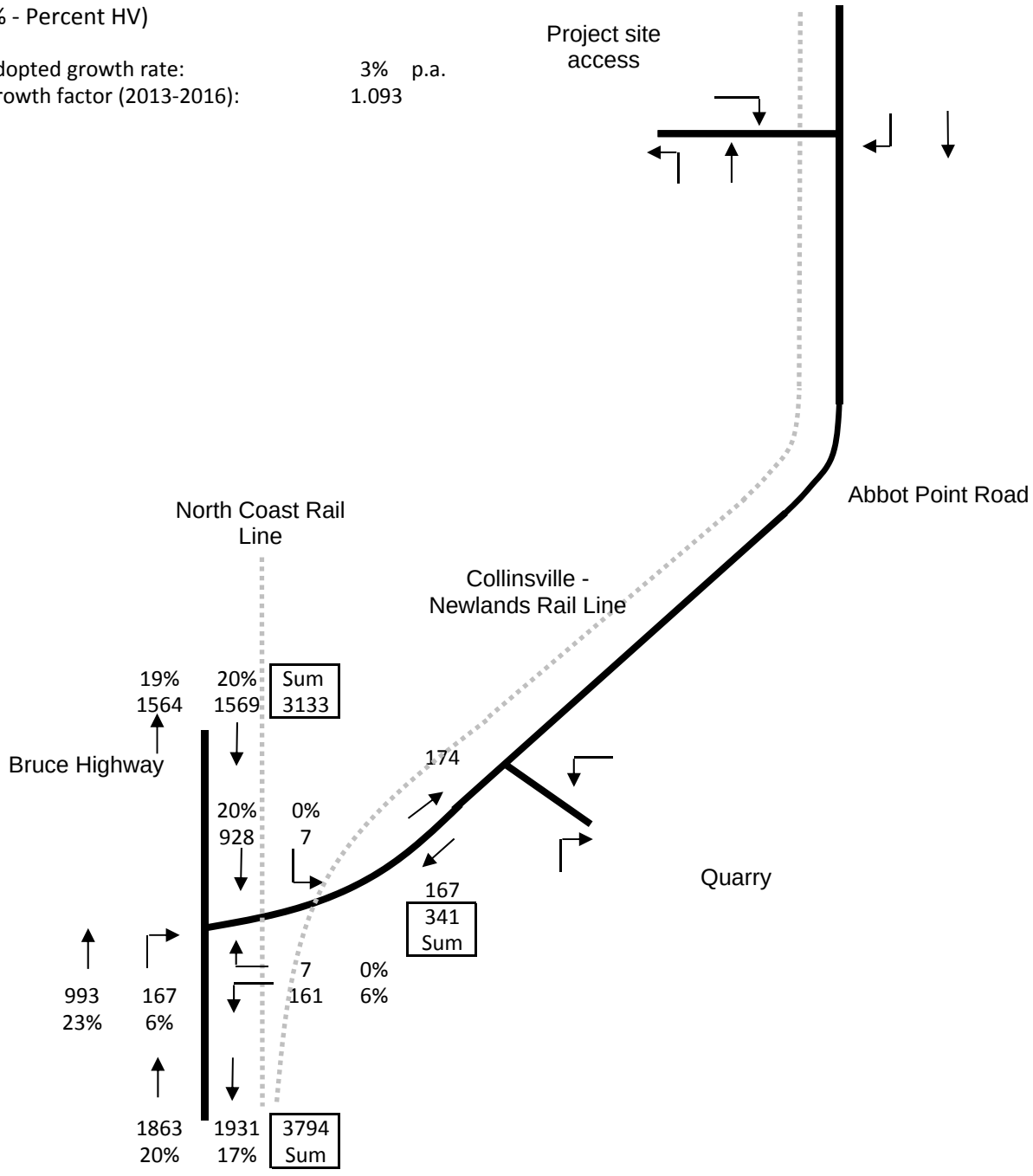
Background Traffic, 2016 (Daily)

TMR - AADT Segment Report
Data Collection Year 2013

Turning movements
TTM Consulting
Tue, 5 Mar 2013; 0500-1900

(% - Percent HV)

Adopted growth rate: 3% p.a.
Growth factor (2013-2016): 1.093



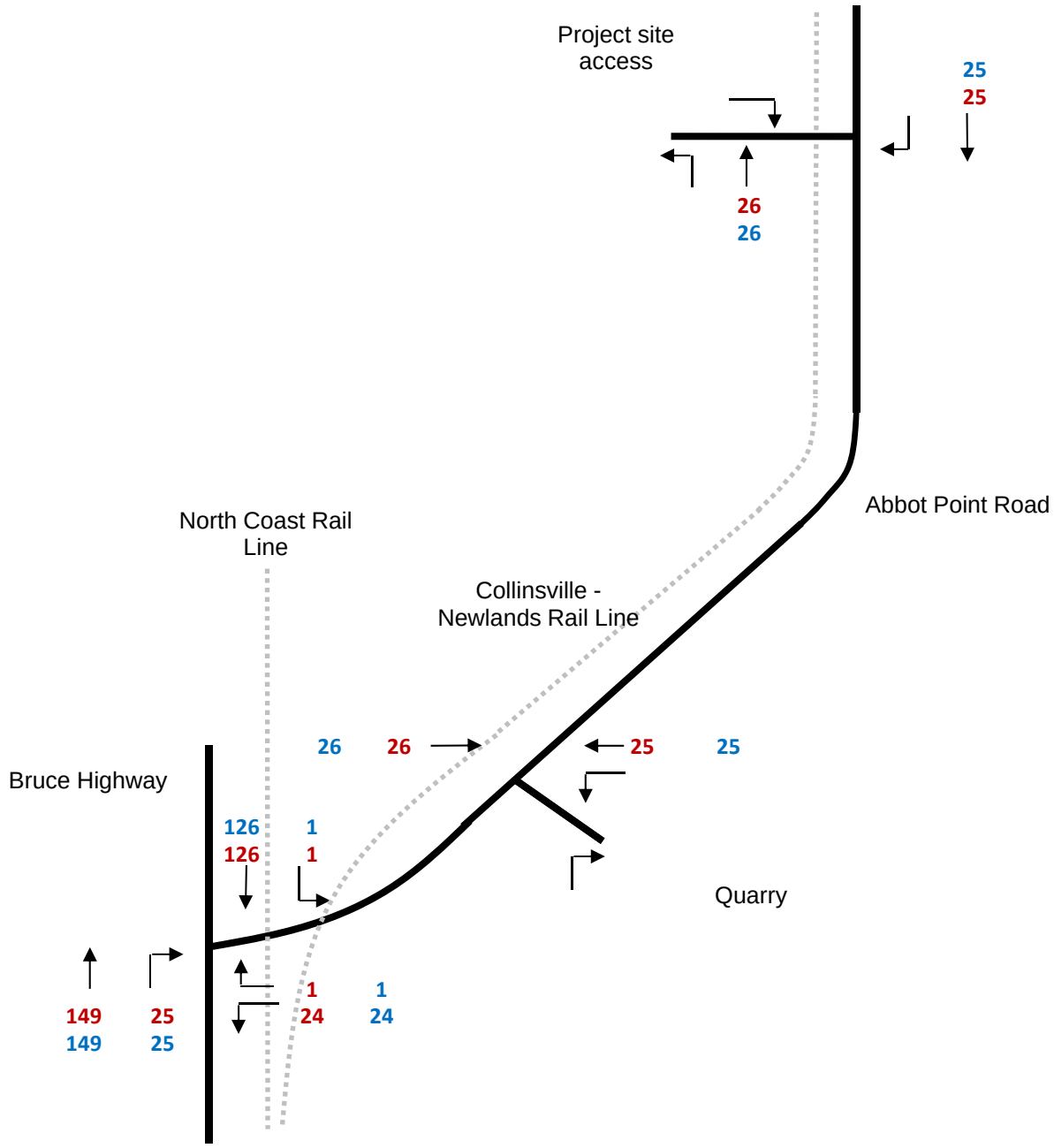
Abbot Point Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

