

ROCKHAMPTON REGIONAL COUNCIL

These plans are approved subject to the current
conditions of approval associated with
Development Permit No. D/278-2013.....
Dated 05-02-14.....



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15 May 2013

Our Ref: 026-10-11

Your Ref: TMR11-000846

Department of Transport and Main Roads
PO Box 5096
Red Hill, Rockhampton Q 4701

Att: Chris Murphy
**Re: Traffic Engineering Assessment of Proposed Material
Change of Use (Extractive Industry – Sand Quarry) -
Extraction Industry Threshold Limit Increase (100,000t
to 200,000t) at Lot 432 on LIV401245 on Fogarty Road,
Fairy Bower**

McMurtrie Consulting Engineers (MCE) has endeavored to work closely with the Department of Transport and Main Roads (DTMR). Several discussions regarding the proposed development were held with TMR Officer Mr. Chris Murphy, including a preliminary traffic evaluation, emailed to the Department (12.04.2013) at their request (see Appendix A). As noted in these discussions this development is merely an expansion of the existing approval. Following protracted pre-lodgment negotiations we would appreciate a timely response to the following assessment:

Dear Chris,

McMurtrie Consulting Engineers (MCE) have been engaged by the Applicant (Mr Paul Waardyk of Hardcore Performance Pty Ltd) as suitably qualified Registered Professional Engineers Queensland (RPEQ) for the purposes of undertaking the Road Impact Assessment (RIA) in accordance with the Department of Transport and Main Roads' (DTMR) 'Guidelines for Assessment of Road Impacts of Development (GARID)' on the State-controlled Roads (SCR) and a Local Government Roads (LGR) Traffic Engineering Assessment.

Background

Hardcore Performance Pty Ltd is currently operating under an existing Extractive Industry approval for 100,000t (see Appendix B for approval D/394-2011). Our Applicant seeks to increase his quarry operation by a further 100,000t based on market research that has identified supply opportunities in Yeppoon and Gladstone.

Development Profile

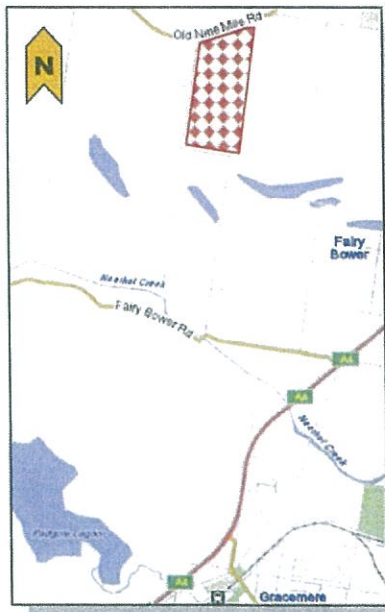
The intent is that the existing processing facility on Lot 432 on LIV401245 (owned by the Applicant) will provide the extra 100,000t required.

The screened sand will be stockpiled onsite (Lot 432 on LIV401245) and collected by customer arranged transport to various sites as demand dictates.

The venture will continue to supply to the following three (3) major companies in the North Rockhampton area as per the original approval:

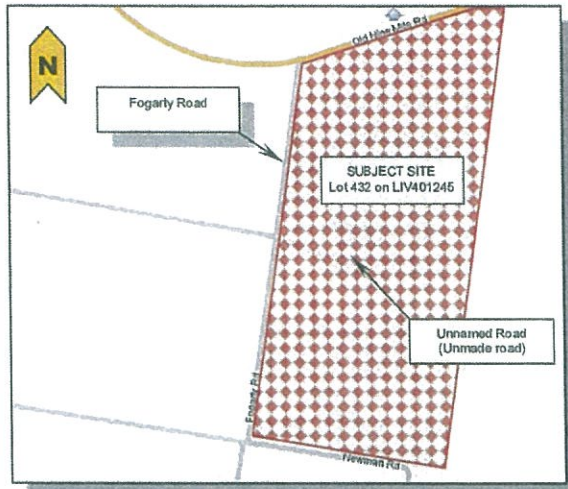
- o Holcim (Australia), Concrete Plant at Knight Street
- o Tandy Concrete, Pre-cast & Concrete Plant at Williamson Street
- o Holcim (Australia), Pre-Cast Plant at McLaughlin Street

Deliveries to and from the processing facility will continue to utilize the Fogarty Road reserve for access onto Nine Mile Road. Refer site plan below.



