

GLADSTONE – FITZROY **PIPELINE PROJECT** Environmental Impact Statement

Transport and
Access Arrangements



Gladstone Area
Water Board



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This information has been prepared by, or on behalf of, the Gladstone Area Water Board (GAWB) regarding the Gladstone-Fitzroy Pipeline Project. Care has been taken to ensure that the information is accurate and up to date at the time of publishing.



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13. Transport and Access Arrangements

13.1 Introduction

This chapter of the EIS addresses Section 3.8 of the project Terms of Reference (ToR) and presents the transport impact assessment prepared for the Gladstone–Fitzroy Pipeline project (the project). This chapter deals with many facets of transport and access including impacts of traffic volumes, access and safety, and transport corridor crossings (such as rail lines).

The study area for the transport and access assessment includes the transport infrastructure traversed by the project and that which is likely to be affected by the project such as roads to be used for access during the construction and operation of the project.

13.2 Methodology

13.2.1 Baseline Methodology

A desktop study was undertaken to establish the baseline conditions in the study area. This included a review of aerial photography, cadastral information and other mapping to identify the access roads and other transport infrastructure in the study area and a review of relevant legislation and policy.

Existing traffic count data was obtained from the Department of Main Roads (DMR), however as the traffic count data obtained from DMR did not provide sufficient coverage of the study area, additional traffic counts were commissioned for the purpose of this study. These counts were carried out by AusTraffic between the 6 September and 31 October 2007.

A site visit was then undertaken to assess the suitability of the identified roads for traffic access during both construction and operation of the project, and to identify the conditions in the study area which may impact upon safety.

13.2.2 Impact Assessment Methodology

The impact assessment has been undertaken generally in accordance with the requirements described within DMR's Guidelines for Assessment of Road Impacts of Development (April 2006).

Transport impacts identified in this study are assigned a significance assessed against a set of significance criteria developed specifically for this project and location. The transport impact criteria adopted are shown in Table 13.1.

Table 13.1 Impact Significance Criteria for Transport and Access Arrangements

Major Adverse	Long delays (in excess of 10 minutes) over an extended period of time experienced by traffic on nationally significant roads. Decreased safety resulting in a high likelihood of a fatal accident occurring
High Adverse	Long delays (up to 10 minutes) over an extended period of time experienced by traffic on regional roads. Decreased safety resulting in a high likelihood of a serious casualty accident occurring
Moderate Adverse	Delays (between 5 and 10 minutes) experienced over an extended period of time by traffic. Average speeds reduced by greater than 50%. Decreased safety resulting in an increased likelihood of a casualty accident occurring
Minor Adverse	Delays (up to 5 minutes) experienced over a short period of time. Average speeds reduced by around 20%. Decrease in safety resulting in an increased likelihood of property damage accidents occurring
Negligible	No apparent delays or no reduction of average vehicle speeds. No decrease in safety to road users
Beneficial	Decreased journey times to road users. Reduction in the likelihood or severity of accidents

13.3 Assumptions and Limitations

The following assumptions and limitations apply to this assessment.

- Traffic counts have been collected for the purposes of this study. These were collected over a 12 hour period on specific days and may be affected by daily or seasonal variations
- A detailed construction plan for the project has not yet been fully developed therefore certain assumptions concerning traffic generation distribution and construction timeframes have been made in consultation with the project designers and contractors. E.g. traffic generation has been calculated based on a 16 month construction period as this was the information available at the time of analysis.) The basis of such assumptions are described within this report and where a range of values is possible, the worst-case scenario has been adopted for the impact assessment
- This impact assessment provides an overview of the potential impacts associated with the project. Detailed traffic management plans will be developed and submitted for approval with the relevant authorities for each element of the project during the detailed design phase.

13.4 Relevant Legislation and Policy

The *Transport Infrastructure Act 1994 (TI Act)* is the relevant legislation in Queensland concerning the management of transport infrastructure including roads and railways.

Where temporary construction accesses and maintenance accesses from state-controlled roads (SCR) are required, approvals would need to be obtained under s62 of the *TI Act* and construction approval under s33 of the *TI Act*.

DMR's, Roads Implementation Program (RIP) 2007-08 to 2011-12, lists road improvement projects scheduled for the next five years. The following projects from the RIP concern roads that will be impacted by the project:

- The Narrows Road – realignment of The Narrows Road scheduled to be completed in 2007-08
- Malchi Nine Mile Road – upgrade standard and bitumen seal scheduled to be completed in 2009.

13.5 Baseline – Fitzroy to Bajool

This section of the report describes the existing transport-related aspects within the Fitzroy to Bajool section of the project area including the existing transportation network and the collection of traffic count data.

13.5.1 Transportation Network

13.5.1.1 Road Network

The project area in the Fitzroy to Bajool section encompasses several nationally and regionally significant transport routes. Roads controlled by DMR and other regionally or locally significant roads, controlled by the local authorities that are in the project area are identified in Table 13.2 and are listed north to south.

Table 13.2 Key Roads in the Project Area – Fitzroy to Bajool

Road name*	Authority	Importance
Bruce Highway	DMR	National
Rockhampton Ridgeland Road	DMR	Regional
Capricorn Highway	DMR	National
Laurel Bank Road	Rockhampton Regional Council	Local
Malchi Nine Mile Road	Rockhampton Regional Council	Local
Wandal Road	DMR	Regional
Campbell Street	DMR	Regional
Albert Street	DMR	National
George Street	DMR	National
Fitzroy Street	DMR	Regional
Port Curtis Road	Rockhampton Regional Council	Local
Old Bruce Highway	Rockhampton Regional Council	Local
Fairy Bower Road	Rockhampton Regional Council	Regional
Roope Road	Rockhampton Regional Council	Local
Georges Road	Rockhampton Regional Council	Local
Casuarina Road	Rockhampton Regional Council	Local
Bajool Port Alma Road	DMR	Regional

*These roads are mapped in Figure 1.3, with the exception of Fitzroy Street, which is in the Rockhampton Central Business District.

13.5.1.2 Rail Network

The project area contains the North Coast Railway Line. The North Coast Railway Line is the major rail corridor running north-south in the State and is of National and State significance. This line carries passenger services between Brisbane and Cairns as well as providing an important freight line, especially for the transportation of coal to shipping terminals in Gladstone. The other rail line in the project area is the Blackwater Mine Branch Line,

Summaries of the number of services using each of the railways for a week indicative of average usage are provided in Table 13.3 and Table 13.4. These tables show the daily number of freight and passenger rail services using the line.

Table 13.3 Number of Services on the North Coast Railway (at Rockhampton)

	Northbound	Southbound	Total
Monday	13	15	28
Tuesday	11	19	30
Wednesday	15	24	39
Thursday	21	20	41
Friday	19	23	42
Saturday	16	14	30
Sunday	15	15	30
Week Total	110	130	240
Average per Day	16	19	35

Table 13.4 Number of Services on the Blackwater Railway

	Northbound	Southbound	Total
Monday	26	31	57
Tuesday	28	27	55
Wednesday	32	30	62
Thursday	27	29	56
Friday	30	28	58
Saturday	29	26	55
Sunday	28	25	53
Week Total	200	196	396
Average per Day	29	28	57

13.5.1.3 School Bus Routes

Information on school bus routes was collected through Queensland Transport. The routes and number of services within the study area are shown in Figure 13.1.

13.5.2 Traffic Volumes

Existing traffic count data was obtained from DMR, which is summarised in Table 13.5, showing the location, average annual daily traffic (AADT) volumes and percentage of heavy vehicles (HV). These counts were only available for the Bruce Highway.

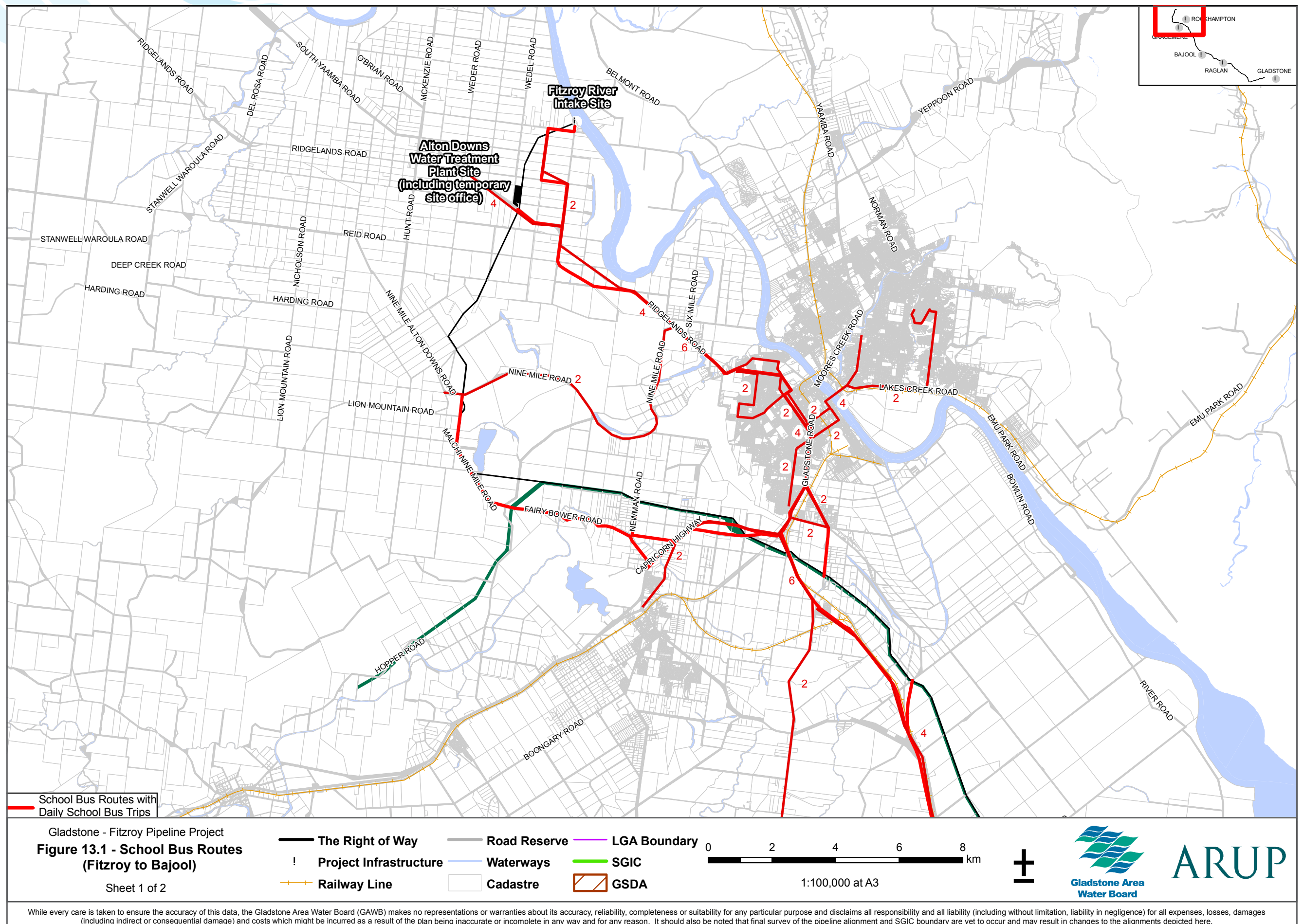
Table 13.5 Existing Traffic Counts – Fitzroy to Bajool Source: Department of Main Roads

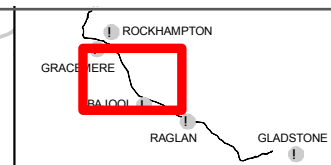
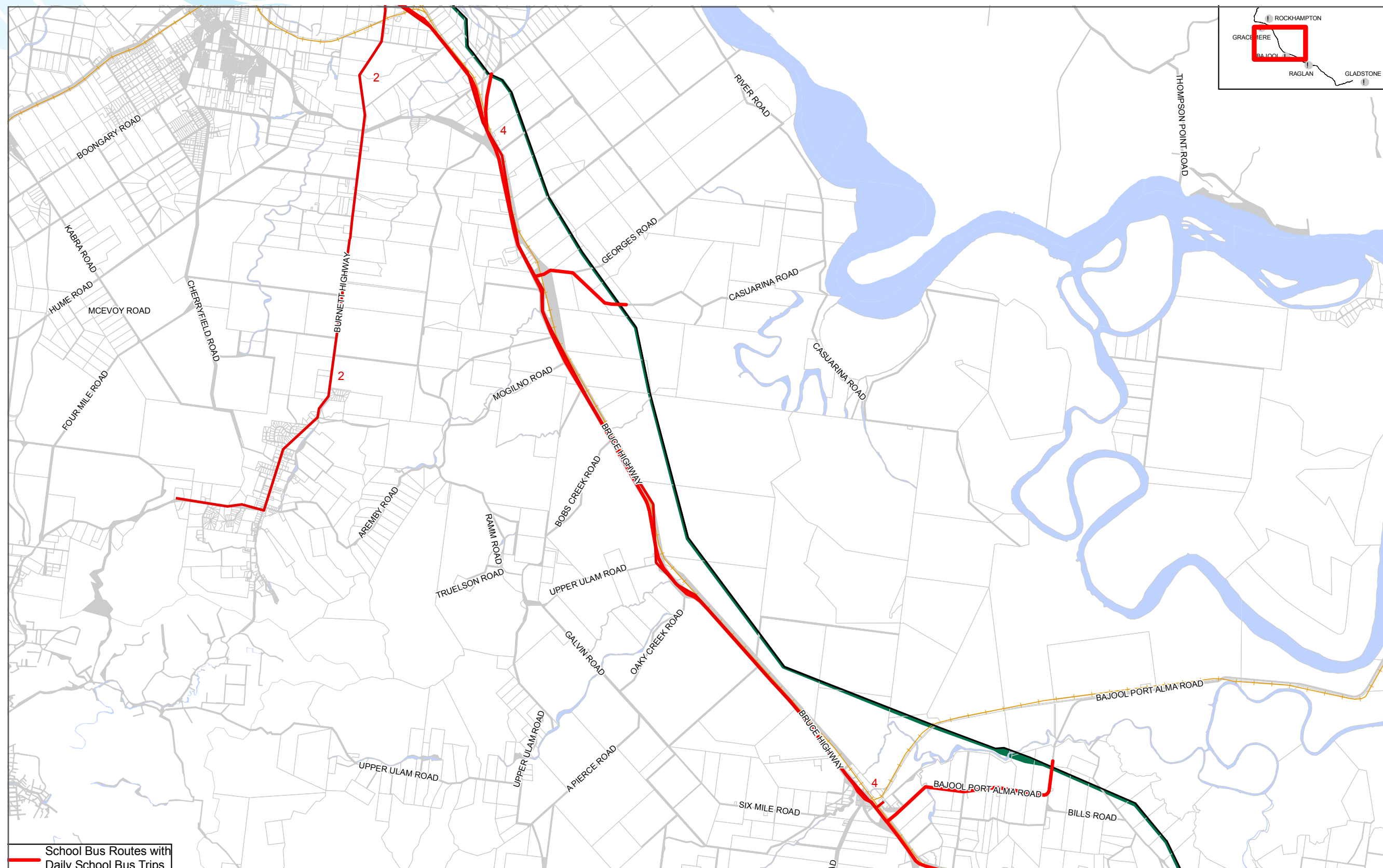
Location	Year of count	AADT volume	% HV
Bruce Highway, 1 km South of Capricorn Highway Interchange	2006	6250	23
Bruce Highway, at Gavial Creek	2006	5000	27
Bruce Highway, Midgee Weigh Station	2006	5150	23

As the traffic count data obtained from DMR did not provide sufficient coverage of the roads in the study area, additional traffic counts were commissioned for the purposes of this study. These counts were carried out by AusTraffic between the 6 September and 31 October 2007.

The location of all traffic counts and the two-way daily traffic volumes are shown in Figure 13.2.

The additional traffic count data is summarised in Table 13.6 followed by a brief general description of each of the counted roads by site number. It should be noted that traffic count data was collected over a 12-hour period. Therefore, daily traffic volumes have been estimated by applying a factor. This factor was determined by comparing 12-hour counts for selected road segments with corresponding AADTs provided by DMR. The factor applied to non-highway roads was 1.15 and the factor for highways was 1.45.