Background Traffic, 2016 (Approximated Peak Hour)

Bruce Highway through traffic % of AADT	8%
Turning movements (AM to Abbot Point, PM from Abbot Point) % of 14-hour survey	15%
Turning movements (AM from Abbot Point, PM to Abbot Point) % of 14-hour survey	15%

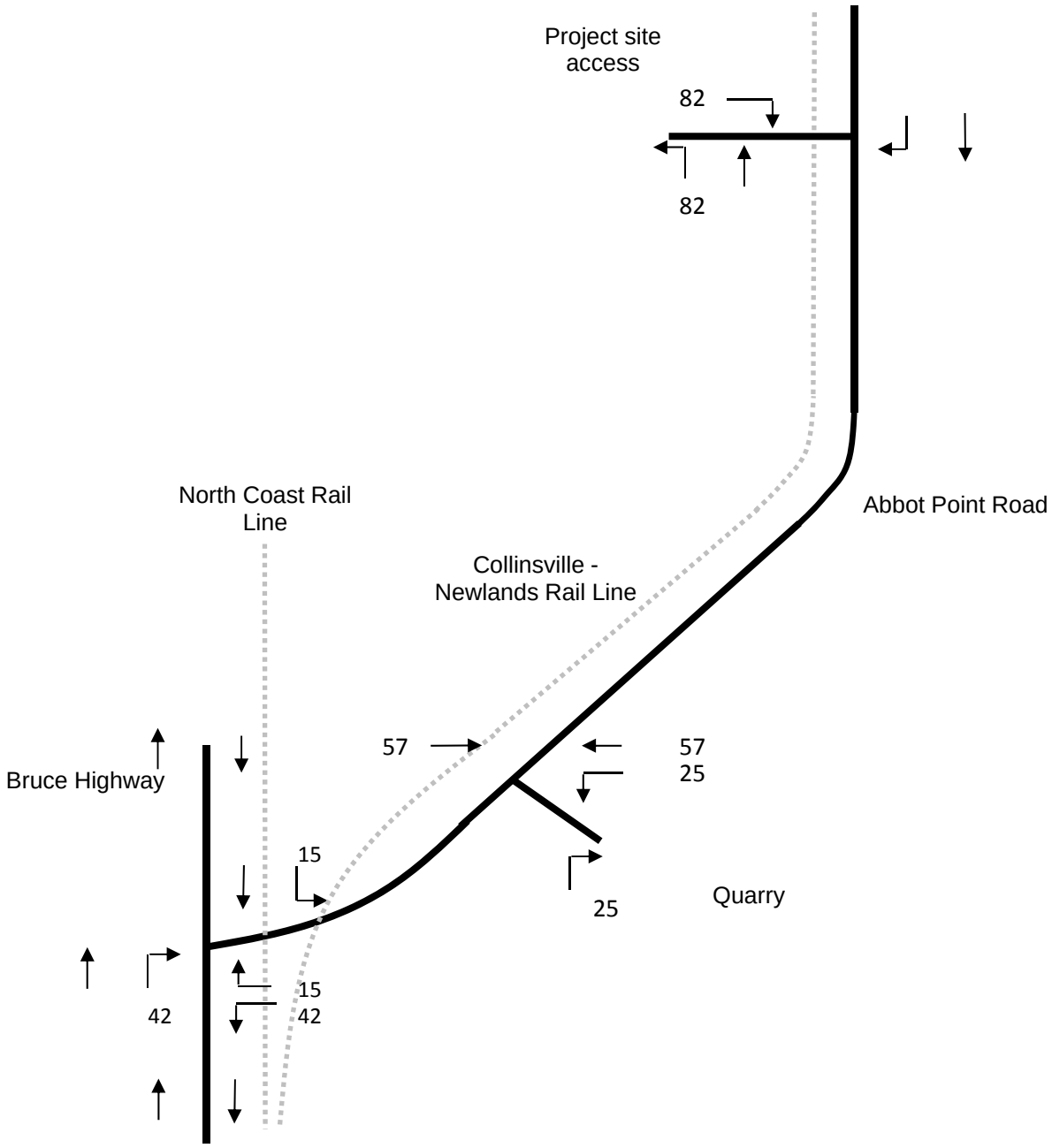


Abbot Point Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

Highest Project Daily Traffic

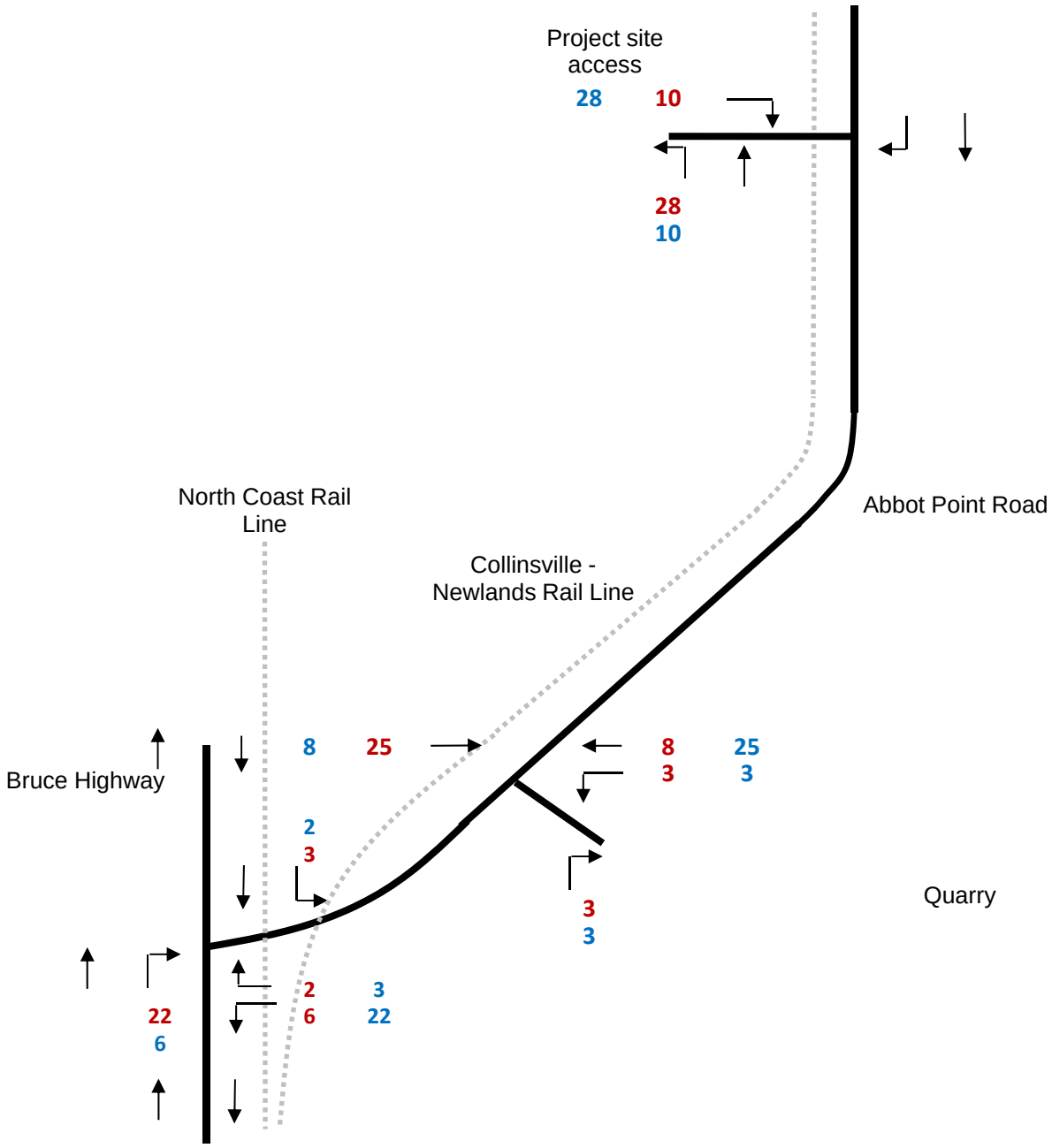


Abbot Point Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

N

WorleyParsons
resources & energy

Highest Project Peak Hourly Traffic

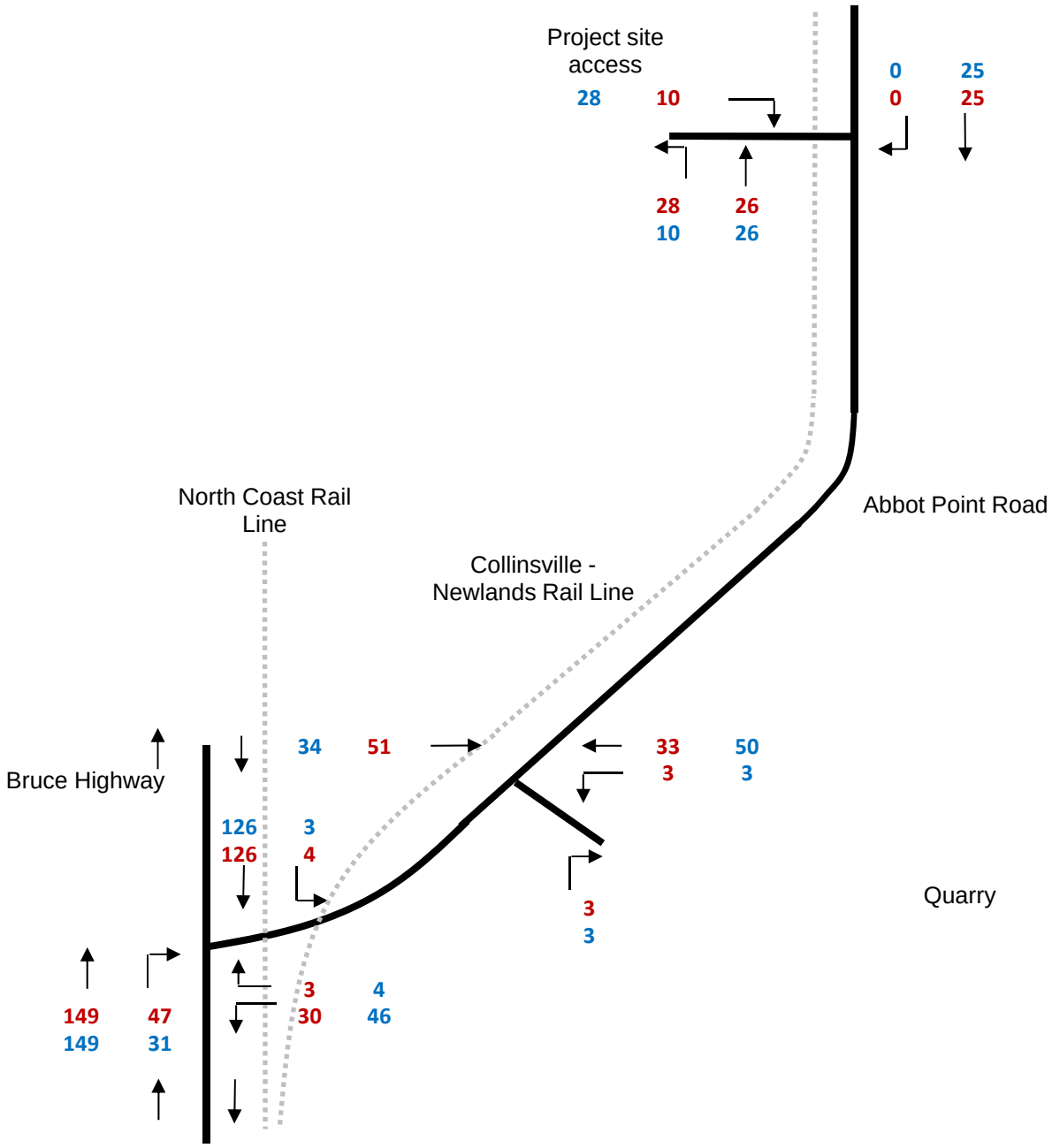


Abbot Point Growth Gateway Project
22 - AM peak period (1 hr volume)
12 - PM peak period (1 hr volume)