Gladstone - Fitzroy Pipeline Project

Figure 13.1 - School Bus Routes (Fitzroy to Bajool)

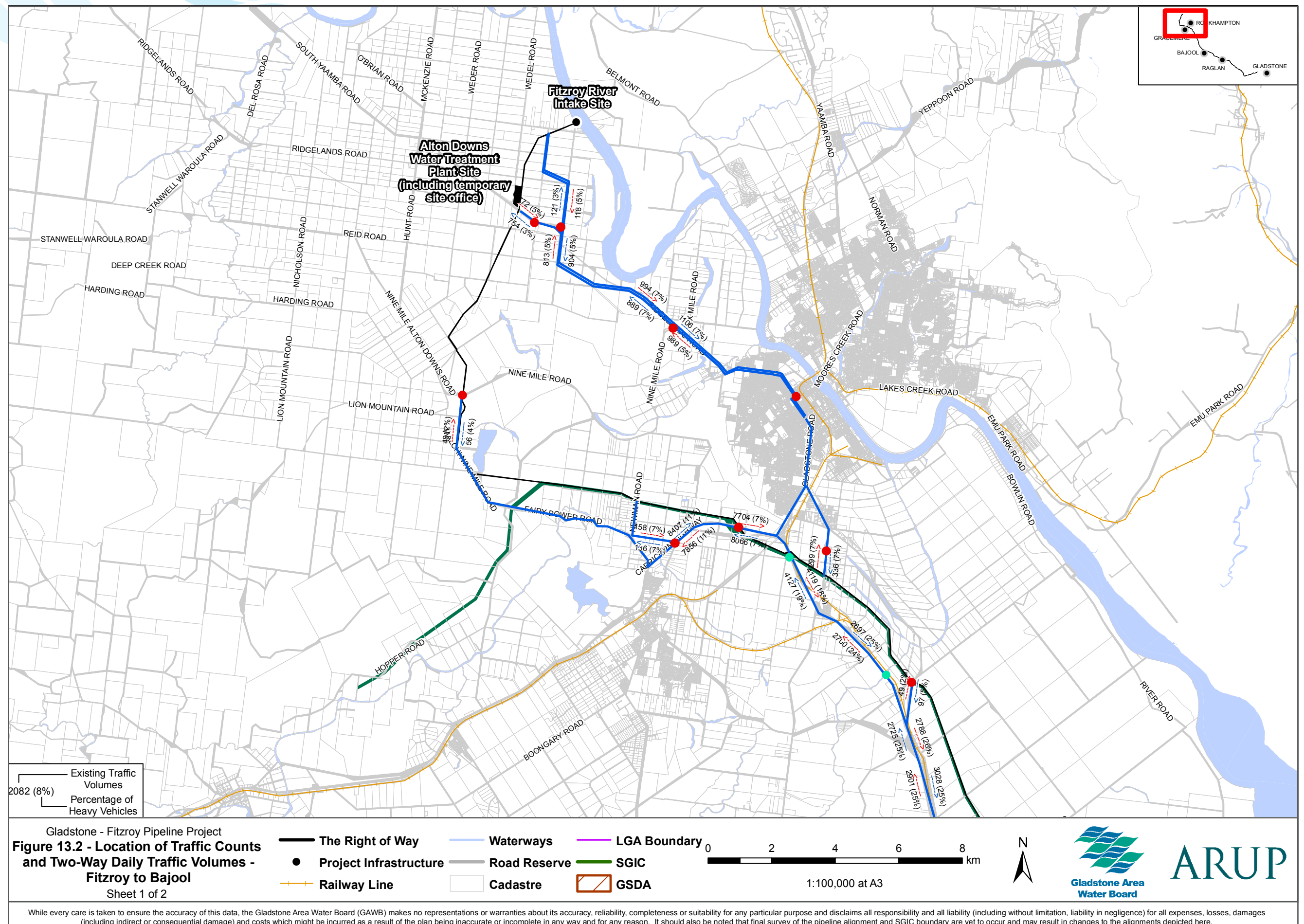
Sheet 2 of 2

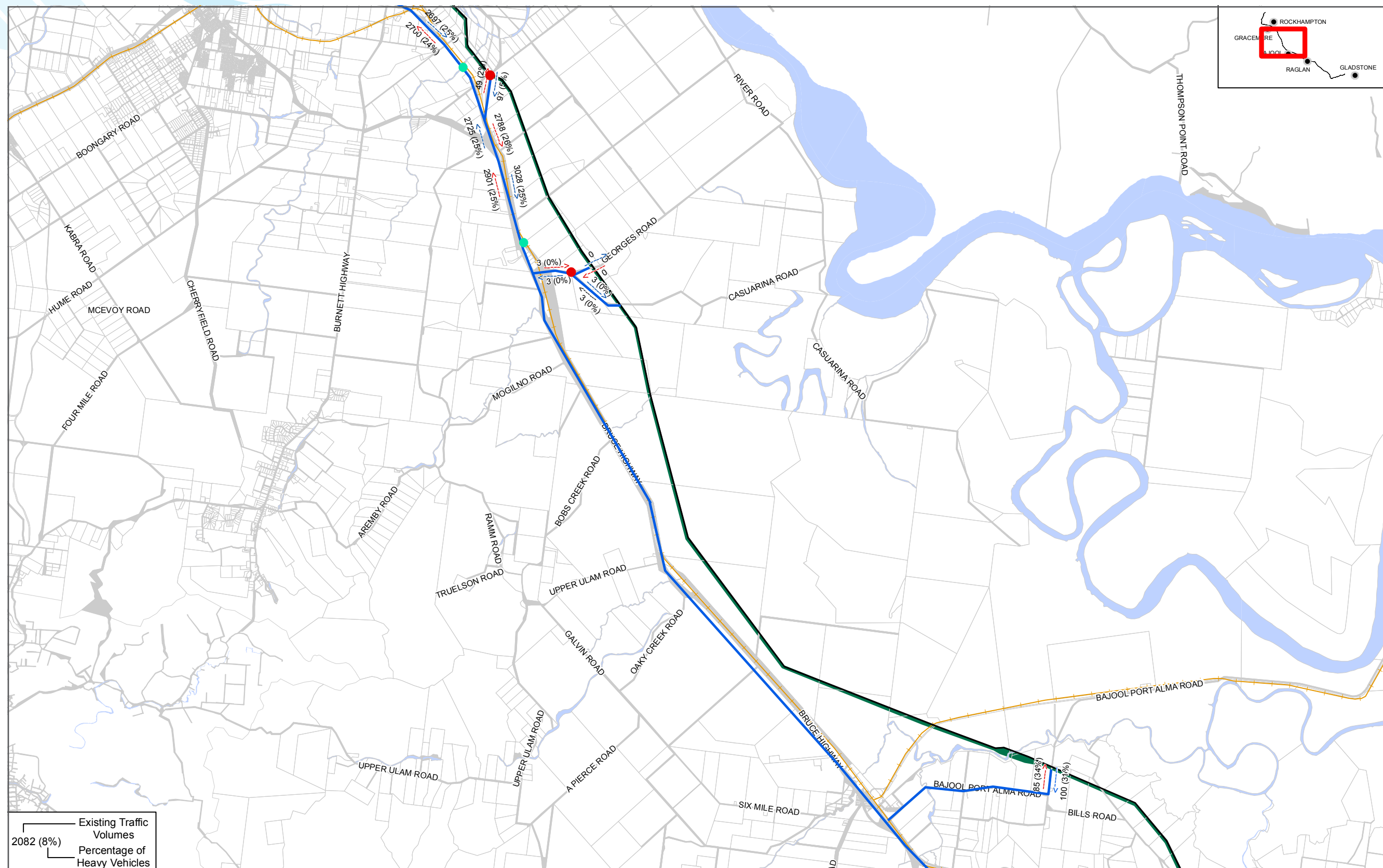
School Bus Routes with Daily School Bus Trips	The Right of Way	Road Reserve	LGA Boundary
Project Infrastructure	Waterways	SGIC	GSDA
Railway Line	Cadastre		

0 2 4 6 8 km

1:100,000 at A3

While every care is taken to ensure the accuracy of this data, the Gladstone Area Water Board (GAWB) makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a result of the plan being inaccurate or incomplete in any way and for any reason. It should also be noted that final survey of the pipeline alignment and SGIC boundary are yet to occur and may result in changes to the alignments depicted here.





Gladstone - Fitzroy Pipeline Project

Figure 13.2 - Location of Traffic Counts and Two-Way Daily Traffic Volumes - Fitzroy to Bajool

Sheet 2 of 2

— The Right of Way	— Waterways	— LGA Boundary
● Project Infrastructure	— Road Reserve	— SGIC
— Railway Line	— Cadastre	— GSDA

0 2 4 6 8 km

1:100,000 at A3

N

Gladstone Area Water Board

While every care is taken to ensure the accuracy of this data, the Gladstone Area Water Board (GAWB) makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a result of the plan being inaccurate or incomplete in any way and for any reason. It should also be noted that final survey of the pipeline alignment and SGIC boundary are yet to occur and may result in changes to the alignments depicted here.

Table 13.6 Additional traffic counts – Fitzroy to Bajool

Site	Road or intersection leg	24-hour total	AM peak hour	PM peak hour
1	Rockhampton Ridgeland Road	1500	190	210
2	Nine Mile Road (North)	240	30	30
	Nine Mile Road (South)	100	8	10
	Malchi Nine Mile Road	180	20	20
3	Capricorn Highway	15800	1250	1220
4	Old Bruce Highway	630	70	100
5	Roope Road (North)	150	20	20
	River Road (East)	20	0	2
	Roope Road (South)	150	20	20
	River Road (West)	0	0	0
6	Georges Road (East)	0	0	0
	Casuarina Road (South)	10	2	2
	Casuarina Road (West)	10	2	2
7	Bajool Port Alma Road	180	30	20
14	Laurel Bank Road (North)	240	30	19
	Rockhampton Ridgeland Road (East)	1720	224	217
	Rockhampton Ridgeland Road (West)	1550	200	202
15	Rockhampton Ridgeland Road (East)	2100	265	259
	Nine Mile Road (South)	250	35	40
	Rockhampton Ridgeland Road (West)	1880	238	223
16	Campbell Street (North)	6940	630	599
	Albert Street (East)	26000	2026	2120
	Campbell Street (South)	3840	262	333
	Albert Street (West)	22610	1714	1784

Site	Road or intersection leg	24-hour total	AM peak hour	PM peak hour
17	Queen Elizabeth Drive (North)	23400	1434	1852
	Lakes Creek Road (East)	19800	1639	1662
	Rockhampton Yeppoon Road (South)	35700	2721	2937
	Bridge Street (West)	4870	320	341
18	Capricorn Highway (North)	16300	1164	1242
	Old Capricorn Highway (East)	1200	90	104
	Capricorn Highway (South)	14600	1057	1126
	Fairy Bower Road (West)	290	21	26

Site 1: Rockhampton Ridgeland Road is a State Controlled Road. It is a sealed, two-lane road with a speed limit of 100 km/h except for the 3 km section near Rockhampton where it reduces to 60 km/h.

Site 2: Malchi Nine Mile Road is a rural road controlled by Rockhampton Regional Council. It is a sealed, two-lane road with a speed limit of 100 km/h.

Site 3: The Capricorn Highway is a highway controlled by the Department of Main Roads. It is a sealed, two-lane road with a speed limit of 100 km/h.

Site 4: Port Curtis Road is an urban access road controlled by Rockhampton Regional Council. It is a sealed, two-lane road with a speed limit of 60 km/h excluding a school zone at the northern end where it is reduced to 40 km/h during restricted times.

Site 5: Roope Road and River Road intersection is controlled by the Rockhampton Regional Council. Roope Road is a sealed, two-lane road, whereas River Road is an unsealed, two-lane road. Neither roads have posted speed limits.

Site 6: Casuarina Road and Georges Road intersection is controlled by the Rockhampton Regional Council. Both are unsealed, two-lane roads and do not have posted speed limits.

Site 7: Bajool Port Alma Road is a main road controlled by DMR. It is a sealed, two-lane road with a speed limit of 100 km/h.

Site 14: Laurel Bank Road and Rockhampton Ridgeland Road intersection is controlled by DMR. Laurel Bank Road is controlled by Rockhampton Regional Council and is a sealed, two-lane road, with a speed limit of 100 km/h.

Site 15: Nine Mile Road and Rockhampton Ridgeland Road intersection is controlled by DMR. Both roads are sealed, two-way roads with a speed limit of 100 km/h.

Site 16: Campbell Street and Albert Street signalised intersection is controlled by DMR. Albert Street is part of the Bruce Highway and is of national importance. It is a sealed, four-lane, two-way road with a speed limit of 60 km/h. Campbell Street is a sealed major road, two lanes, and two-way with a speed limit of 60 km/h.

Site 17: Queen Elizabeth Drive, Lakes Creek Road, Rockhampton Yeppoon Road and Bridge Street signalised intersection is controlled by DMR. Queen Elizabeth Drive, Lakes Creek Road and Rockhampton Yeppoon Road are all sealed, four-lane, two-way major roads with a speed limit of 60 km/h. Bridge Street is a sealed, two-lane, two-way road with a speed limit of 60 km/h.

Site 18: Capricorn Highway, Old Capricorn Highway and Fairy Bower Road intersection is controlled by DMR. Fairy Bower Road is a sealed, two-lanes, two-way road with a speed limit of 100 km/h. Old Capricorn Highway is a sealed, two-lane, two-way road with a speed limit of 100 km/h. The Capricorn Highway is a sealed, two-lane road with an east-west two-way flow of traffic with a speed limit of 100 km/h.

13.6 Baseline – Bajool to Gladstone

13.6.1 Transportation Network

13.6.1.1 Road Network

The project study area in the Bajool to Gladstone section encompasses several nationally and regionally significant transport routes. Roads controlled by DMR and other regionally or locally significant roads, controlled by the local authorities are identified in Table 13.7 and are listed north to south.

Table 13.7 Key Roads in the Project Area – Bajool to Gladstone

Road name	Authority	Importance
Bruce Highway	DMR	National
Twelve Mile Road	Rockhampton Regional Council	Local
Raglan Station Road	Gladstone Regional Council	Local
Reedy Creek Road	Gladstone Regional Council	Local
Darts Creek Road	Gladstone Regional Council	Local
Popenia Road	Gladstone Regional Council	Local
The Narrows Road	Gladstone Regional Council	Local
Mylrea Road	Gladstone Regional Council	Local
Gladstone Mt Larcom Road	DMR	Regional
Calliope River Road	Gladstone Regional Council	Local

13.6.1.2 Rail Network

The project area contains the North Coast Railway Line. The North Coast Railway Line is the major rail corridor running north-south in the State and is of National and State significance. This line carries passenger services between Brisbane and Cairns as well as providing an important freight line, especially for the transportation of coal to shipping terminals in Gladstone. Other rail lines in the project area include the East End Mine Branch Line.

Summaries of the number of services using each railway for a week indicative of average usage are provided in Table 13.8 and Table 13.9. These tables show the daily number of freight and passenger rail services using the line.

Table 13.8 Number of Services of the North Coast Railway (at Bajool)

	Northbound	Southbound	Total
Monday	38	38	76
Tuesday	31	33	64
Wednesday	39	42	81
Thursday	43	39	82
Friday	43	39	82
Saturday	33	36	69
Sunday	35	28	63
Week Total	262	255	517
Average	38	37	75

Table 13.9 Number of Services of the East End Mine Branch Railway

	Northbound	Southbound	Total
Sunday	6	7	13
Monday	6	7	13
Tuesday	6	7	13
Wednesday	6	7	13
Thursday	6	7	13
Friday	6	7	13
Saturday	6	7	13
Week Total	42	49	91
Average	6	7	13

13.6.1.3 School Bus Routes

Information on school bus routes was collected through Queensland Transport. The routes and number of services within the project area are shown in Figure 13.3.

13.6.2 Traffic Volumes

Existing traffic data was obtained from DMR for two roads in the project area, which is summarised in Table 13.10, showing the location, AADT volumes and percentage of HVs.

Table 13.10 Existing traffic counts – Bajool to Gladstone

Location	Year of count	AADT volume	% HV
Bruce Highway, Hut Creek (north of Ambrose)	2006	4550	25
Gladstone Mt Larcom Road, 150 m north of Yarwun Road	2006	2750	21

Source: Department of Main Roads

As the traffic count data obtained from DMR did not provide sufficient coverage of the study area, additional traffic counts were commissioned for the purposes of this study. These counts were carried out by AusTraffic on 6 September 2007.

The location of all traffic counts and the two-way daily traffic volumes are shown in Figure 13.4.

The additional traffic count data is summarised in Table 13.11 below followed by a brief general description of each of the counted roads by site number. It should be noted that traffic count data was collected over a 12-hour period. Therefore, daily traffic volumes have been estimated by applying a factor. This factor was determined by comparing 12-hour counts for selected road segments with corresponding AADTs provided by DMR. The factor applied to non-highway roads was 1.15 and the factor for highways was 1.45.

Table 13.11 Additional traffic counts – Bajool to Gladstone

Site	Road or intersection leg	24 hour total	AM peak hour	PM peak hour
7	Bajool Port Alma Road	180	30	20
8	Raglan Station Road	20	4	3
9	Raglan Station Road (North)	1	1	0
	Reedy Creek Road (East)	10	2	1
	Raglan Station Road (South)	5	1	1
10	Darts Creek Road	130	20	20
11	Mt Larcom Gladstone Road	2630	250	250
12	Calliope River Targinie Road (North)	260	30	30
	Mt Larcom Gladstone Road (East)	3170	290	300
	Calliope River Targinie Road (South)	710	40	80
	Mt Larcom Gladstone Road (West)	2610	260	220
13	Landing Road (North)	1120	80	120
	Mt Larcom Gladstone Road (South)	5030	350	340
	Mt Larcom Gladstone Road (West)	3350	300	270

Site 8: Raglan Station Road is a rural road controlled by the Gladstone Regional Council. It is an unsealed, single-lane road with a speed limit of 100 km/h excluding the sections within towns where it reduces to 50 km/h.

Site 9: Raglan Station Road and Reedy Creek Road intersection is controlled by Gladstone Regional Council. Both are single-lane, unsealed rural roads. Reedy Creek Road has a speed limit of 100 km/h excluding the sections within towns where it reduces to 50 km/h.

Site 10: Darts Creek Road is a rural road controlled by Gladstone Regional Council. It is an unsealed, single-lane road with a speed limit of 100 km/h.

Site 11: Gladstone Mt Larcom Road is a regional highway controlled by DMR. It is a sealed, two-lane road with a speed limit of 100 km/h except for the stretch leading up to the intersection with the Bruce Highway, which reduces to 80 km/h.

Site 12: Mt Larcom Gladstone Road, Calliope River Road and Targinie Road intersection is controlled by DMR. All are sealed roads. Calliope River Road has a speed limit of 100 km/h once past the town of Yarwun.

Site 13: Mt Larcom Gladstone Road and Landing Road intersection is controlled by DMR. Both are two-lane, sealed roads. Landing Road has a speed limit of 80 km/h.

13.7 Assessment of Impacts – Fitzroy to Bajool

This section of the chapter describes the traffic-related impacts associated with the construction and operational phases of the project in the Fitzroy to Bajool section of the study area. The project elements in this section of the study area include the Fitzroy River intake, the Alton Downs Water Treatment Plant (WTP) and the pipeline.