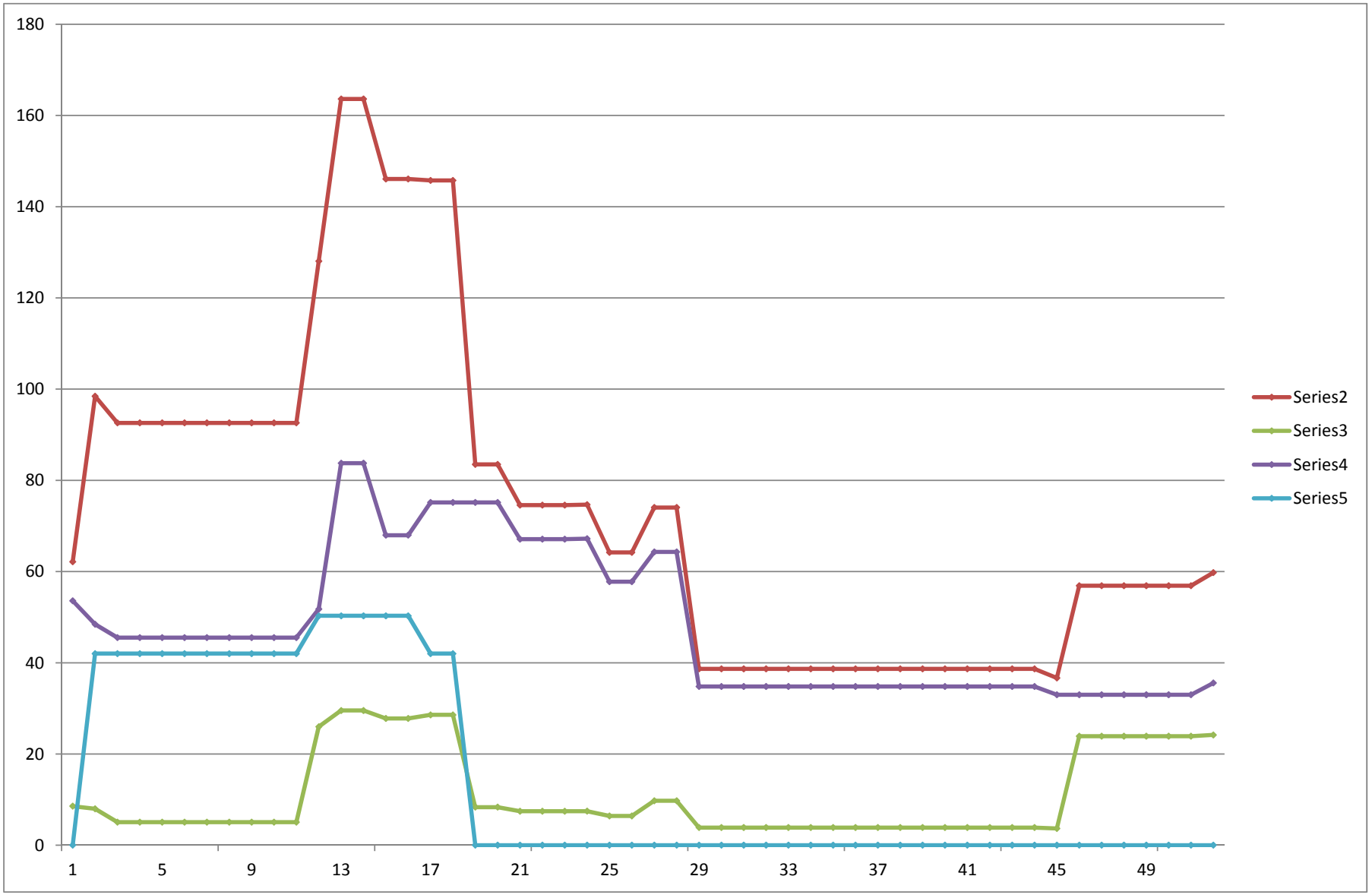
N

WorleyParsons
resources & energy

Highest Project Peak Hourly Traffic + Approximated Peak Hour Background Traffic



ATTACHMENT 1B


180
160
140
120
100
80
60
40
20
0
1
5
9
13
17
21
25
29
33
37
41
45
49
Series2
Series3
Series4
Series5

ATTACHMENT 2

600000 605000 610000 615000 620000

7805000 7800000 7795000 7790000

LEGEND

- Dredged material pipeline (indicative)
- Return water pipeline (indicative)
- Dredging footprint
- Dredging referral area
- Referral and site investigation area
- Dredged material containment pond
- Railway level crossing
- Existing rail network
- Private access road
- Highway
- Existing Terminal T1

ABBOT POINT

MOUNT LUCE

CURLEWIS BAY

MOUNT CURLEWIS

CALEY VALLEY WETLANDS

Abbot Point Western Access Road (Collinsville - Newlands rail line)

(Private road) Collinsville - Newlands Rail Line

Abbot Point Road

Deco Quarry Access Road

ROUNDBACK

CALEY VALLEY WATERHOLES

NULLA WATERHOLE

To Townsville

MOUNT CAREW

North Coast Line

BRUCE HIGHWAY

MOUNT LITTLE

LONG WATERHOLE

KAILI

Abbot Point Road (North Coast rail line)

Abbot Point Road (Collinsville - Newlands rail line)

MOUNT ROUNDBACK

SPROLE CASTLE

To Mackay

DURROBURRA

EURI

0 1 2
Kilometres
SCALE: 1 : 75,000 (at A3)
GDA 1994 MGA Zone 55

N W E S

600000 605000 610000 615000 620000

G:\301001\01956 PROJ - Abbot Point Growth Gateway\10.0 Engineering\10 GM-Geomatics\Output\301001-01956-00-GM-SKT-0008-B (Transport).mxd