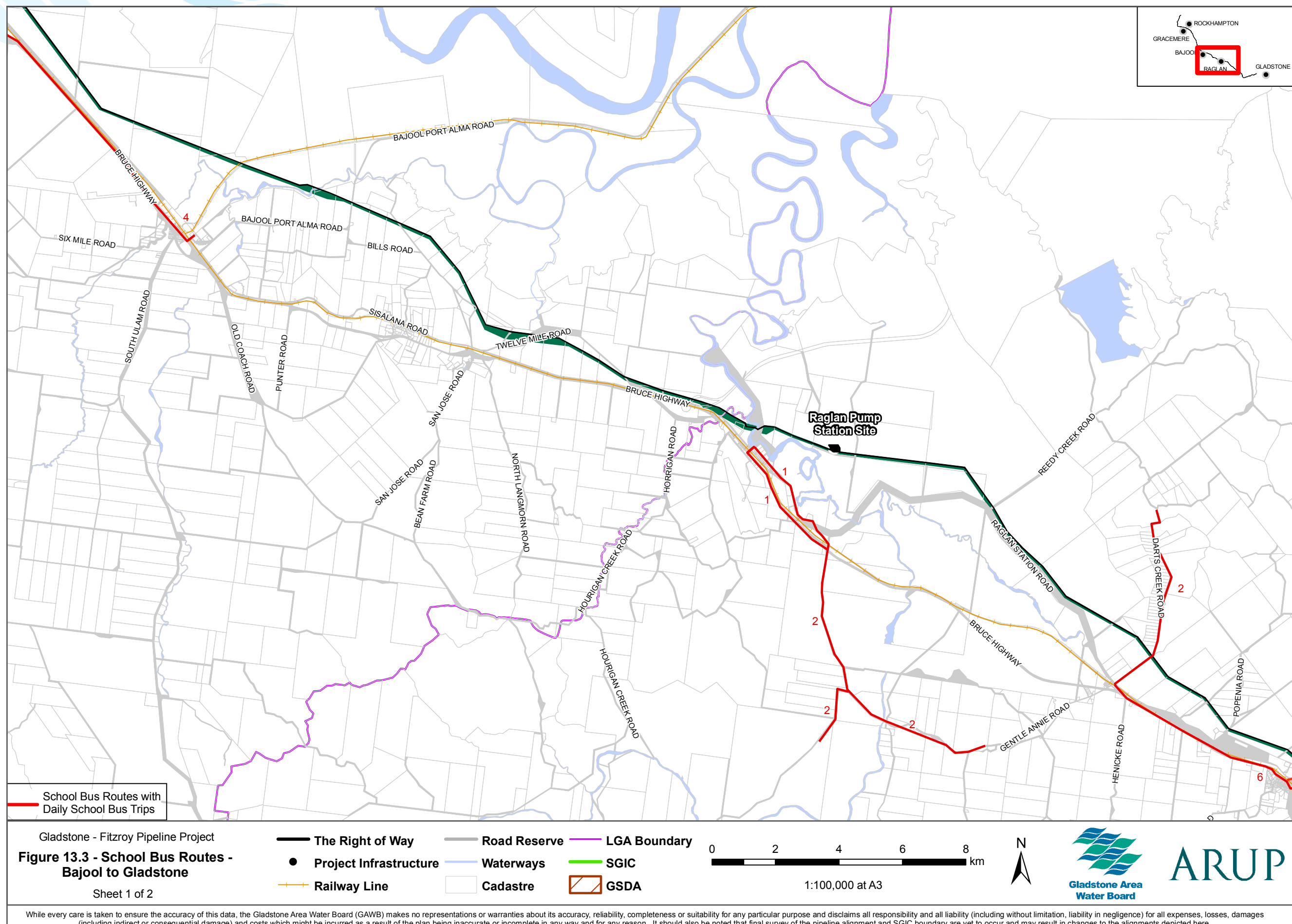
The elements of the project are firstly described in terms of their potential traffic generation and this is followed by an overall assessment of the impacts of the total traffic generation.

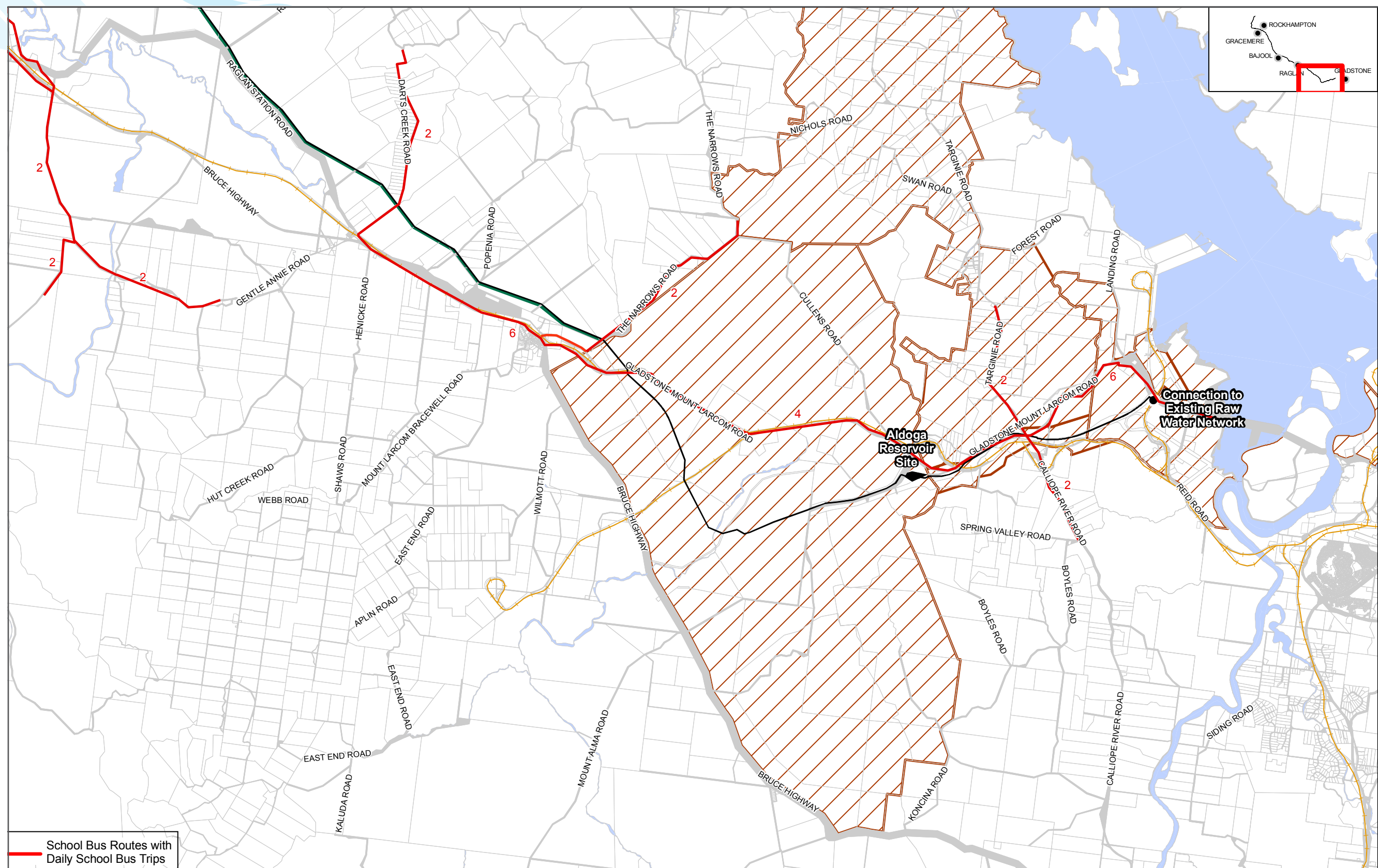
13.7.1 Pipeline

13.7.1.1 Access Routes

Access into the pipeline corridor is assumed to occur via several routes, which would be used as pipeline construction progresses. These are shown in Figure 13.5. The access routes were chosen with consideration given to the standard of the roads and the standard of intersection from the SCR network. The following list briefly describes the proposed access routes to the pipeline corridor:

- Ski Gardens Road – existing SunWater access
- Laurel Bank Road – to be accessed from Rockhampton Ridgeland Road
- Rockhampton Ridgeland Road – newly formed direct access to the Alton Downs WTP
- Malchi Nine Mile Road – to be accessed from the Capricorn Highway via Fairy Bower Road
- Nelson Street – construction of an access track to the corridor required, accessed from the Capricorn Highway via McLaughlin Street
- Capricorn Highway Service Road – to be accessed from the Capricorn Highway
- Old Bruce Highway – to be accessed from the Bruce Highway via Port Curtis Road
- Roope Road – to be accessed from the Bruce Highway
- Casuarina Road – to be accessed from the Bruce Highway
- Bajool Port Alma Road – to be accessed from the Bruce Highway.

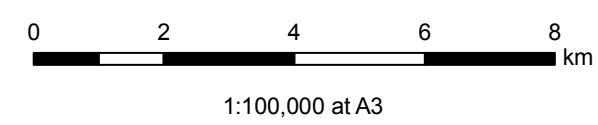




School Bus Routes with Daily School Bus Trips

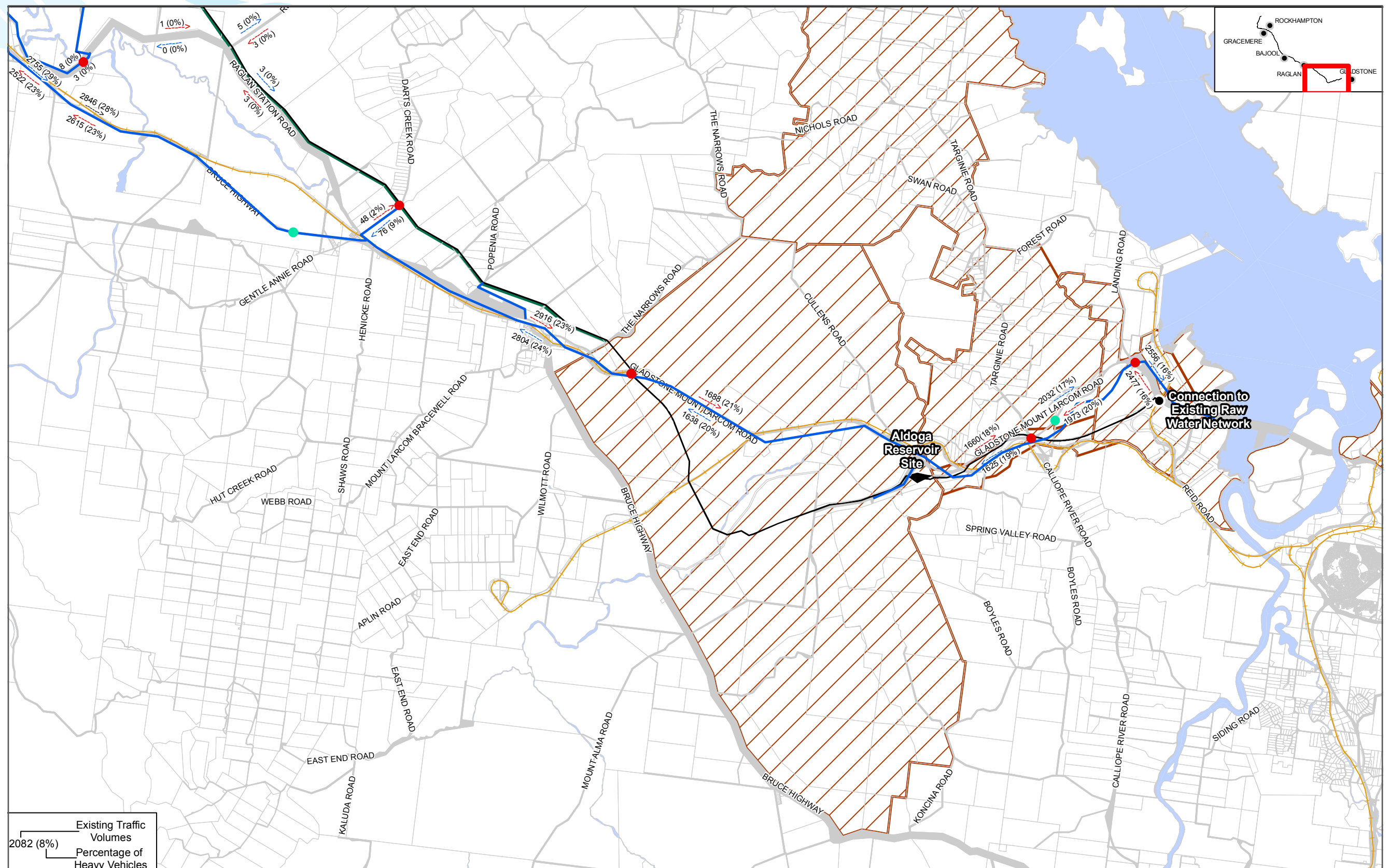
Gladstone - Fitzroy Pipeline Project
Figure 13.3 - School Bus Routes - Bajool to Gladstone
 Sheet 2 of 2

- | | | |
|------------------------|--------------|--------------|
| The Right of Way | Road Reserve | LGA Boundary |
| Project Infrastructure | Waterways | SGIC |
| Railway Line | Cadastre | GSDA |



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Gladstone - Fitzroy Pipeline Project
Figure 13.4 - Location of Traffic Counts and Two-Way Daily Traffic Volumes - Bajool to Gladstone
 Sheet 2 of 2

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An upgrade to Malchi Nine Mile Road is currently scheduled within DMR's Road Implementation Program for completion in 2009. It is expected that construction of the pipeline in this area could be scheduled after the road upgrade works, thereby avoiding any conflict with the upgrade.

13.7.1.2 Traffic Generation – Construction

Traffic generated by construction of the pipeline will consist of the following:

1. Transportation of construction equipment to/from site
2. Delivery of pipe
3. Delivery of construction materials
4. Construction workers.

The duration of construction for the total pipeline is expected to take up to 24 months (although this chapter has modelled construction based on the assumption that it will take 16 months – see the assumptions and limitations in section 13.3), taking into account downtime due to wet weather, a three month start-up period, and a testing period of two months. It is assumed that, on average, 350 m of pipeline can be completed per day per work crew. It is expected that two work crews would operate concurrently.

Construction Equipment

The machinery and equipment required to be transported to the pipeline corridor for construction is described in Chapter 2, Project Description. It is not expected at this time that this would involve the transportation of over-dimension or excess mass loads. However, this will not be finalised until a detailed

construction plan is developed by the contractor. If required, the appropriate approvals from Queensland Transport would be applied for the transportation of such loads.

Once the machinery is initially transported to the pipeline corridor it is expected that it would travel along the corridor as the project progresses. Some transportation of machinery by road from one work area to another could also be expected (e.g. from one side of a water crossing to the other).

Based on the above, the number of trips generated by the transportation of construction equipment is not expected to have a significant impact on the road network.

Delivery of Pipe

The pipe is expected to be transported from manufacturers based in either Brisbane or Adelaide by road using standard mass semi-trailers to predetermined pipe storage locations along the pipeline corridor. No stockpile locations have been finalised. Locations were assumed at various locations adjacent to the pipeline route for the purposes of this report and therefore the actual locations will be negotiated based on landowner consultation and approval requirements. The Bruce Highway from the south is therefore expected to be the main access route to the pipeline storage areas. It is expected that transportation of the pipe via rail or sea would not be economical at this time. However, possible impacts of these alternative methods are discussed in Section 13.13. The pipe will then be transported as required to the pipeline corridor. Table 13.12 outlines the six pipe storage locations that have been assumed. Gravel hardstand areas and roadways will be laid within the stockpile sites to allow the movement of heavy equipment and to allow loading of trucks and trailers.

Table 13.12 Assumed Stockpile locations

Site	Location	Access	Kp*	Reason
1	Fitzroy River Intake Station	Off Ski Gardens Road	0.0	Centralised storage of all the pipe valves and fittings. Only a small quantity of line pipe stored at this location
2	Ridgeland Road	Off Rockhampton Ridgeland Road	4.0	Ease of access off asphalt road. Cleared land next to ROW
3	Roope Road	Off Bruce Highway	28.0	Ease of access a short distance off the Bruce Hwy. Access from here along the ROW to the eastern side of the highway/rail crossing at Kp22
4	Existing works area off Port Alma Road	Off Port Alma Road	58.0	Asphalt all weather access. Utilise existing disused works area. Access from this point to southern side of Serpentine Creek
5	Darts Creek Road	Off Bruce Highway and Darts Creek Road	89.0	Asphalt all weather access. Southern side of road may require small amount of clearing on the ROW
6	Aldoga Industrial Area	Off Gladstone-Mt Larcom Road and Mylrea Road	106.0	All weather access off Asphalt road. Within an existing industrial site adjacent to the Aldoga reservoir site.

*Kp- Kilometre Point- the distance (chainage) along the pipeline route measured from the intake.

The total number of vehicles required to deliver the pipe to the six stockpiles for the total project is expected to be approximately 2,300 loads. Each load is expected to be equal to 48 m of pipeline. This equates to an average delivery rate of 15 loads per day over the six month delivery period. However, it is anticipated that peak delivery rates up to 40 loads per day may occur. Table 13.13 shows the maximum daily trips generated by delivering pipe to the stockpiles along each road section and the duration of impact assuming the maximum delivery rate. This is also summarised in Figure 13.6.