PROJECT LOCALITY

Service Layer Credits: Sources: Esri, DeLorme, HERE, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom

Source information:
Dredging referral areas
Setout points derviced from coordinates on NQBP/Aurecon figure 242770-0000-DRG-SK-0021-A supplied by NQBP
Dredged material and return water pipelines
Digitised from NQBP/Aurecon figure 242770-0000-DRG-SK-0021-A supplied by NQBP
Dredged material containment pond
Extracted from Golder design file SC_2-2-2.dxf supplied 25/05/2015
Cadastre
Queensland Government - Department of Natural Resources and Mines
Downloaded on 23/03/2015 http://qldspatial.information.qld.gov.au/catalogue/
Existing transport network
Physical Road Network - Queensland, Physical Rail Network - Queensland
Queensland Government - Department of Environment and Resource Management
Existing Terminal T1
Digitised from 2013 imagery and cadastral boundaries
2013 Imagery
Queensland Government - Department of State Development, Infrastructure and Planning 2015

REV	DATE	REVISION DESCRIPTION	DRN	CHK	ENG	CHK ENG	APPD
B	22/06/2015	Re-issued for information	KM	SJ			
A	27/05/2015	Issued for information	KM	SL			

Queensland Government

QUEENSLAND GOVERNMENT

ABBOT POINT GROWTH GATEWAY PROJECT

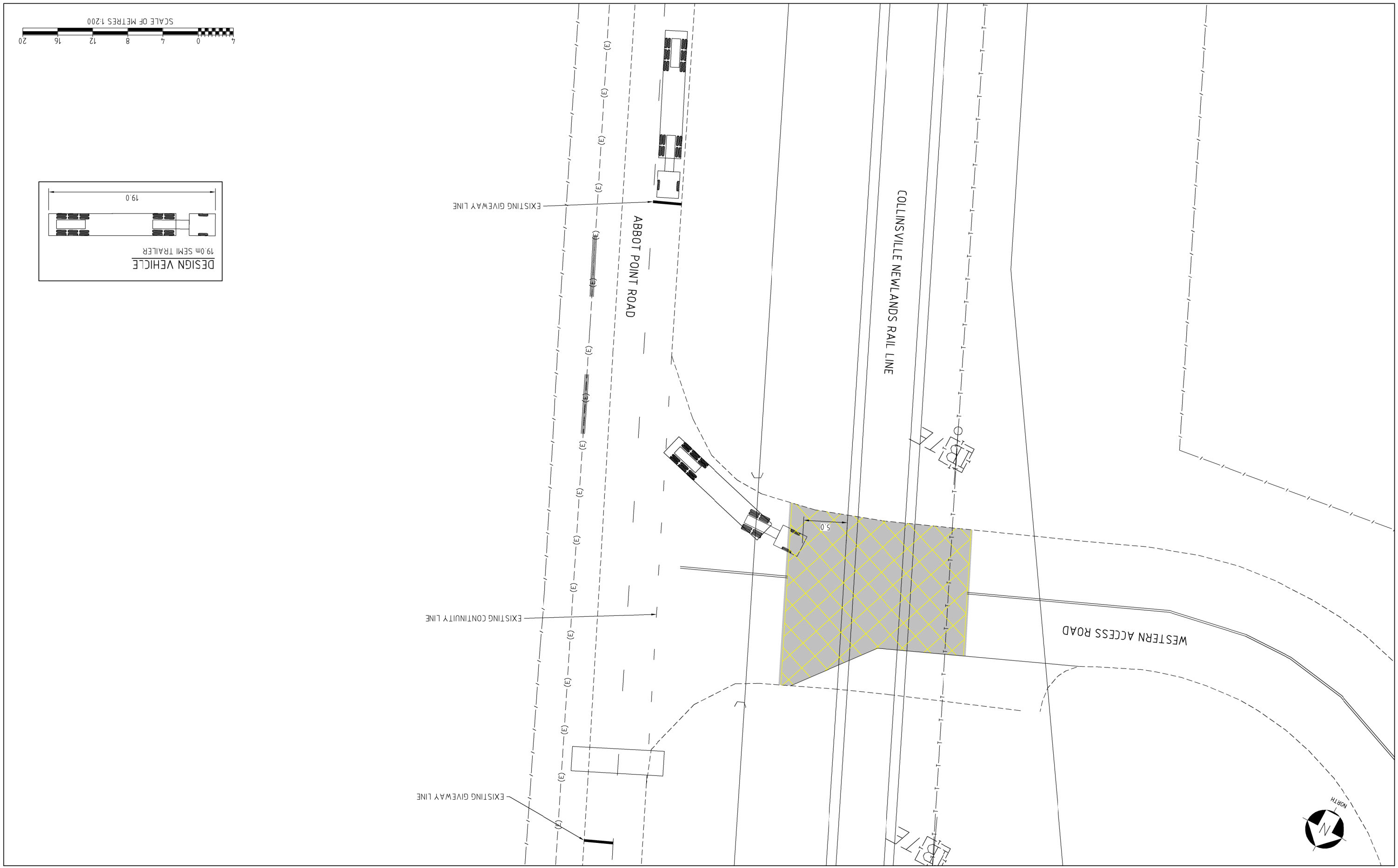
Project Locality

Figure: 301001-01956-00-GM-SKT-0008 | Rev: B

Compiled by BRISBANE GEOMATICS

ATTACHMENT 3A

ABBOT POINT ROAD / WESTERN ACCESS ROAD INTERSECTION
VEHICLE QUEUING LAYOUT
301001-01956-00-CI-DSK-0002



ATTACHMENT 3B

NORTH

BRUCE HIGHWAY

NORTH COAST RAIL LINE

ABBOT POINT ROAD

COLLINSVILLE NEWLANDS RAIL LINE

EXISTING GRID

5.0 MIN

2.0

NEW GIVE WAY LINE

EXISTING CONTINUITY LINE

NEW CHEVRONS

(E)

(3)