Table 13.13 Construction Traffic Generated by Pipe Delivery to Stockpiles – Fitzroy to Bajool

Road Section	Duration (weeks)	Pipe Delivery (HV trips per day)
Ski Gardens Road	0.3	80
Laurel Bank Road	0.3	80
Rockhampton Ridgeland Road (West of Laurel Bank Road)	1.6	80
Rockhampton Ridgeland Road (Laurel Bank Road to Campbell Street in Rockhampton City)	2.0	80
Campbell Street in Rockhampton City	2.0	80
Bruce Highway (Albert Street in Rockhampton City to Port Curtis Road)	2.0	80
Bruce Highway (Port Curtis Road to Capricorn Hwy)	2.0	80
Malchi Nine Mile Road	0.0	0
Fairy Bower Road (Malchi Nine Mile Road to McLaughlin Street in Kawana)	0.0	0
Nelson Street	0.0	0
Fairy Bower Road (McLaughlin Street in Kawana to Capricorn Hwy)	0.0	0
McLaughlin Street in Kawana	0.0	0
Capricorn Highway (McLaughlin Street in Kawana to Fairy Bower Road)	0.0	0
Capricorn Highway (Fairy Bower Road to Capricorn Hwy Service Road)	0.0	0
Capricorn Highway Service Road	0.0	0
Capricorn Highway (Capricorn Hwy Service Road to Bruce Hwy)	0.0	0
Old Bruce Highway	0.0	0

Road Section	Duration (weeks)	Pipe Delivery (HV trips per day)
Port Curtis Road	0.0	0
Rooke Road	2.9	80
Bruce Highway (Capricorn Hwy to Roope Road)	2.0	80
Bruce Highway (Rooke Road to Casuarina Road)	4.9	80
Casuarina Road	0.0	0
Bruce Highway (Casuarina Road to Bajool Port Alma Road)	4.9	80
Bajool Port Alma Road	1.4	80
Bruce Highway (Bajool Port Alma Road to Twelve Mile Road)	6.3	80

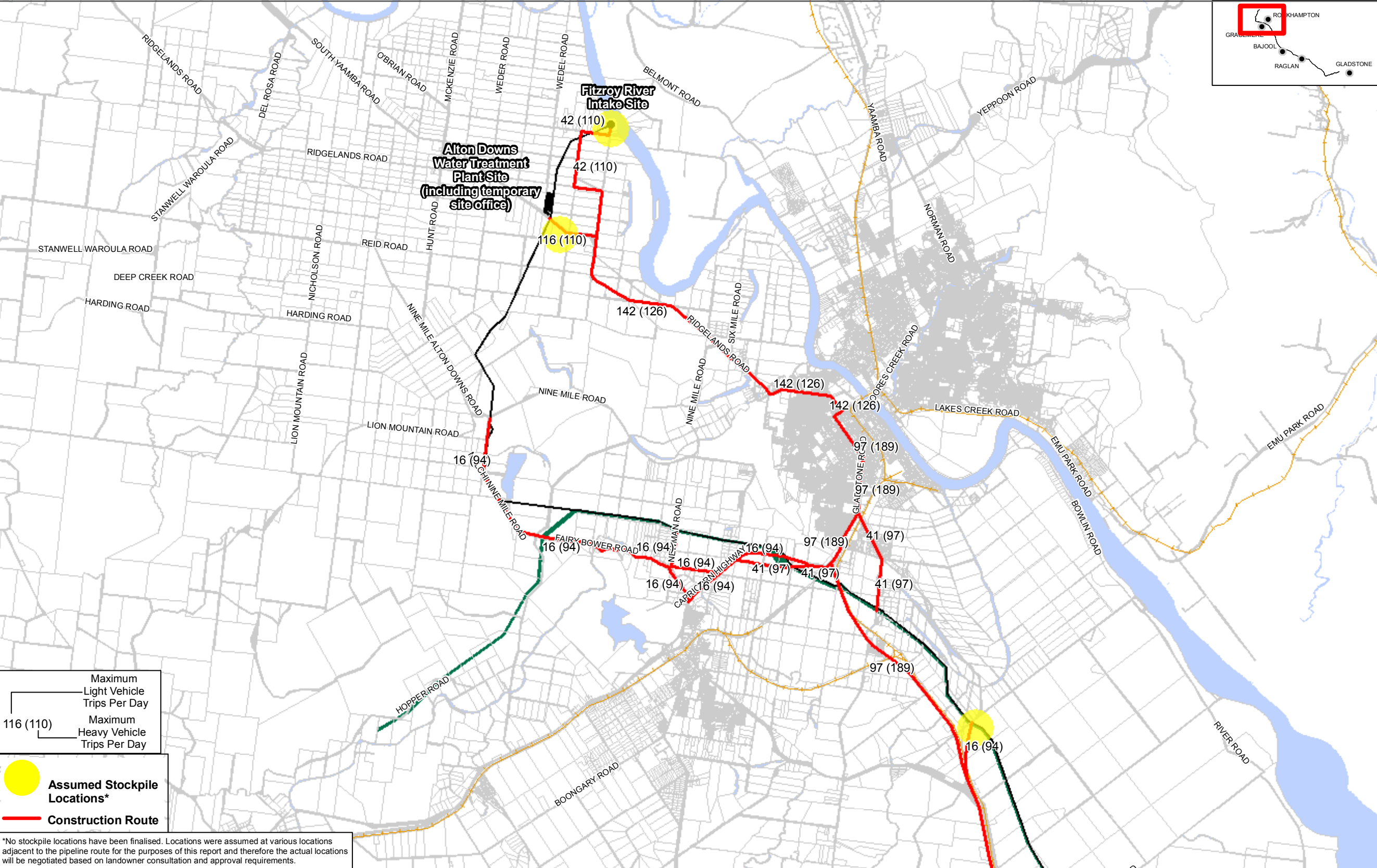
The number of trips generated by the transportation of pipe from the stockpiles to the pipeline corridor has been distributed on the access routes described earlier and shown in Table 13.14. This table shows the average of daily trips generated on each road section and the duration of impact.

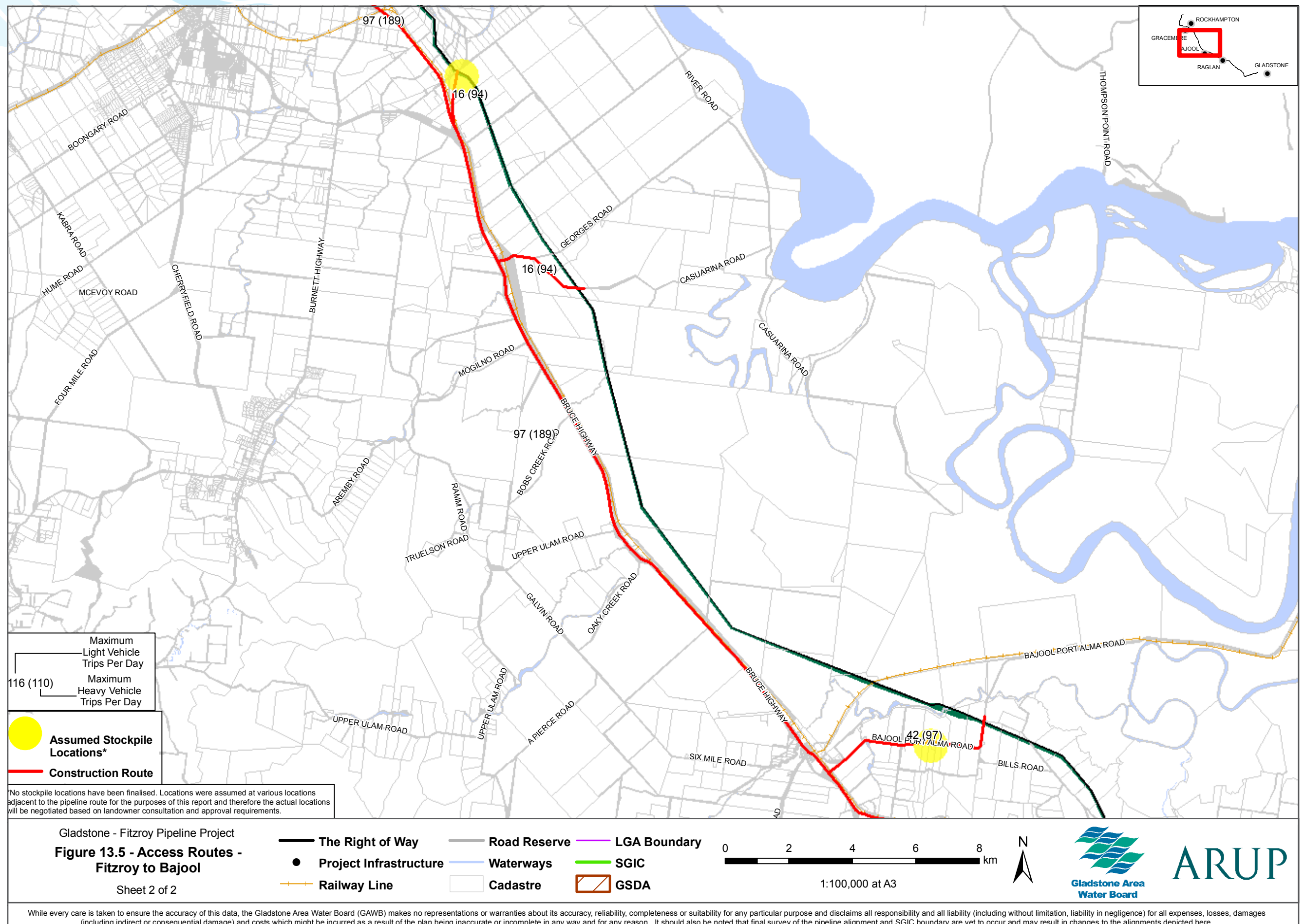
Delivery of Construction Materials

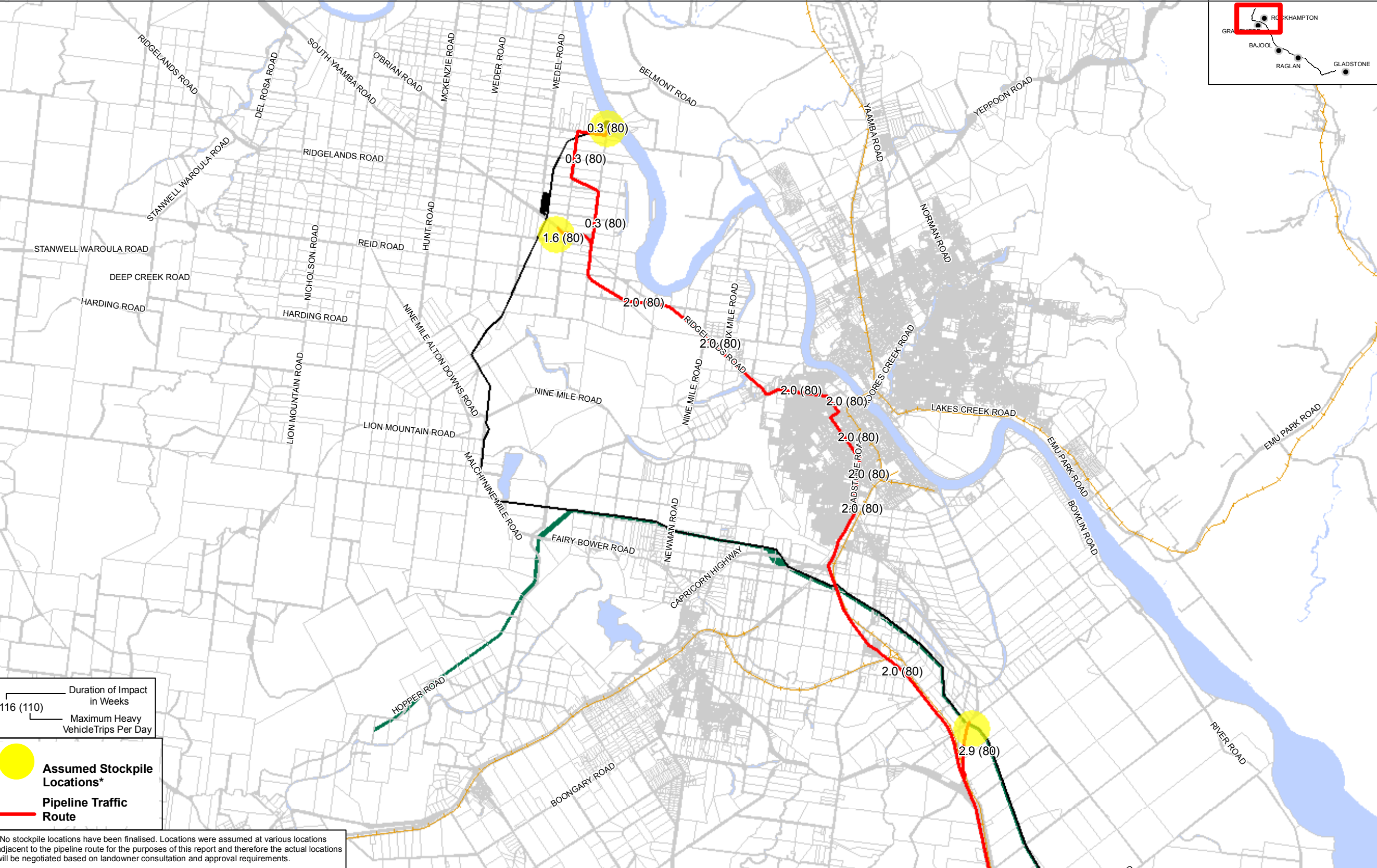
In addition to the pipe, other construction materials will need to be delivered to the pipeline corridor. These deliveries are expected to be made using standard dimension trucks (i.e. no larger than a 19 m semi-trailer) and are estimated to average around two deliveries of general materials, 30 tip truck loads of bedding, three tip truck loads of road base, and two water trucks per day (i.e. 74 trips per day in total). It is assumed that any construction waste/spoil required to be removed from the pipeline corridor will be removed by the construction material delivery vehicles, therefore avoiding the generation of additional trips. Table 13.14 summarises the traffic generation associated with the delivery of construction materials.

Construction Workers

It is expected that there will be two pipeline laying crews of 25 personnel each. Additionally, specialist crews of eight to 25 personnel will be used where boring or bridging is required at road and creek crossings. The workers are expected to be accommodated in the Rockhampton area and would travel each day to the pipeline corridor via the various access routes described previously. Table 13.14 summarises the estimated traffic generated by the construction personnel.



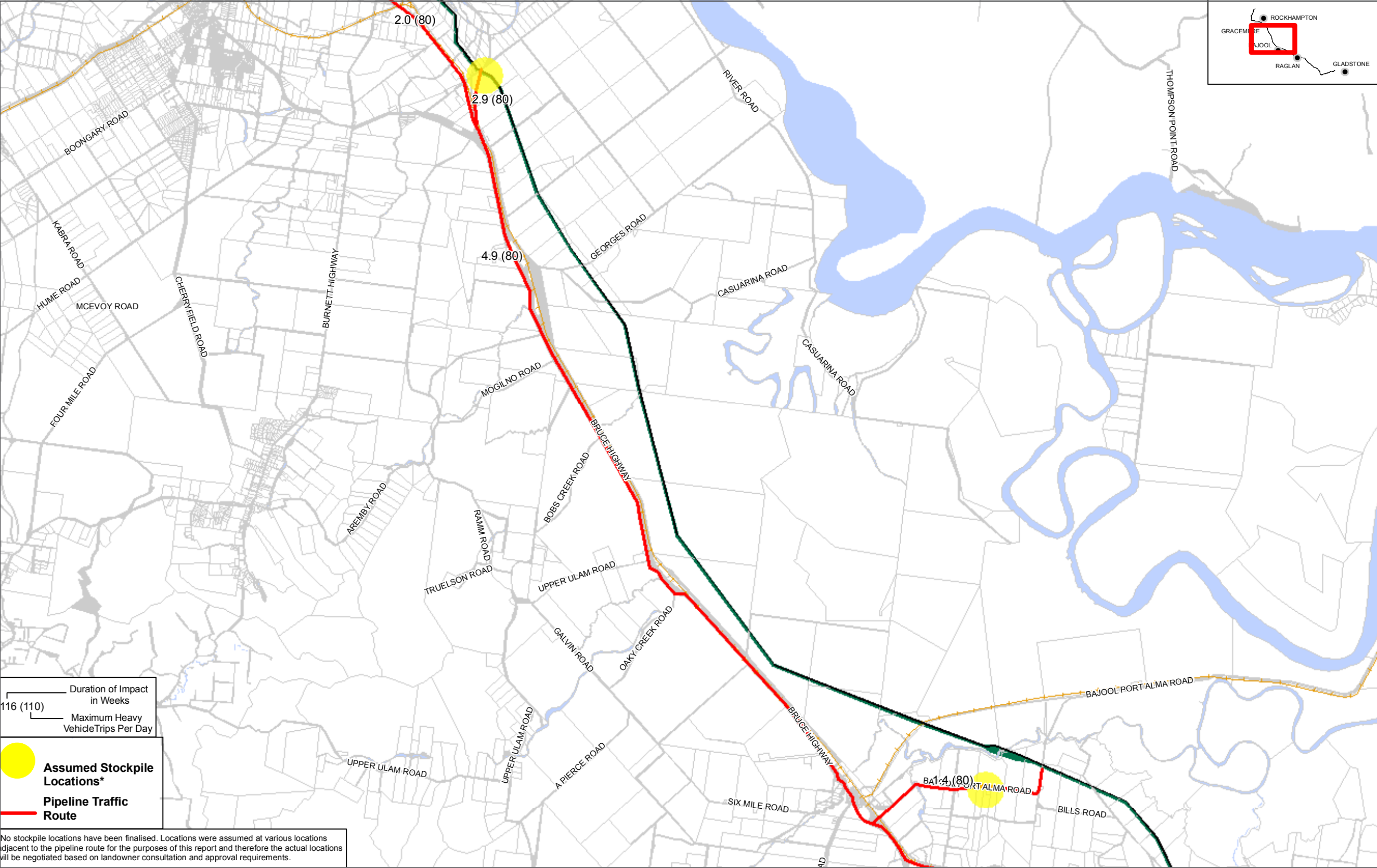




Gladstone - Fitzroy Pipeline Project
Figure 13.6 - Pipeline Delivery to Stockpiles - Fitzroy to Bajool

Sheet 1 of 2

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Duration of Impact
in Weeks
116 (110)
Maximum Heavy
Vehicle Trips Per Day

**Assumed Stockpile
Locations***
**Pipeline Traffic
Route**

No stockpile locations have been finalised. Locations were assumed at various locations adjacent to the pipeline route for the purposes of this report and therefore the actual locations will be negotiated based on landowner consultation and approval requirements.

Gladstone - Fitzroy Pipeline Project
**Figure 13.6 - Pipeline Delivery to
Stockpiles - Fitzroy to Bajool**

Sheet 2 of 2

- The Right of Way**
- Road Reserve**
- LGA Boundary**
- Project Infrastructure**
- Waterways**
- SGIC**
- Railway Line**
- Cadastre**
- GSDA**

0 2 4 6 8 km
1:100,000 at A3




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Table 13.14 Construction Traffic to Pipeline Corridor – Fitzroy to Bajool

(Note the duration in weeks is based on the approximate rate of construction on the pipeline in different areas)

Road Section	Pipeline Construction				Special Crossings Construction			Totals			
	Duration (weeks)	Construction Personnel (LVs)	Pipe Transport (HV/s)	Materials Delivery (HV/s)	Duration (weeks)	Construction Personnel (LVs)	Materials Delivery (HV/s)	Max Duration (weeks)	Max Light Vehicles per day	Max Heavy Vehicles per day	Total Vehicle Trips per day
Ski Gardens Road	1.9	16	16	78	0.0	0	0	1.9	16	94	110
Laurel Bank Road	1.9	16	16	78	0.0	0	0	1.9	16	94	110
Rockhampton Ridgeland Road (West of Laurel Bank Road)	6.2	16	16	78	0.0	0	0	6.2	16	94	110
Rockhampton Ridgeland Road (Laurel Bank Road to Campbell Street)	6.2	16	16	78	0.0	0	0	6.2	16	94	110
Campbell Street	6.2	16	16	78	0.0	0	0	6.2	16	94	110
Bruce Highway (Albert Street to Port Curtis Road)	6.2	32	16	156	11.0	25	3	11.0	57	175	232
Bruce Highway (Port Curtis Road to Capricorn Hwy)	6.9	32	16	156	10.0	25	3	10.0	57	175	232
Malchi Nine Mile Road	3.6	16	16	78	0.0	0	0	3.6	16	94	110
Fairy Bower Road (Malchi Nine Mile Road to McLaughlin Street)	3.6	16	16	78	0.0	0	0	3.6	16	94	110
Nelson Street	1.9	16	16	78	0.0	0	0	1.9	16	94	110
Fairy Bower Road (McLaughlin Street to Capricorn Hwy)	1.9	16	16	78	0.0	0	0	1.9	16	94	110
McLaughlin Street	3.6	16	16	78	0.0	0	0	3.6	16	94	110
Capricorn Highway (McLaughlin Street to Fairy Bower Road)	3.6	16	16	78	0.0	0	0	3.6	16	94	110
Capricorn Highway (Fairy Bower Road to Capricorn Hwy Service Road)	5.5	16	16	78	0.0	0	0	5.5	16	94	110
Capricorn Highway Service Road	0.7	16	16	78	3.0	25	3	3.0	41	97	138
Capricorn Highway (Capricorn Hwy Service Road to Bruce Hwy)	6.2	16	16	78	3.0	25	3	6.2	41	97	138



Road Section	Pipeline Construction				Special Crossings Construction			Totals			
	Duration (weeks)	Construction Personnel (LVs)	Pipe Transport (HVs)	Materials Delivery (HVs)	Duration (weeks)	Construction Personnel (LVs)	Materials Delivery (HVs)	Max Duration (weeks)	Max Light Vehicles per day	Max Heavy Vehicles per day	Total Vehicle Trips per day
Old Bruce Highway	0.7	16	16	78	1.0	25	3	1.0	41	97	138
Port Curtis Road	0.7	16	16	78	1.0	25	3	1.0	41	97	138
Roope Road	9.8	16	16	78	0.0	0	0	9.8	16	94	110
Bruce Highway (Capricorn Hwy to Roope Road)	0.7	32	16	156	7.0	25	3	7.0	57	175	232
Bruce Highway (Roope Road to Casuarina Road)	9.0	32	16	156	7.0	25	3	9.0	57	175	232
Casuarina Road	9.0	16	16	78	0.0	0	0	9.0	16	94	110
Bruce Highway(Casuarina Road to Bajool Port Alma Road)	9.0	32	16	156	7.0	25	3	9.0	57	175	232
Bajool Port Alma Road	3.6	16	16	78	1.0	26	3	3.6	42	97	139
Bruce Highway (Bajool Port Alma Road to Twelve Mile Road)	3.6	32	16	156	6.0	25	3	6.0	57	175	232

13.7.1.3 Traffic Generation – Operational

The pipeline is expected to generate a very low level of traffic during its operational phase. Occasional access into the corridor would be required by four-wheel drive passenger vehicles to conduct inspections. Occasional access for maintenance by heavy machinery may also be required throughout the life of the pipeline.

13.7.1.4 Road and Rail Crossings

Within this section of the project area the pipeline will cross the road and rail corridors shown in Table 13.15. The method of pipeline construction to be applied at each crossing is also shown. Generally, trenching is the preferred method of crossing as this is the most economical and time efficient method. However, where road closures would cause unacceptable delays to traffic, the construction method would be thrust boring (or another trenchless method), which would not cause any disruption to traffic.

In the Fitzroy to Bajool section the pipeline crosses one rail line. All rail line crossings are proposed to be trenchless in accordance with AS4799 (Installation of Underground Utility Services and Pipelines within Railway Boundaries) and will have no impact on the operation of the rail line. Approvals will be obtained from Queensland Rail in accordance with the requirements of the *Transport Infrastructure Act 1994*.

See Chapter 2, Project Description, for a detailed description of construction methods.

Table 13.15 Pipeline Crossing of Road and Rail Corridors – Fitzroy to Bajool

Road/rail name	Location	Authority	Method of construction
Laurel Bank Road	170 m south of Ski Gardens Road	Rockhampton Regional Council	Trenching
Ski Gardens Road	700 m east of Laurel Bank Road	Rockhampton Regional Council	Trenching
Rockhampton Ridgелands Road	1.4 km west of Laurel Bank Road	DMR	Thrust Bore
Nine Mile Road	Just east of Malchi Nine Mile Road	Rockhampton Regional Council	Trenching
Capricorn Highway	1.4 km west of the Bruce Highway	DMR	Thrust Bore
Service Road along Capricorn Highway	450 m west of the Bruce Highway	Rockhampton Regional Council	Trenching
Bruce Highway	500m south of the Capricorn Highway	DMR	Thrust Bore
North Coast Railway	500 m south of the Capricorn Highway	QR	Thrust Bore
Old Bruce Highway	1.5 km south of Port Curtis Road	Rockhampton Regional Council	Trenching
Rooke Road	1.5 km north of the Bruce Highway	Rockhampton Regional Council	Trenching
Georges Road	1.8 km west of the Bruce Highway	Rockhampton Regional Council	Trenching
Casuarina Road	2.9 km west of the Bruce Highway	Rockhampton Regional Council	Trenching
Bajool Port Alma Road	870 m north of Bills Road	DMR	Trenching

Where road crossings are proposed to be trenched, a traffic management plan will be developed in consultation with the relevant road authority prior to construction. Generally, traffic will be restricted to one lane. Roads that are proposed to be trenched carry relatively low traffic flows. It is expected that delays of less than 30 seconds per vehicle would be experienced for the duration of up to one day.

13.7.2 Fitzroy River Intake

13.7.2.1 Access Routes

The Fitzroy River intake and pump station is to be located on the Fitzroy River approximately 15.5 km upstream of the Fitzroy Barrage, and within the existing SunWater compound off Ski Gardens Road (subject to final design). Access to the intake station would be via the existing SunWater access. Access to Ski Gardens Road is gained from Rockhampton Ridgелands Road via Laurel Bank Road. Most traffic would be expected to originate from Rockhampton or via the Bruce Highway from the south. The preferred transport routes to the site are shown in Figure 13.5.

Ski Gardens Road is a gravel road, approximately 5 m wide. It provides access to a number of rural residences and farmland lots, as well as the SunWater compound, and the local ski club.

Laurel Bank Road is a rural access road primarily providing access to rural residential and farm land. It has a posted speed limit of 100 km/hr. Currently there are varying standards along the section of Laurel Bank Road between Ski Gardens Road and Rockhampton Ridgелands Road. The width of this road varies from 3.8 m wide bitumen seal with 1 m wide gravel shoulders each side for the first 2.3 km north of Rockhampton Ridgелands Road, and 6.2 m wide bitumen seal without shoulders for the remaining 1 km. The narrow section of this road is currently experiencing edge deterioration as opposing vehicles are required to pull over onto the shoulder to pass each other. Without appropriate mitigation this section of road is considered too narrow to allow acceptable traffic operation during the construction of the intake given the predicted heavy vehicle volumes.

Rockhampton Ridgелands Road is a rural highway providing a connection between Rockhampton and the settlements of Waroula and Ridgелands. Generally it is 6.5 m wide, bitumen sealed with a speed limit of 100 km/hr. Closer to Rockhampton it is urban in nature and fronted by residential and light commercial development.

The intersection of Rockhampton Ridgелands Road and Laurel Bank Road has sufficient sight distances, however, the existing pavement is not wide enough to allow through travelling vehicles on Rockhampton Ridgелands Road to pass vehicles waiting to turn right into Laurel Bank Road.

13.7.2.2 Traffic Generation – Construction

Construction traffic will consist of the initial delivery of construction equipment to the site, which will remain onsite for the duration of construction. It is not expected that this will require over-dimension loads.

Construction materials will be delivered to site on an ongoing basis. It is estimated, on average that this would consist of approximately two concrete trucks carrying premix concrete as well as six trucks delivering assorted materials per day.

On average the intake and pump station will require a construction crew of approximately 26 people depending on the construction phases, typically generating 26 light vehicle trips a day. The expected construction duration is eight months.

Traffic generated by the construction of the Fitzroy River intake and pump station, distributed on the access route, is summarised in Table 13.16.

13.7.2.3 Traffic Generation – Operational

The intake is expected to generate only a low level of operational traffic, consisting of approximately one to two vehicles per week and one maintenance truck per month. Occasional access by up to a 19 m articulated truck may be required for maintenance purposes.

13.7.3 Water Treatment Plant

13.7.3.1 Access Routes

The Alton Downs WTP will be located approximately 3 km from the Fitzroy River intake and will be accessed from a newly formed access off Rockhampton Ridgeland Road. Due to the nature of operational traffic generated by this development a Basic Right Turn (BAR) treatment as per DMR's Road Planning and Design Manual (this is a localised widening of the road pavement to allow through travelling vehicles to pass vehicles waiting to turn right) will be required for the access. The preferred transport routes to the site are shown in Figure 13.5.

13.7.3.2 Construction Traffic

Construction traffic will consist of the initial delivery of construction equipment to the site, which will remain onsite for the duration of construction. It is not expected that this will require over-dimension loads.

Construction materials will be delivered to site on an ongoing basis. It is possible that a mobile concrete batching plant will be established at the WTP. As a result, reduced concrete traffic from Rockhampton to site will be generated than what otherwise would be generated by other construction methods. It is estimated that on average approximately two trucks delivering concrete material and six trucks delivering assorted materials per day would be required.

On average the WTP will require a construction crew of approximately 20 people on site, peaking at around 100 people depending on the construction phases, typically generating 20 to 100 light vehicle trips a day. The expected construction duration is 16 months.

Traffic generated by the construction of the WTP, distributed on the access route, is summarised in Table 13.17.

Table 13.16 Construction Traffic Generated by the Construction of the Fitzroy River Intake

Road Section	Duration (weeks)	Construction Personnel (LVs)	Materials Delivery (HVs)	Total Vehicle Trips per day
Ski Gardens Road	35	26	16	42
Laurel Bank Road	35	26	16	42
Rockhampton Ridgeland Road (Laurel Bank Road to Campbell Street)	35	26	16	42
Campbell Street	35	26	16	42

Table 13.17 Construction Traffic Generated by the Construction of the Water Treatment Plant

Road Section	Duration (weeks)	Construction Personnel (LVs)	Materials Delivery (HVs)	Total Vehicle Trips per day
Rockhampton Ridgeland Road (West of Laurel Bank Road)	70	100	16	116
Rockhampton Ridgeland Road (Laurel Bank Road to Campbell Street)	70	100	16	116
Campbell Street	70	100	16	116

13.7.3.3 Operational Traffic

Regarding the long-term operations of the WTP, it is anticipated that a maximum of five personnel would be required, and as the site will be generally unmanned and operated remotely from Gladstone, an average of two personnel is expected on the premises during normal operating conditions and weekday business hours. Regular monthly deliveries of chemicals will be required during the operation of the plant. These will consist of the following;

- One delivery truck per month of Polymer
- Four trucks per month during average conditions or 10 trucks per month during peak conditions of Aluminium Chlorohydrate (or PolyDADMAC)
- Five trucks per month of Sodium Hypochlorite
- One truck of Ammonium Sulfate
- Two trucks of Sodium Hydroxide depending on the pH requirements.

All of the above chemicals that are classified as dangerous goods in the Australian Dangerous Goods Code will be transported and handled accordingly under the provisions of the Australian Dangerous Goods Code (Edition 6) and/or the *Transport Operations (Road Use Management) Act 1995* and the *Transport Operations (Road Use Management—Dangerous Goods) Regulation 1998*.

For the purposes of this assessment it is assumed that the waste residue will be transported by truck to an approved local government landfill nearby or supplied to a local contractor in a similar proximity. The route to the site from the WTP would be along Rockhampton Ridgeland Road, Campbell Street, Bruce Highway (Albert Street to Capricorn Highway), and the Capricorn Highway towards Gracemere.

The amount of residue to be transported depends on the method and level of treatment of the raw water. At this time, based on the likely water treatment characteristics, it is assumed that there will most likely be approximately 120 tonnes of residue produced per day. Assuming that a 20 tonne capacity truck will be used, this would generate an average of 12 truck trips per day. Based on the quality of the influent water this may increase to 20 truck trips per day, as more residue would be required to be removed.

The operational traffic generated by the WTP is summarised as follows:

- Four light vehicle trips per day
- 12 heavy vehicle trips per day
- Two additional heavy vehicle trips per day on a semi-regular basis.

The operational traffic, distributed on the access routes, is shown in Figure 13.7.

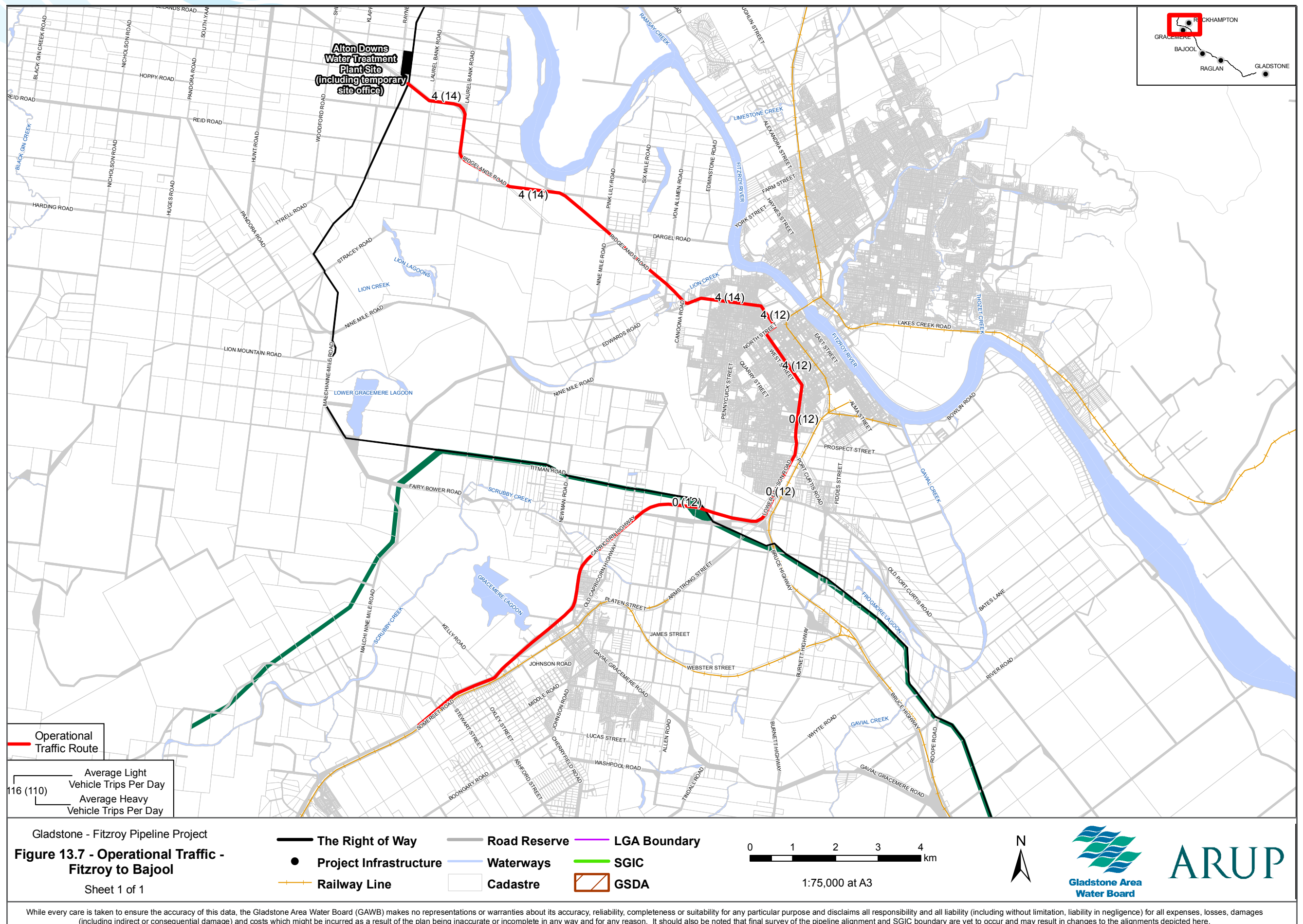
13.7.4 Summary of Traffic Generation

The total traffic generation from construction activities impacting roads within the Fitzroy to Bajool section is summarised in Table 13.18. It should be noted that where the intensity of construction activity varies for certain construction elements, the peak traffic generation has been used. This represents a worst-case analysis for this assessment.

It should also be noted that the duration of construction shown is the maximum duration considering the various elements of the project. It does not necessarily mean that the Peak Total Vehicles will impact a section of road for the full duration shown.