DESIGN VEHICLE

19.0m SEMI TRAILER

19.0

4 0 4 8 12 16 20

SCALE OF METRES 1:200

WorleyParsons
resources & energy

WORLEYPARSONS DOCUMENT NO: 301001-01956-00-CI-DSK-0001

CERTIFICATION

NAME: STEPHEN JOUGHIN

R.P.E.Q.: 4672 DATE: 24-07-15

BRUCE HIGHWAY / ABBOT POINT ROAD INTERSECTION
VEHICLE QUEUING LAYOUT WITH NEW LINEMARKING
301001-01956-00-CI-DSK-0001

NORTH

BRUCE HIGHWAY

NORTH COAST RAIL LINE

ABBOT POINT ROAD

EXISTING GRID

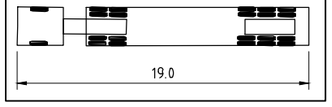
EXISTING GIVE WAY LINE

EXISTING CONTINUITY LINE

COLLINSVILLE NEWLANDS RAIL LINE

DESIGN VEHICLE

19.0m SEMI TRAILER



4 0 4 8 12 16 20

SCALE OF METRES 1:200

BRUCE HIGHWAY / ABBOT POINT ROAD INTERSECTION
EXISTING VEHICLE QUEUING LAYOUT
301001-01956-00-CI-DSK-0005

Appendix 11 Abbot Point Road / Bruce Highway Intersection Line Marking Works

NORTH

BRUCE HIGHWAY

NORTH COAST RAIL LINE

ABBOT POINT ROAD

COLLINSVILLE NEWLANDS RAIL LINE

EXISTING GRID

5.0 MIN

2.0

NEW GIVE WAY LINE

EXISTING CONTINUITY LINE

NEW CHEVRONS

(E)

(3)

DESIGN VEHICLE

19.0m SEMI TRAILER

19.0

4 0 4 8 12 16 20

SCALE OF METRES 1:200

WorleyParsons
resources & energy

WORLEYPARSONS DOCUMENT NO: 301001-01956-00-CI-DSK-0001

CERTIFICATION

NAME: STEPHEN JOUGHIN

R.P.E.Q.: 4672 DATE: 24-07-15

BRUCE HIGHWAY / ABBOT POINT ROAD INTERSECTION
VEHICLE QUEUING LAYOUT WITH NEW LINEMARKING
301001-01956-00-CI-DSK-0001

NORTH

NORTH COAST RAIL LINE

ABBOT POINT ROAD

SAFE INTERSECTION SIGHT DISTANCE (315m)

BRUCE HIGHWAY

COLLINSVILLE NEWLANDS RAIL LINE

ABBOT POINT ROAD

NORTH COAST RAIL LINE

SAFE INTERSECTION SIGHT DISTANCE (315m)

BRUCE HIGHWAY

10 0 10 20 30 40 50

SCALE OF METRES 1:500

BRUCE HIGHWAY / ABBOT POINT ROAD INTERSECTION
SAFE INTERSECTION SIGHT DISTANCE (SISD)
301001-01956-00-CI-DSK-0006

NORTH

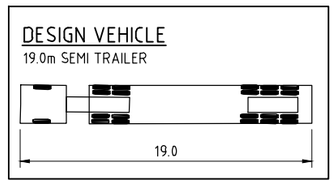
BRUCE HIGHWAY

NORTH COAST RAIL LINE

ABBOT POINT ROAD

COLLINSVILLE NEWLANDS RAIL LINE

DESIGN VEHICLE
19.0m SEMI TRAILER



4 0 4 8 12 16 20
SCALE OF METRES 1:200

BRUCE HIGHWAY / ABBOT POINT ROAD INTERSECTION
DESIGN VEHICLE TURN PATHS
301001-01956-00-CI-DSK-0007

Appendix 12 Pavement Impact Assessment

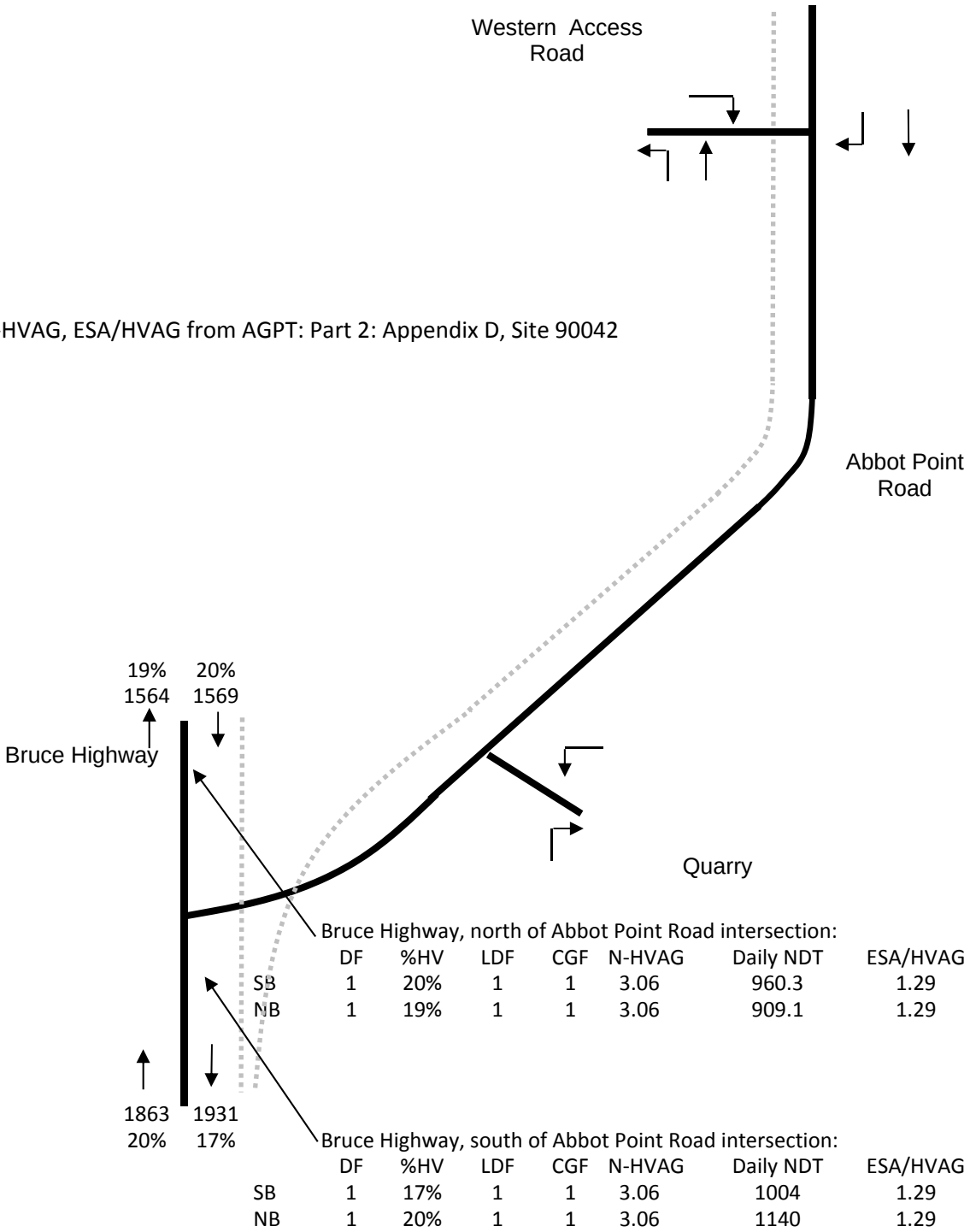
N

WorleyParsons
resources & energy

PAVEMENT IMPACT ASSESSMENT
Background Traffic / ESAs

TMR - AADT Segment Report
Data Collection Year 2013
(% - Percent HV)