Table 13.18 Summary of Construction Traffic Generation – Fitzroy to Bajool

Road Section	Max. Duration (weeks)	Construction Personnel (LVs)	Materials Delivery (HVs)	Peak Total Vehicle Trips per day
Ski Gardens Road	35	42	110	152
Laurel Bank Road	35	42	110	152
Rockhampton Ridgeland Road (West of Laurel Bank Road)	70	116	110	226
Rockhampton Ridgeland Road (Laurel Bank Road to Campbell Street)	70	142	126	268
Campbell Street	70	142	126	268
Bruce Highway (Albert Street to Port Curtis Road)	52	97	189	286
Bruce Highway (Port Curtis Road to Capricorn Hwy)	52	97	189	286
Malchi Nine Mile Road	4	16	94	110
Fairy Bower Road (Malchi Nine Mile Road to McLaughin Street)	4	16	94	110
Nelson Street	2	16	94	110
Fairy Bower Road (McLaughin Street to Capricorn Hwy)	2	16	94	110
McLaughin Street	4	16	94	110
Capricorn Highway (McLaughin Street to Fairy Bower Road)	4	16	94	110
Capricorn Highway (Fairy Bower Road to Capricorn Hwy Service Road)	5	16	94	110
Capricorn Highway Service Road	3	41	97	138
Capricorn Highway (Capricorn Hwy Service Road to Bruce Hwy)	6	41	97	138
Old Bruce Highway	3	41	97	138
Port Curtis Road	3	41	97	138
Roope Road	10	16	94	110
Bruce Highway (Capricorn Hwy to Roope Road)	52	97	189	286
Bruce Highway (Roope Road to Casuarina Road)	52	97	189	286
Casuarina Road	9	16	94	110
Bruce Highway (Casuarina Road to Bajool Port Alma Road)	52	97	189	286
Bajool Port Alma Road	4	42	97	139
Bruce Highway (Bajool Port Alma Road to Twelve Mile Road)	52	97	189	286



The total traffic generation associated with the operational phase of the project within the Fitzroy to Bajool section is summarised in Table 13.19. This table shows trips regularly generated and does not include occasional (i.e. more than a weekly frequency) trips.

The only element of the project that produces regular operational traffic is the WTP. The intake and the pipeline corridor would only need to be accessed on a less frequent basis for maintenance purposes.

Table 13.19 Summary of operational traffic generation -Fitzroy to Bajool

Road section	Light vehicles	Heavy vehicles	Total vehicles per day
Rockhampton Ridgелands Road (Water Treatment Plant to Campbell Street)	4	14	18
Campbell Street	4	14	18
Bruce Highway (Albert Street to Port Curtis Road)	0	14	14
Bruce Highway (Port Curtis Road to Capricorn Hwy)	0	14	14
Capricorn Hwy (to Gracemere)	0	14	14

13.7.5 Impact on State Controlled Roads

In accordance with DMR's requirements, the extent of impact caused by the project on the State Controlled Road (SCR) network has been determined by calculating the percentage traffic increase caused by the project. It is generally accepted that impacts within 5 percent are considered acceptable and do not require further consideration. Table 13.20 shows the calculated percentage traffic increase on the SCR network.

Table 13.20 Construction Traffic Impact on State Controlled Roads - Fitzroy to Bajool

Road section	Existing daily vehicles	Peak construction trips per day	Percentage impact
Rockhampton Ridgелands Road	1,700	268	16%
Capricorn Highway	15,750	138	1%
Bruce Highway (north of Capricorn Highway)	8,250	302	4%
Bruce Highway (south of Capricorn Highway)	5,200	302	6%
Bajool Port Alma Road	185	139	75%

Three out of five roads impacted by construction traffic above the 5 percent limit are Rockhampton Ridgелands Road, Bruce Highway (south of Capricorn Highway), and Bajool Port Alma Road.

Traffic on the Rockhampton Ridgелands Road is estimated to increase by approximately 16 percent. However, this volume represents a peak construction generation which would only be over a relatively short period of time. Average construction traffic volumes over the 16- month construction period are expected to be significantly lower than the maximum volume shown in Table 13.20. In any case, the present level of traffic on this road is significantly less than its capacity. For example, a typical two-lane rural highway would continue to operate at a good level of service for AADT flows up to approximately 5,000 vehicles per day. Given the level of spare capacity available, the addition of construction traffic is not expected to have a significant effect on the operation of the Rockhampton Ridgелands Road.

Similarly, the traffic impact on the Bajool Port Alma Road appears large due the relatively low existing traffic volumes on this road. The estimated increase of 139 vehicles per day on this road for the duration of only three weeks is considered a very low impact.

Traffic volumes on the Bruce Highway south of the Capricorn Highway are predicted to increase just above the 5 percent threshold. However, given that the impact will be limited to a period of only one year and the current level of traffic on the highway is well below its capacity, it is considered that the impact would be low and no specific mitigation measures are required.

Table 13.21 demonstrates that the level of operational traffic generated by the project is well within the limit of 5 percent impact. Therefore, the level of operational traffic impact generated by the project can be considered negligible.

Table 13.21 Operational Traffic Impact on State Controlled Roads – Fitzroy to Bajool

Road section	Existing daily vehicles	Operational trips per day	Percentage impact
Rockhampton Ridgелands Road	1700	12	<1%
Bruce Highway (George Street)	22,000	12	<1%
Capricorn Highway	15750	6	<1%
Bruce Highway (south of Rockhampton)	8250	Occasional	n/a
Bajool Port Alma Road	200	Occasional	n/a

13.7.6 Access from State Controlled Roads

There are three access points required directly from the SCR network. These are:

- Rockhampton Ridgeland Road – a permanent access is proposed approximately 1.6 km west of Laurel Bank Road to provide access to the WTP. A BAR treatment will need to be implemented for this access. In the vicinity of the access point the road is bitumen sealed, approximately 6 m wide with wide gravel verges and with a posted speed limit of 100 km/hr. During the construction phase a traffic management plan will need to be implemented, which would require a reduction in the speed limit to 80km/h, advanced heavy vehicle turning warning signs, and general access construction warning
- Rockhampton Ridgeland Road – an access is proposed approximately 1.5 km west of Laurel Bank Road to provide access to the pipeline corridor. In the vicinity of the access point the road is bitumen sealed, approximately 6 m wide with wide gravel verges and with a posted speed limit of 100 km/hr. The road is flat and straight and sufficient sight distance would be available for safe traffic operation. No specific intersection treatments are proposed to be constructed due to the relatively short construction period and very low operational traffic impact. However, a traffic management plan will be required to be implemented during the construction period
- Bajool Port Alma Road – an access is proposed approximately 6.1 km north of the Bruce Highway to provide access to the pipeline corridor. In the vicinity of the access point the road is bitumen sealed, approximately 5.5 m wide and with a posted speed limit of 100 km/hr. The road is flat and straight and sufficient sight distance would be available for safe traffic operation. No specific intersection treatments are proposed to be constructed due to the relatively short construction period and very low operational traffic impact. However, a traffic management plan will be required to be implemented during the construction period.

All other accesses will be off local roads, which are in turn generally accessed from the SCR network. Each of the affected SCR intersections have been checked to ensure safe traffic operations would be possible. Characteristics checked include sight distances, need for turning lanes and condition of road surface. Instances where inadequate conditions exist are described below:

- Rockhampton Ridgeland Road / Laurel Bank Road intersection will be required to be upgraded to a BAR treatment. During the construction phase a traffic management plan will need to be implemented, which would require a reduction in the speed limit to 80km/h, advanced heavy vehicle turning warning signs, and general access construction warning signs
- Capricorn Highway and Service Road intersection – this intersection is located approximately 750 m west of the Bruce Highway and Capricorn Highway roundabout. There are sufficient sight distances available but the Service Road leg of the intersection is unsealed
- Bruce Highway and Roope Road intersection – this intersection is located immediately south of a northbound overtaking lane. Whilst adequate sight distance is available in both directions, the Bruce Highway centreline is marked with double, unbroken barrier lines, which technically restricts this intersection to left-in; left-out movements only (although tyre marks on the road indicate that right-turn movements are regularly made)
- Bruce Highway and Casuarina Road intersection – the minor leg of this intersection (Casuarina Road) is unsealed. Adequate sight distance is available in both directions.

Mitigation measures are proposed to address the access conditions discussed above and are described in Section 13.10 of this chapter.

13.7.7 Rail Line Crossings

The proposed access routes cross rail lines at a number of locations, as described in Table 13.22.

Table 13.22 Impact on Rail Line Crossings – Fitzroy to Bajool

Location	Rail line	Crossing type	Construction traffic impact	Operational traffic impact
Port Curtis Road	North Coast	OLC with boom gate	40 light vehicles per day and 95 heavy vehicles per day over 3 weeks	Occasional maintenance vehicles for pipeline
Roope Road	North Coast	OLC with boom gate	15 light vehicles per day and 95 heavy vehicles per day over 10 weeks	Occasional maintenance vehicles for pipeline
Casuarina Road	North Coast	OLC with boom gate	15 light vehicles per day and 95 heavy vehicles per day over 9 weeks	Occasional maintenance vehicles for pipeline
Bajool Port Alma Road	North Coast	Two-lane Bridge	40 light vehicles per day and 95 heavy vehicles per day over 4 weeks	Occasional maintenance vehicles for pipeline

It is not expected that traffic generated by the construction or operational phases of the project will have an adverse impact on the railway level crossings.

13.7.8 Impact on School Bus Routes

Access routes to the project will overlap school bus routes on the following road sections:

- Laurel Bank Road
- Rockhampton Ridgeland Road
- Port Curtis Road
- Bruce Highway north of Bajool
- Capricorn Highway.

Given the relatively low number of school bus services it is expected that there would be a negligible impact on the operation of the school bus routes. However, any potential impacts will be addressed in detail when traffic management plans for construction are prepared.

13.8 Assessment of Impacts – Bajool to Gladstone

This section of the chapter describes the traffic related impacts associated with the construction and operational phases of the project in the Bajool to Gladstone section of the project area. The project elements in this section of the project area include the pipeline, the Raglan pump station and reservoir and the Aldoga reservoir.

The elements of the project are firstly described in terms of their potential traffic generation and this is followed by an overall assessment of the impacts of the total traffic generation.

13.8.1 Pipeline

13.8.1.1 Access Routes

Access into the pipeline corridor is assumed to occur via several routes, which would be used as the pipeline progresses. These are shown in Figure 13.8. The access routes were chosen with consideration given to the standard of the roads and the standard of intersection from the SCR network. The following list briefly describes the proposed access routes to the pipeline corridor:

- Twelve Mile Road – accessed from the Bruce Highway
- Raglan Street – accessed from the Bruce Highway
- Darts Creek Road – accessed from the Bruce Highway
- Gostevsky Road – accessed from the Bruce Highway via Popenia Road
- The Narrows Road – accessed from the Bruce Highway
- Mt Larcom Road – newly formed direct access
- Mylrea Road – accessed from Mt Larcom Road
- Targinie Road – accessed from Mt Larcom Road
- Calliope River Road – accessed from Mt Larcom Road.

It is noted that an upgrade to the Narrows Road is scheduled for the 2007-08 financial year as per DMR's Road Implementation Program. It is understood that this will be completed before the commencement of the project.

13.8.1.2 Traffic Generation – Construction

Traffic generated by the construction of the pipeline will consist of the following:

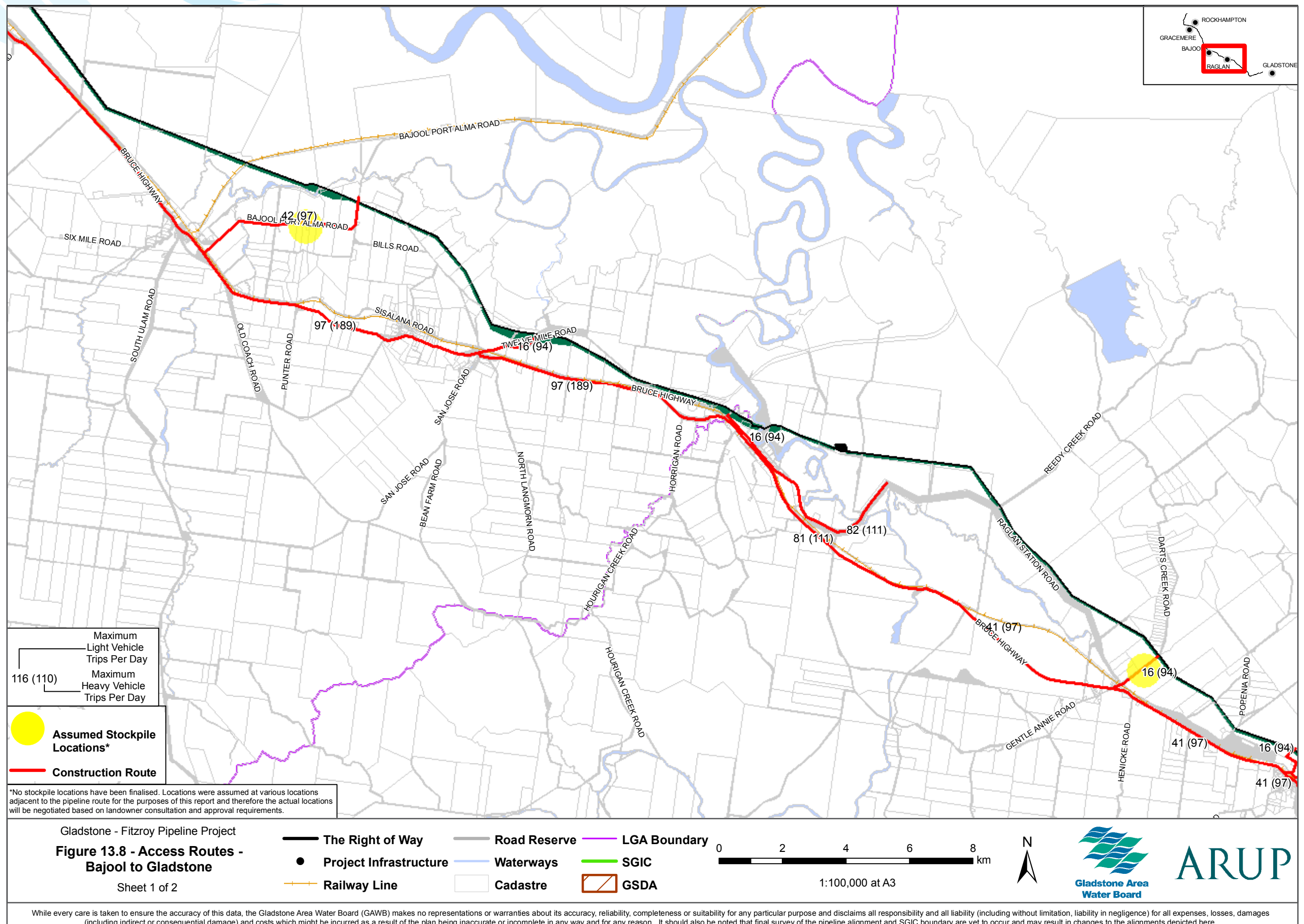
- Transportation of construction equipment to/from site
- Delivery of pipe
- Delivery of construction materials
- Construction workers.

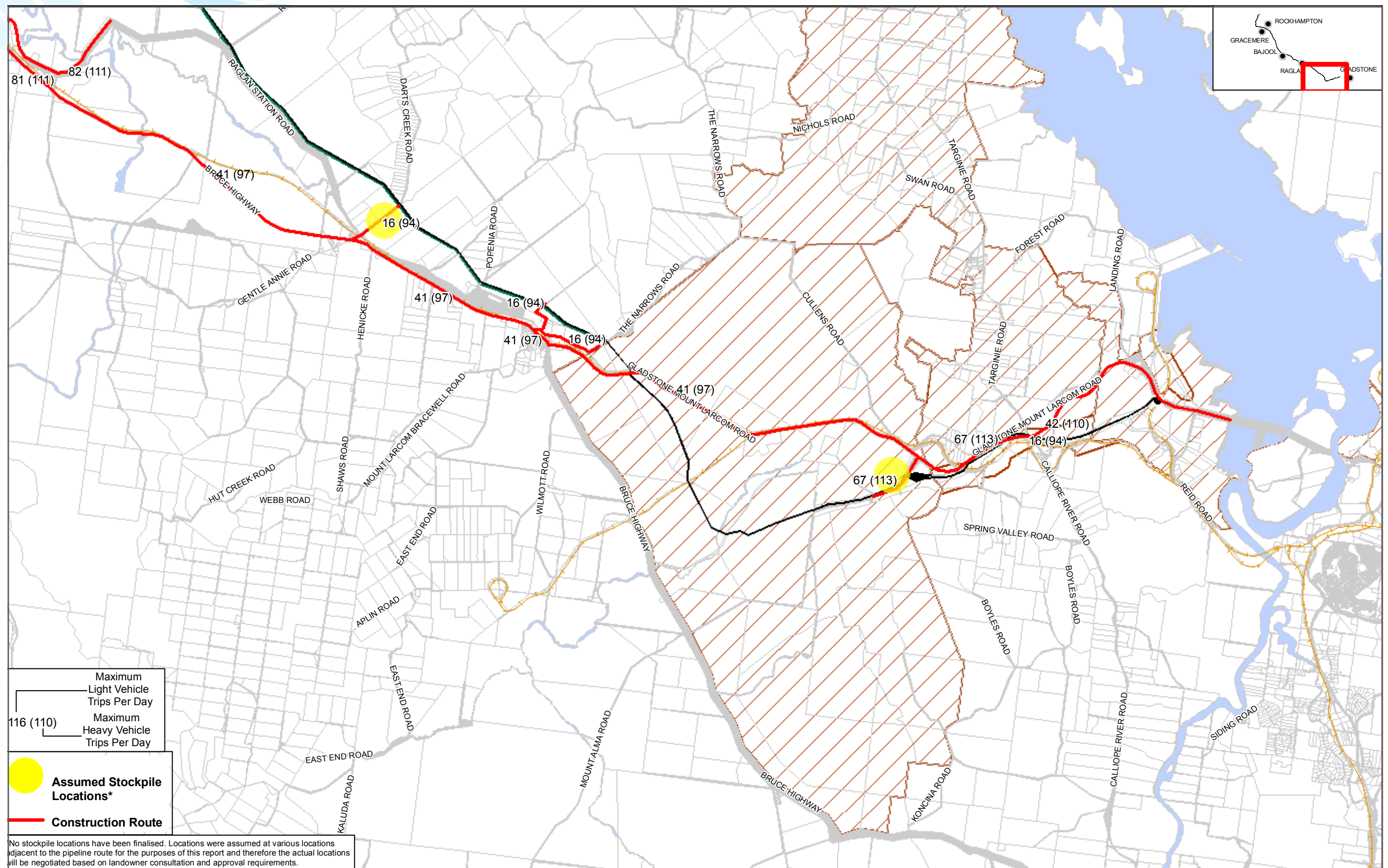
The assumptions regarding construction traffic generation for the pipeline are the same as those for the Fitzroy to Bajool section, which are discussed in Section 13.7.1.1 of this report. The construction traffic generation for the Bajool to Gladstone section is summarised in Table 13.23 and Table 13.24. The maximum daily trips generated by delivering pipe to the stockpiles along each road section and the duration of impact assuming the maximum delivery rate is summarised in Figure 13.9.

Table 13.23 Construction Traffic Generated by Pipe Delivery to Stockpiles – Bajool to Gladstone

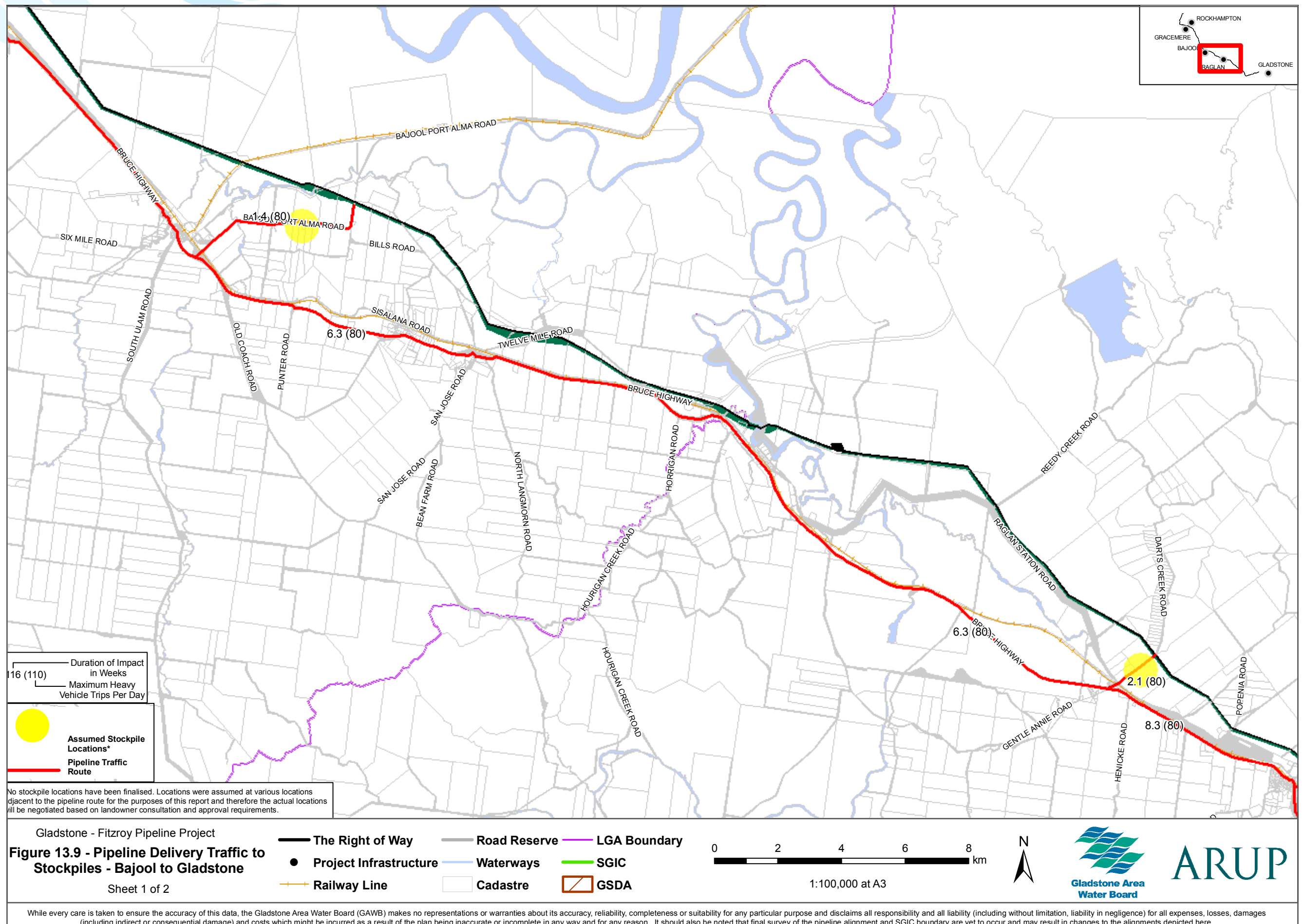
Road Section	Duration (weeks)	Pipe Delivery (HV trips per day)
Twelve Mile Road	0.0	0
Bruce Highway (Twelve Mile Road to Raglan Street)	6.3	80
Raglan Street	0.0	0
Bruce Highway (Raglan Street to Raglan Station Road)	6.3	80
Raglan Station Road	0.0	0
Bruce Highway (Raglan Station Road to Darts Creek Road)	6.3	80
Darts Creek Road	2.1	80
Bruce Highway (Darts Creek Road to The Narrows Road)	8.3	80
Gostevsky Road	0.0	0
The Narrows Road	0.0	0
The Narrows Road to Gostevsky	0.0	0
Bruce Highway (The Narrows Road to Gladstone Mt Larcom Road)	8.3	80
Mt Larcom Road (access)	0.0	0
Mylrea Road	1.7	80
Mt Larcom Road (Bruce Hwy to Mylrea Road)	1.7	80
Targinie Road	0.0	0
Calliope River Road	0.0	0
Mt Larcom Road (Mylrea Road to Calliope River Road)	0.0	0
Mt Larcom Road (East of Calliope River Road)	0.0	0
Bruce Highway (south of Mt Larcom Road)	10.1	80

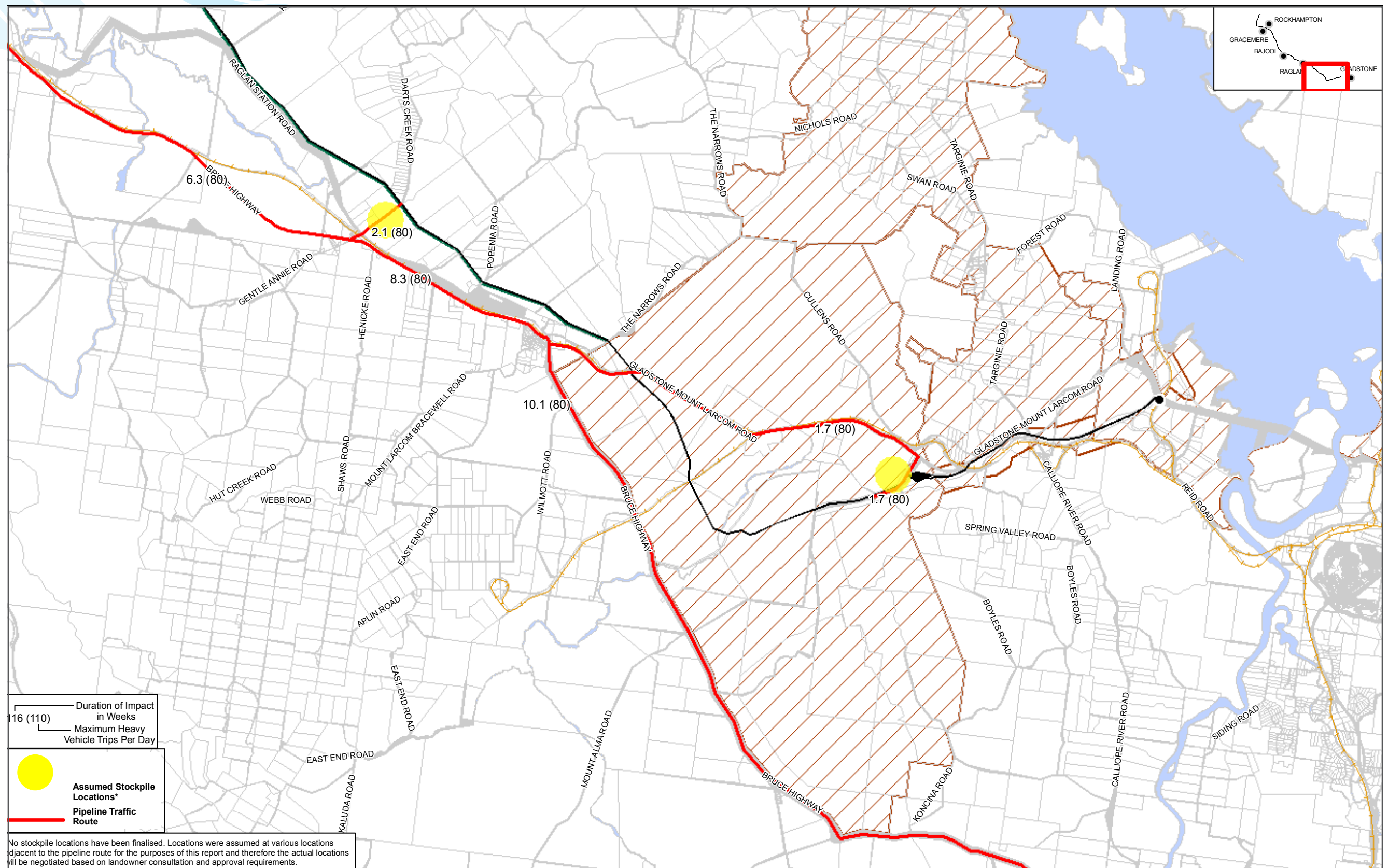
The maximum daily trips generated by delivering pipe to the stockpiles along each road section and the duration of impact assuming the maximum delivery rate is summarised in Figure 13.9.





While every care is taken to ensure the accuracy of this data, the Gladstone Area Water Board (GAWB) makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a result of the plan being inaccurate or incomplete in any way and for any reason. It should also be noted that final survey of the pipeline alignment and SGIC boundary are yet to occur and may result in changes to the alignments depicted here.





Gladstone - Fitzroy Pipeline Project

Figure 13.9 - Pipeline Delivery Traffic to Stockpiles - Bajool to Gladstone

Sheet 2 of 2

While every care is taken to ensure the accuracy of this data, the Gladstone Area Water Board (GAWB) makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a result of the plan being inaccurate or incomplete in any way and for any reason. It should also be noted that final survey of the pipeline alignment and SGIC boundary are yet to occur and may result in changes to the alignments depicted here.

Table 13.24 Construction traffic to pipeline corridor – Bajool to Gladstone

Road Section	Pipeline Construction				Special Crossings Construction			Totals			
	Duration (weeks)	Construction Personnel (LVs)	Pipe Transport (HVs)	Materials Delivery (HVs)	Duration (weeks)	Construction Personnel (LVs)	Materials Delivery (HVs)	Max Duration (weeks)	Max Light Vehicles per day	Max Heavy Vehicles per day	Total Vehicle Trips per day
Twelve Mile Road	3.6	16	16	78	0.0	0	0	3.6	16	94	110
Bruce Highway (Twelve Mile Road to Raglan Street)	0.0	32	16	156	6.0	25	3	6.0	57	175	232
Raglan Street	7.1	16	16	78	0.0	0	0	7.1	16	94	110
Bruce Highway (Raglan Street to Raglan Station Road)	7.1	16	16	78	6.0	25	3	7.1	41	97	138
Raglan Station Road	7.1	16	16	78	1.0	26	3	7.1	42	97	139
Woorilla Road	7.1	16	16	78	1.0	26	3	7.1	42	97	139
Bruce Highway (Raglan Station Road to Darts Creek Road)	14.3	16	16	78	5.0	25	3	14.3	41	97	138
Darts Creek Road	16.7	16	16	78	0.0	0	0	16.7	16	94	110
Bruce Highway (Darts Creek Road to The Narrows Road)	2.4	16	16	78	5.0	25	3	5.0	41	97	138
Gostevsky Road	1.9	16	16	78	0.0	0	0	1.9	16	94	110
The Narrows Road	0.5	16	16	78	0.0	0	0	0.5	16	94	110
The Narrows Road to Gostevsky	2.4	16	16	78	0.0	0	0	2.4	16	94	110
Bruce Highway (The Narrows Road to Gladstone Mt Larcom Road)	0.0	16	16	78	5.0	25	3	5.0	41	97	138
Mt Larcom Road (access)	0.0	16	16	78	2.0	25	3	2.0	41	97	138
Mylrea Road	4.4	16	16	78	1.0	25	3	4.4	41	97	138
Mt Larcom Road (Bruce Hwy to Mylrea Road)	4.4	16	16	78	5.0	25	3	5.0	41	97	138
Targinie Road	0.5	16	16	78	1.0	25	3	1.0	41	97	138
Calliope River Road	2.0	16	16	78	0.0	0	0	2.0	16	94	110
Mt Larcom Road (Mylrea Road to Calliope River Road)	2.5	16	16	78	3.0	25	3	3.0	41	97	138
Mt Larcom Road (East of Calliope River Road)	1.9	16	16	78	0.0	0	0	1.9	16	94	110
Bruce Highway (south of Mt Larcom Road)	0.0	16	16	78	0.0	0	0	0.0	16	94	110

13.8.1.3 Traffic Generation – Operational

The pipeline is expected to generate a negligible level of traffic during its operational phase in this section of the project area. Occasional access would be required by four-wheel drive passenger vehicles to conduct inspections. Occasional access for maintenance by heavy machinery may also be required throughout the life of the pipeline.

13.8.1.4 Road and Rail Crossings

Within this section, the pipeline will cross the road and rail corridors shown in Table 13.25. The method of construction to be applied at each crossing is also shown. Generally, trenching is the preferred method of crossing as this is the most economical and time efficient method. However, where road closures would cause unacceptable delays to traffic, the construction method would be thrust boring (or other trenchless method), which would not cause any disruption to traffic.

In the Bajool to Gladstone section the pipeline will cross rail lines in three instances. All rail line crossings are proposed to be trenchless in accordance with AS4799 (Installation of Underground Utility Services within Railway Boundaries) and will have no impact on the operation of the rail line. Approvals will be obtained from Queensland Rail in accordance with the requirements of the *Transport Infrastructure Act 1994*.

See Chapter 2, Project Description, for a detailed description of construction methods.

Table 13.25 Pipeline Crossing of Road and Rail Corridors – Bajool to Gladstone

Road/rail name	Location	Authority	Method of construction
Twelve Mile Road	2.3 km northeast of the Bruce Highway	Rockhampton Regional Council	Trenching
Reedy Creek Road	150 m east of Raglan Station Road	Gladstone Regional Council	Trenching
Darts Creek Road	1.5 km northeast of Raglan Station Road	Gladstone Regional Council	Trenching
Popenia Road	2.8 km northwest of The Narrows Road	Gladstone Regional Council	Trenching
Gostevsky Road	1.3 km northwest of The Narrows Road	Gladstone Regional Council	Trenching
The Narrows Road	2.1 km east of the Bruce Highway	Gladstone Regional Council	Trenching
Gladstone Mt Larcom Road	2.5 km east of the Bruce Highway	DMR	Thrust Bore
North Coast Railway	2.5 km east of the Bruce Highway	QR	Thrust Bore
East End Branch Line	2.1 km west of Gladstone Mt Larcom Road	QR	Thrust Bore
Gladstone Mt Larcom Road	1.3 km east of Mylrea Road	DMR	Thrust Bore
North Coast Railway	1.3 km east of Mylrea Road	QR	Thrust Bore
Mylrea Road	3.7 km south of Gladstone Mt Larcom Road	Gladstone Regional Council	Trenching
Gladstone Mt Larcom Road and Calliope River Road Intersection	Just east of Mylrea Road	DMR	Thrust Bore

Where road crossings are proposed to be trenched, a traffic management plan will be developed in consultation with the relevant road authority prior to construction. Generally, traffic will be restricted to one lane.

Thrust boring Gladstone Mt Larcom Road and Calliope River Road intersection is proposed to be implemented due to the proximity of the North Coast Railway Line, which will also require thrust boring.

Roads that are proposed to be trenched carry significantly less traffic than Mt Larcom Road and are not expected to have a significant impact on traffic delay. Delays of less than 30 seconds per vehicle could be expected on these roads for duration of up to one day.

13.8.2 Raglan Pump Station and Reservoir

13.8.2.1 Access Routes

Access to the Raglan reservoir and pump station is proposed via an easement accessed from Raglan Station Road. Raglan Station Road is accessed from the Bruce Highway. Raglan Station Road, except for a short section connecting to the Bruce Highway, is an unsealed dirt road approximately 4 m wide.

The intersection of the Bruce Highway and Raglan Station Road includes local widening of the highway to allow passing of vehicles waiting to turn right into Raglan Station Road. Sufficient sight distances are available to the intersection and the topography in the vicinity of the intersection is flat. It is expected that the existing intersection would be adequate for the construction and operational phases of the project.

13.8.2.2 Traffic Generation – Construction

The construction of the Raglan pump station and reservoir is estimated to require a construction crew of approximately 25 personnel on site, peaking at around 40 personnel depending on the construction phases, typically generating 25 to 40 light vehicle trips per day.

The heavy vehicle traffic generated would consist of approximately four pre-mixed concrete trucks and three trucks delivering other construction materials per day.