Growth applied, 3% p.a. 2013 - 2016



N-HVAG, ESA/HVAG from AGPT: Part 2: Appendix D, Site 90042

Bruce Highway, north of Abbot Point Road intersection:

	DF	%HV	LDF	CGF	N-HVAG	Daily NDT	ESA/HVAG	**Daily ESA**
SB	1	20%	1	1	3.06	960.3	1.29	**1239**
NB	1	19%	1	1	3.06	909.1	1.29	**1173**

Bruce Highway, south of Abbot Point Road intersection:

	DF	%HV	LDF	CGF	N-HVAG	Daily NDT	ESA/HVAG	**Daily ESA**
SB	1	17%	1	1	3.06	1004	1.29	**1296**
NB	1	20%	1	1	3.06	1140	1.29	**1471**

N

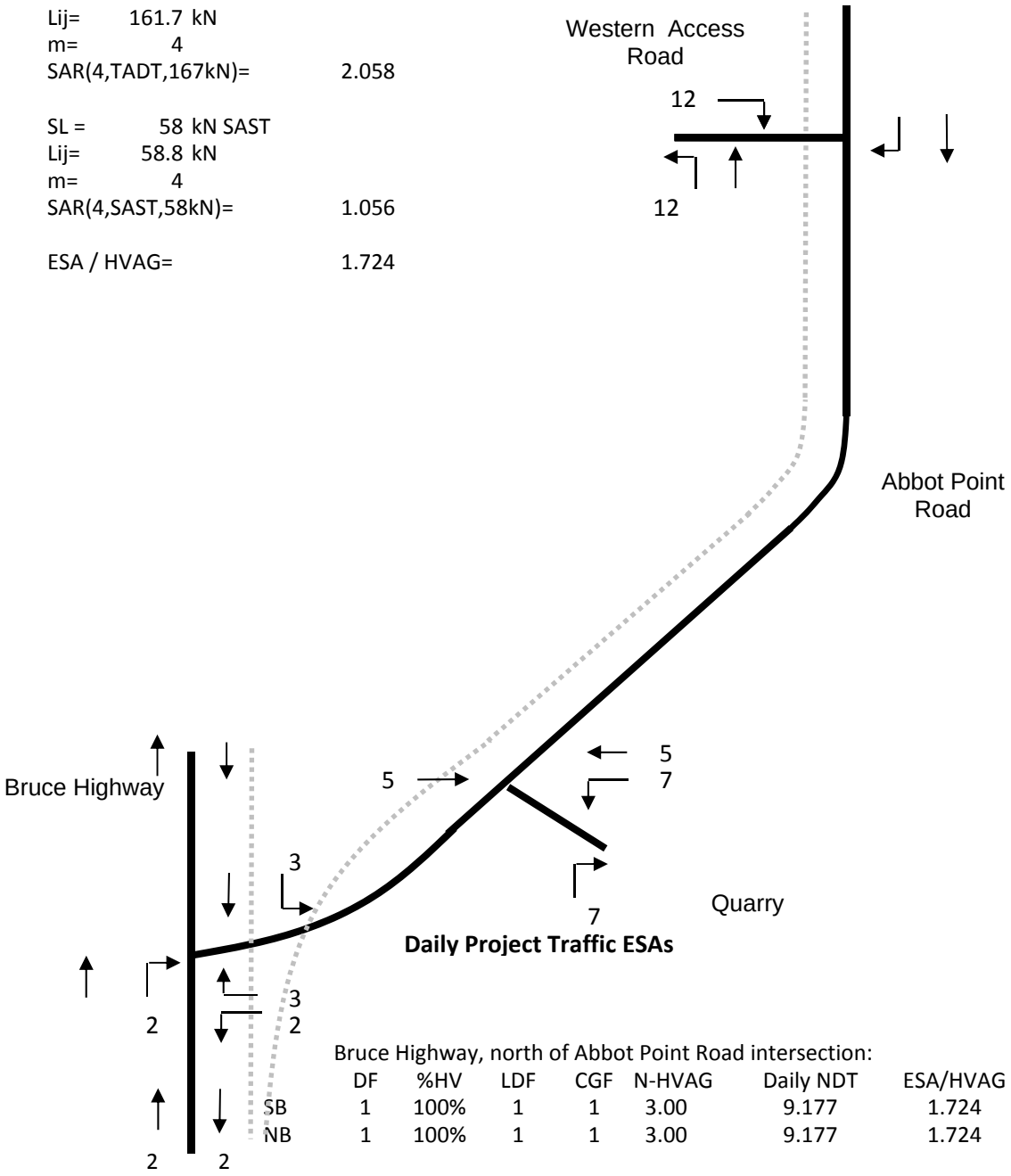
WorleyParsons
resources & energy

PAVEMENT IMPACT ASSESSMENT - BRUCE HIGHWAY
Average Project Daily Heavy Vehicle Traffic

Assumed Project heavy vehicle: 5 axle, 19m semi-trailer
Axle configuration: 3 axle groups, SAST - TADT - TADT
Loading to Queensland axle mass limits: SAST - 6t; TADT - 16.5t

SARmij = (Lij / SLi)^m

SL =	135	kN TADT	
Lij=	161.7	kN	
m=	4		
SAR(4,TADT,167kN)=			2.058
SL =	58	kN SAST	
Lij=	58.8	kN	
m=	4		
SAR(4,SAST,58kN)=			1.056
ESA / HVAG=			1.724



Daily Project Traffic ESAs

Bruce Highway, north of Abbot Point Road intersection:

	DF	%HV	LDF	CGF	N-HVAG	Daily NDT	ESA/HVAG	**Daily ESA**	**% B'ground**
SB	1	100%	1	1	3.00	9.177	1.724	**15.82**	**1.3%**
NB	1	100%	1	1	3.00	9.177	1.724	**15.82**	**1.3%**

Bruce Highway, south of Abbot Point Road intersection:

	DF	%HV	LDF	CGF	N-HVAG	Daily NDT	ESA/HVAG	**Daily ESA**	**% B'ground**
SB	1	100%	1	1	3.00	6.329	1.724	**10.91**	**0.8%**
NB	1	100%	1	1	3.00	6.329	1.724	**10.91**	**0.7%**

N

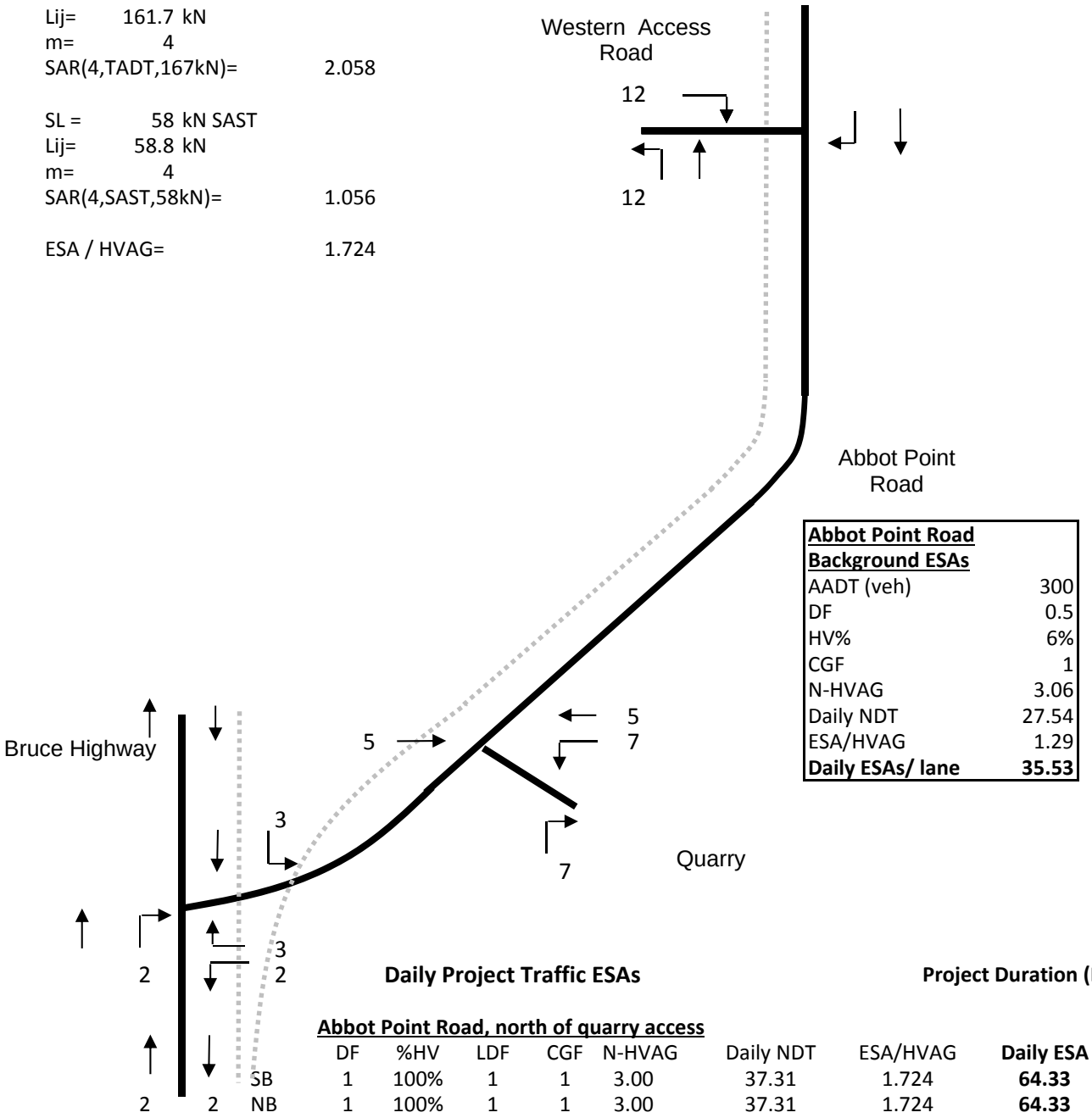
WorleyParsons
resources & energy

PAVEMENT IMPACT ASSESSMENT - ABBOT POINT ROAD
Average Project Daily Heavy Vehicle Traffic

Assumed Project heavy vehicle: 5 axle, 19m semi-trailer
Axle configuration: 3 axle groups, SAST - TADT - TADT
Loading to Queensland axle mass limits: SAST - 6t; TADT - 16.5t

SARmij = (Lij / SLi)^m

SL =	135	kN TADT	
Lij=	161.7	kN	
m=	4		
SAR(4,TADT,167kN)=			2.058
SL =	58	kN SAST	
Lij=	58.8	kN	
m=	4		
SAR(4,SAST,58kN)=			1.056
ESA / HVAG=			1.724



Abbot Point Road Background ESAs	
AADT (veh)	300
DF	0.5
HV%	6%
CGF	1
N-HVAG	3.06
Daily NDT	27.54
ESA/HVAG	1.29
Daily ESAs/ lane	**35.53**

Daily Project Traffic ESAs **Project Duration (Days) 364**

Abbot Point Road, north of quarry access

	DF	%HV	LDF	CGF	N-HVAG	Daily NDT	ESA/HVAG	Daily ESA	Total ESA
SB	1	100%	1	1	3.00	37.31	1.724	**64.33**	**23414**
NB	1	100%	1	1	3.00	37.31	1.724	**64.33**	**23414**

Abbot Point Road, south of quarry access

	DF	%HV	LDF	CGF	N-HVAG	Daily NDT	ESA/HVAG	Daily ESA	Total ESA
SB	1	100%	1	1	3.00	15.51	1.724	**26.74**	**9732**
NB	1	100%	1	1	3.00	15.51	1.724	**26.74**	**9732**

Appendix 13 Suggested Traffic Guidance Scheme

Abbot Point Port Growth Gateway Project
Proposed Traffic Guidance Scheme

N

WorleyParsons
resources & energy

Notes.
1. Proposed traffic guidance scheme shall be designed by a qualified person prior to implementation

2. Intent of scheme: a) Should northbound through traffic be held waiting behind a vehicle turning left from Abbot Point Road to Western Access Road, TC No.1 shall hold all southbound traffic. b) at the direction of TC No.2, all northbound through traffic shall proceed by temporary use of the southbound carriageway.