For the purposes of determining the traffic generation it was assumed that construction materials and personnel would travel from Rockhampton. The expected construction duration is 12 months with peak activity period of approximately 16 weeks.

Traffic generated by the construction of the Raglan pump station and reservoir, distributed on the access route, is summarised in Table 13.26. It should be noted that this traffic distribution includes sections of the Bruce Highway within the Fitzroy to Bajool section.

Table 13.26 Construction Traffic Generated by the Construction of the Raglan Pump Station and Reservoir

Road Section	Duration (weeks)	Construction Personnel (LVs)	Materials Delivery (HVs)	Total Vehicle Trips per day
Bruce Highway (Albert Street to Port Curtis Road)	52	40	14	54
Bruce Highway (Port Curtis Road to Capricorn Hwy)	52	40	14	54
Bruce Highway (Capricorn Hwy to Roope Road)	52	40	14	54
Bruce Highway (Roope Road to Casuarina Road)	52	40	14	54
Bruce Highway (Casuarina Road to Bajool Port Alma Road)	52	40	14	54
Bruce Highway (Bajool Port Alma Road to Twelve Mile Road)	52	40	14	54
Bruce Highway (Twelve Mile Road to Raglan Street)	52	40	14	54
Bruce Highway (Raglan Street to Raglan Station Road)	52	40	14	54
Raglan Station Road	52	40	14	54

13.8.2.3 Traffic Generation – Operational

The Raglan pump station and reservoir is expected to generate a negligible level of operational traffic. Occasional access by up to a 19 m articulated truck maybe required for maintenance purposes.

13.8.3 Aldoga Reservoir

13.8.3.1 Access Routes

Access to the Aldoga reservoir will be from a newly formed access off Mylrea Road. Mylrea Road is accessed from Mt Larcom Road and primarily provides access to Rio Tinto's Aluminium Residue Management Area and the previously proposed Aldoga Aluminium Smelter. It is sealed bitumen, approximately 5.5 m wide.

The intersection of Mt Larcom Road and Mylrea Road has adequate sight distances and is locally widened to allow passing of right-turning vehicles. The left-turns to and from Mylrea Road are fully channelised. It is expected that the existing intersection would be adequate for the construction and operational phases of the project.

13.8.3.2 Traffic Generation – Construction

A construction crew of approximately 20 personnel on average, peaking at around 25 personnel will be required, depending on the construction phases, typically generating 25 light vehicle trips per day.

It is likely that a mobile concrete batching plant will be established at the Aldoga reservoir. As a result, reduced concrete traffic from Gladstone to site will be generated than what otherwise would be generated by other construction methods. The heavy vehicle traffic generated would consist of approximately eight trucks for delivery of construction materials. Also, approximately 20 trucks per day for one month would be required for removing excavated rock, which may be used as road base along the pipeline right of way, depending on the quality of the rock.

There may also be a requirement for blasting during construction. Explosives required for this task would need to be delivered to site, along with any necessary support team and emergency service vehicles.

For the purposes of determining the traffic generation it was assumed that construction materials and personnel would travel from Gladstone. The expected construction duration is 12 months.

Traffic generated by the construction of the Aldoga reservoir, distributed on the access route, is summarised in Table 13.27.

13.8.3.3 Traffic Generation – Operational

The reservoir is not expected to generate an insignificant level of traffic during its operational phase (i.e. less than a 5 percent increase of the traffic volumes on existing roads).

13.8.4 Summary of Traffic Generation

The total traffic generation from construction activities impacting roads within the Bajool to Gladstone section is summarised in Table 13.28. It should be noted that where the intensity of construction activity varies for certain construction elements, the peak traffic generation has been used. This represents a worst-case analysis for this assessment.

It should also be noted that the duration of construction shown is the maximum duration considering the various elements of the project. It does not necessarily mean that the Peak Total Vehicles will impact a section of road for the full duration shown.

It is expected that the total traffic generation associated with the operational phase of the project within the Bajool to Gladstone section will not be material with traffic generated only on an occasional basis.

Table 13.27 Construction Traffic Generated by the Construction of the Aldoga Reservoir

Road Section	Duration (weeks)	Construction Personnel (LVs)	Materials Delivery (HVs)	Total Vehicle Trips per day
Mylrea Road	52	26	16	42
Mt Larcom Road (Mylrea Road to Calliope River Road)	52	26	16	42
Mt Larcom Road (East of Calliope River Road)	52	26	16	42

Table 13.28 Summary of construction traffic generation – Bajool to Gladstone

Road Section	Max. Duration (weeks)	Construction Personnel (LVs)	Materials Delivery (HVs)	Peak Total Vehicle Trips per day
Twelve Mile Road	4	16	94	110
Bruce Highway (Twelve Mile Road to Raglan Street)	52	97	189	286
Raglan Street	7	16	94	110
Bruce Highway (Raglan Street to Raglan Station Road)	52	81	111	192
Raglan Station Road	52	82	111	193
Woorilla Road	7	42	97	139
Bruce Highway (Raglan Station Road to Darts Creek Road)	16	41	97	138
Darts Creek Road	17	16	94	110
Bruce Highway (Darts Creek Road to The Narrows Road)	14	41	97	138
Gostevsky Road	2	16	94	110
The Narrows Road	0	16	94	110
The Narrows Road to Gostevsky	2	16	94	110
Bruce Highway (The Narrows Road to Gladstone Mt Larcom Road)	12	41	97	138
Mt Larcom Road (access)	2	41	97	138
Mylrea Road	52	67	113	180
Mt Larcom Road (Bruce Hwy to Mylrea Road)	9	41	97	138
Targinie Road	1	41	97	138
Calliope River Road	2	16	94	110
Mt Larcom Road (Mylrea Road to Calliope River Road)	52	67	113	180
Mt Larcom Road (East of Calliope River Road)	52	42	110	152
Bruce Highway (south of Mt Larcom Road)	0	16	94	110

13.8.5 Impact on State Controlled Roads

In accordance with DMR's requirements, the extent of impact caused by the project on the SCR network has been determined by calculating the percentage traffic increase caused by the project. It is generally accepted that impacts within 5 percent are considered acceptable and do not require further consideration.

As shown in Table 13.29, the project will have a negligible impact on the operation of the SCR network.

Table 13.29 Construction Traffic Impact on State Controlled Roads – Bajool to Gladstone

Road section	Existing daily vehicles	Peak construction trips per day	Percentage impact
Bruce Highway (north of Mt Larcom Road)	5,700	138	3%
Mt Larcom Road	3,300	138	4%
Bruce Highway (south of Mt Larcom Road)	3,500	110	3%

13.8.6 Access from State Controlled Roads

There is one access point required directly from the SCR network:

- Mt Larcom Road – an access is proposed approximately 2.5 km east of the Bruce Highway to provide access to the pipeline corridor. In the vicinity of the access point the road is bitumen sealed, approximately 6 m wide with 0.5 m sealed shoulders and with a posted speed limit of 100 km/hr. The road is flat and straight and sufficient sight distance would be available for safe traffic operation. No specific intersection treatments are proposed to be constructed due to the relatively short construction period and very low operational traffic impact. However, a traffic management plan will be required to be implemented during the construction period.

All other accesses will be off local roads, which are in-turn generally accessed from the SCR network. Each of the affected SCR intersections have been checked to ensure safe traffic operations would be possible. Characteristics checked include sight distances, the need for turning lanes and condition of road surface. All intersections were found to be of an adequate standard.

13.8.7 Rail Line Crossings – Bajool to Gladstone

The proposed access routes cross rail lines at a number of locations, detailed in Table 13.30.

It is not expected that traffic generated by the construction or operational phases of the project will have an adverse effect on the railway level crossings.

13.8.8 Impact on School Bus Routes

Access routes to the project will overlap school bus routes on the following road sections:

- The Bruce Highway south of Raglan
- Darts Creek Road
- The Narrows Road
- Mt Larcom Road
- Calliope River Road.

Given the relatively low number of school bus services it is expected that there would be a negligible impact on the operation of the school bus routes. However, any potential impacts will be addressed in detail when traffic management plans for construction are prepared.

Table 13.30 Impact on rail line crossings – Bajool to Gladstone

Location	Rail line	Crossing type	Construction traffic impact	Operational traffic impact
Twelve Mile Road	North Coast	OLC with boom gate	15 light vehicles per day and 95 heavy vehicles per day over 4 weeks	Occasional maintenance vehicles for Pipeline
Raglan Street	North Coast	OLC with boom gate	15 light vehicles per day and 95 heavy vehicles per day over 7 weeks	Occasional maintenance vehicles for Pipeline
Raglan Station Road	North Coast	OLC with boom gate	80 light vehicles per day and 110 heavy vehicles per day over 12 months	Occasional maintenance vehicles for Pipeline and Pump Station
Darts Creek Road	North Coast	OLC with boom gate	15 light vehicles per day and 95 heavy vehicles per day over 28 weeks	Occasional maintenance vehicles for Pipeline
The Narrows	North Coast	OLC with boom gate	15 light vehicles per day and 95 heavy vehicles per day over one week	Occasional maintenance vehicles for Pipeline
OLC = Open Level Crossing				

13.9 Summary of Impacts

13.9.1 Construction Impacts

The generation of construction traffic will create a short-term increase in traffic volumes on the road network during the construction period. The duration of this impact ranges from just a few weeks up to 16 months, depending on the road section under consideration. Calculation of the potential maximum traffic flows and distribution on the road network showed that such increases are relatively low and could be readily absorbed by the road network without undue road capacity problems.

Laurel Bank Road, which provides access to the intake station and a short section of the pipeline corridor, is currently too narrow along the first 2.3 km of its length from Rockhampton Ridgels Road to allow opposing vehicles to pass each other. It is proposed that this section be upgraded.

It was found that, without appropriate mitigation, four intersections are currently at an inadequate standard to accommodate the predicted traffic. These were:

- Rockhampton Ridgels Road / Laurel Banks Road Intersection
- Bruce Highway / Roope Road intersection
- Bruce Highway / Casuarina Road intersection.
- Capricorn Highway / Service Road intersection

With the exception of the Rockhampton Ridgels Road / Laurel Banks Road Intersection, it is proposed to mitigate impacts at the other three intersections via an appropriate traffic management plan.

It is assumed that the increased safety risk at other intersections due to the increased number of heavy vehicle turning movements would be adequately mitigated through the implementation of an appropriate traffic management plan.

The construction of the pipeline will require crossing of road and rail corridors. For roads which carry relatively low traffic volumes, the construction method adopted would be trenching. This would cause some minor delays to road traffic. It is expected that most of the local roads would be trenched.

For all other regionally significant roads, specifically the Bruce Highway and the Capricorn Highway, the proposed construction method for the pipeline crossing is thrust boring (or other trenchless method). This will result in no disruption to traffic on these roads.

Thrust boring/trenchless methods will be used for all railway line crossings, thus resulting in no disruption to rail services. Traffic management plans developed with input from Queensland Rail will be in place to minimise the potential safety impacts of heavy vehicles on rail crossings.

New accesses to the project from the road network will be required from several local roads as well as four points on SCRs. The SCRs that will be affected by new direct accesses are:

- Rockhampton Ridgels Road – WTP
- Rockhampton Ridgels Road – Pipeline
- Bajool Port Alma Road – Pipeline
- Gladstone Mt Larcom Road – Pipeline.

These will be accesses for construction traffic, then permanent accesses for occasional operational traffic.

13.9.2 Operational Impacts

Transport impacts due to the operation of the project in this section of the project area are expected to be relatively minor. The only element of the project that generates regular traffic flows is the Alton Downs WTP, and this level of traffic is only in the order of four light vehicle trips and 12 heavy vehicle trips per day. Other operational traffic consists of only occasional access required for maintenance purposes.

13.10 Mitigation

This section describes the various measures that will be implemented to mitigate traffic impacts.

13.10.1 Road Improvements

Road/intersection improvements are proposed at the following locations:

- Laurel Banks Road – The first 2.3 km section is proposed to be widened to a similar standard as the remaining wider section to Ski Gardens Road. This would allow opposing vehicles to pass each other without pulling over onto the gravel shoulder
- Laurel Banks Road / Rockhampton Ridgels Road intersection – upgrading to a BAR (Basic Right Turn) treatment is proposed. During this phase a traffic management plan will need to be implemented, which would require a reduction in the speed limit to 80 km/h, advanced heavy vehicle turning warning signs, and general access construction warning signs
- Rockhampton Ridgels Road – The newly formed direct access for the Alton Downs WTP which is proposed to be constructed will require a BAR treatment to be implemented

13.10.2 Construction Methods

The importance of the rail network, particularly the North Coast Rail Line for freight and passenger movement means that no disruption to rail services should occur. Therefore, the construction method chosen where the pipeline crosses the rail line will be thrust boring (or other trenchless method).

Thrust boring/trenchless technology is also proposed as the construction method where the pipeline crosses the National Highway network (i.e. the Bruce Highway and the Capricorn Highway) and other regionally significant roads. Potential impacts to rail security and access will be low as a result of the selected construction method and consultation with Queensland Rail prior to construction will enable their requirements to be met.

13.10.3 Traffic Management

Traffic management plans will be developed during the detailed design phase to address site specific details for each element of the project. These plans will detail the design of site accesses, including the provision of signage and traffic control during construction at site accesses and pipeline crossings. Temporary speed reductions may be required in the vicinity of site accesses. Traffic management plans will also address necessary changes to management that may be required for example changes to conditions as a result of wet weather. The traffic management plans will be approved by the relevant Local or State Road Authority before the commencement of construction.

13.10.4 Road Maintenance

A number of unsealed roads are likely to be used to access the project during construction. These roads will be maintained by the contractor during construction.

13.11 Residual Impact

Given the implementation of the proposed mitigation measures it is expected the transport impact would only be **minor adverse** during construction and would be **negligible** during operation of the project. The residual impacts are summarised in Table 13.31.

13.12 Cumulative and Interactive Impacts

13.12.1 Cumulative Impacts

Given the relatively low operational traffic generation of the project, it is not expected that there would be any long-term cumulative traffic impacts with other planned projects in the study area.

13.12.2 Interactive Impacts

The following interactive impacts apply:

Impacts on rail corridors due to dust, noise, blasting, vibration and electrical effects are addressed in Chapter 10, Air Environment and Chapter 12, Noise and Vibration

An assessment of environmental issues relating to transport, including ways to ameliorate any adverse impacts are discussed in Chapter 10, Air Environment and Chapter 12, Noise and Vibration.

Cultural heritage issues arising from project activities in or near road reserves are described in Chapter 14, Cultural Heritage.

13.13 Alternative Transport Methods

The preceding traffic impact assessment assumed that the delivery of pipe from manufacturers to the storage areas would occur entirely via road. However, there is the possibility that transportation could also be via rail or sea. If transportation via rail was to occur, it is envisioned that pipe would be delivered to the Rockhampton Railway Yards. The pipe would then be transported by road to the various storage areas. If transportation via sea was to occur, it is likely that the pipe would be delivered to Gladstone Port, with the pipe then also transported by road to the various storage areas. This is not expected to substantially alter the outcomes of this traffic impact assessment. It is not anticipated that the transportation of pipe from the Rockhampton Railway Yards or Gladstone Port would create an unmanageable impact on the road network and a management plan would be developed as part of the Construction Environmental Management Plan.

13.14 Summary and Conclusions

Table 13.31 below summarises the key transportation impacts of the project, mitigation measures proposed and the significance of the residual impacts.

Table 13.31 Summary of impacts and mitigation

EIS Area: Transport Feature/ activity	Current value + Substitutable Y:N	Description of impact		
		Description in words	Mitigation inherent in design/standard practice mitigation	Residual impact using significance criteria
Construction Impacts				
Local Roads	<ul style="list-style-type: none">Local Access Partially substitutable (i.e. detours and other roads)	Increased traffic on local roads, periodic disruption of road traffic due to road/lane closure	<ul style="list-style-type: none">Construction traffic management plans Widening of Laurel Banks Road	Minor –ve D T ST
Regional Roads/ Major Roads	<ul style="list-style-type: none">Regional Access Partially substitutable (i.e. detours and other roads)	Increased traffic on major roads, disruption of road traffic due to road/lane closure	<ul style="list-style-type: none">Construction traffic management plans Construction method to be Thrust bore / trenchless where required	Minor –ve D T ST
Railway Operation	<ul style="list-style-type: none">Safe and efficient rail transport Not substitutable	Disruption of rail traffic	<ul style="list-style-type: none">Construction method to be Thrust bore / trenchless	Negligible
Intersection Operation	<ul style="list-style-type: none">Safe and efficient intersections Partially substitutable	Increased traffic causing existing intersections to become inadequate	<ul style="list-style-type: none">Construction traffic management plans Upgrade of some intersections	Minor –ve D T ST
Operational Impacts				
Local Roads	<ul style="list-style-type: none">Local Access Partially substitutable (i.e. detours and other roads)	Increased traffic on local roads	None required	Negligible
Regional Roads/ Major Roads	<ul style="list-style-type: none">Regional Access Partially substitutable (i.e. detours and other roads)	Increased traffic on major roads	None required	Negligible
Railway Operation	<ul style="list-style-type: none">Safe and efficient rail transport Not substitutable	None	None required	Negligible
Intersection Operation	<ul style="list-style-type: none">Safe and efficient intersections Partially substitutable	Increased traffic causing existing intersections to become inadequate	None required	Negligible
Key Significance Criteria: Major, High, Moderate, Minor, Negligible +ve = positive impacts; -ve = negative impacts D = direct; I = indirect C = cumulative; P = permanent; T = temporary ST = short-term; MT = medium-term; LT = long-term.		Relative Duration of Environmental Effects Temporary: Up to one year Short-term: From one to seven years Medium-term: From seven to 20 years Long-term: From 20 to 50 years Permanent: Period in excess of 50 years		



13.15 References

Department of Main Roads (DMR) Guidelines for Assessment of Road Impacts of Development (April 2006).

Department of Main Road's (DMR) Roads Implementation Program 2007-08 to 2011-12.

AS 4799-2000 Installation of underground utility services and pipelines within railway boundaries.