◀ Figure 1: Proposed location of Site

▼ Figure 2: Close-up of proposed location of Site



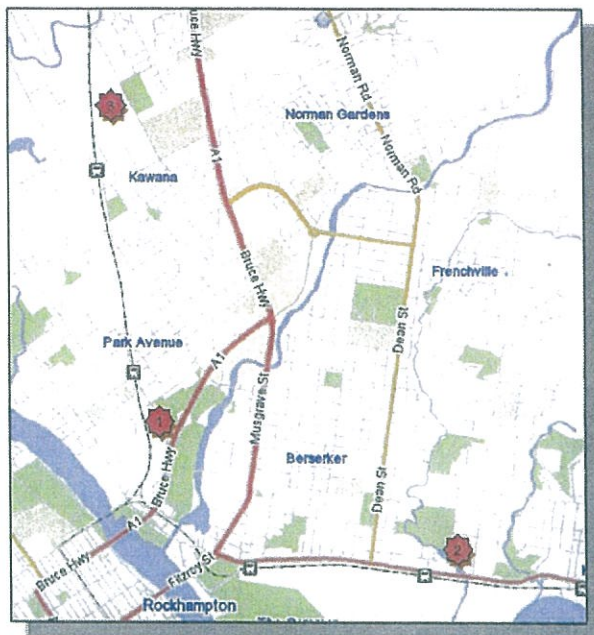
Proposed Transport Route – SCR and LGR Networks

As previously approved, from the processing facility, delivery vehicles will utilize the ring road arrangement (refer Appendix G for Site Layout Plan) to access onto Fogarty Road. Trucks will then use the Nine Mile Road network to traverse over to Ridgeland Road and into the Rockhampton (Wandal) area.

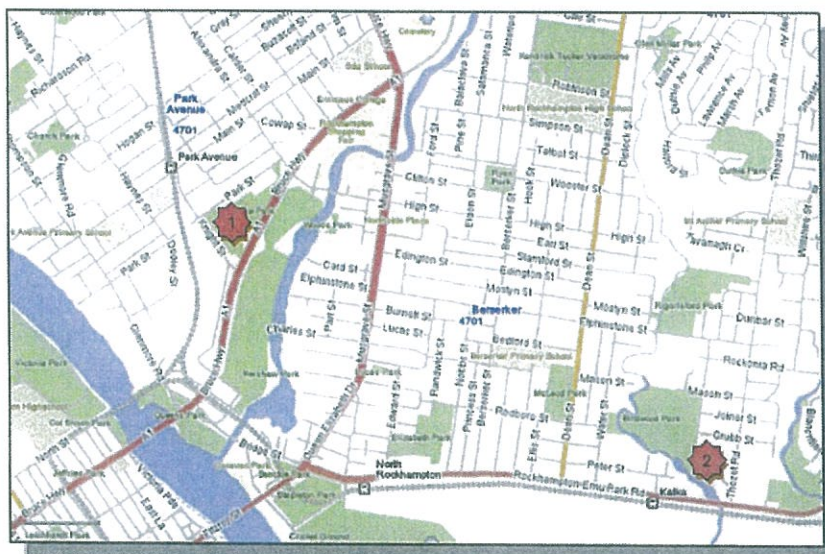
Fogarty Road, from Nine Mile Road to the site has been constructed to a gravel pavement (8m wide formation), by the property owner under agreement/permit with RRC.

As mentioned, the development will continue to deliver to 3 major companies in the Rockhampton area; these sites are located in the figure below:

1. Holcim (Australia), Concrete Plant at Knight Street;
2. Tandy Concrete, Pre-Cast & Concrete Plant at Williamson Street;
3. Holcim (Australia), Pre-Cast Plant at McLaughlin Street.

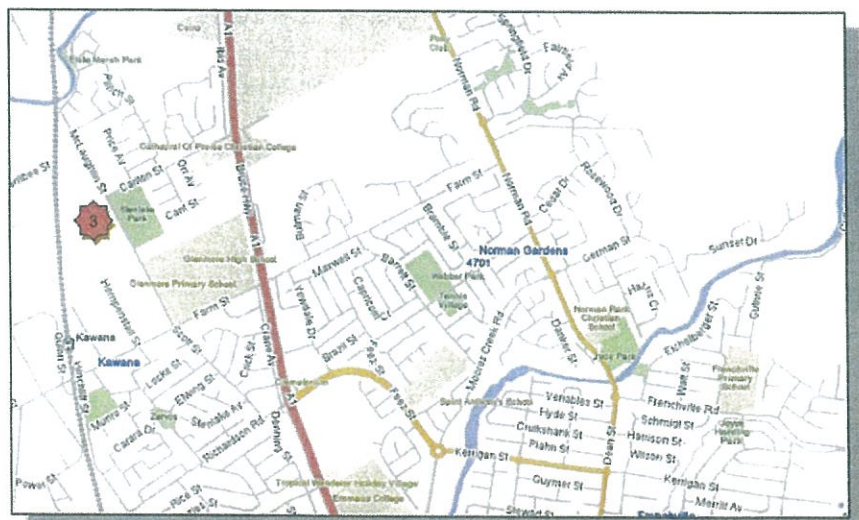


◀ Figure 3:
Proposed delivery Sites 1, 2
and 3.



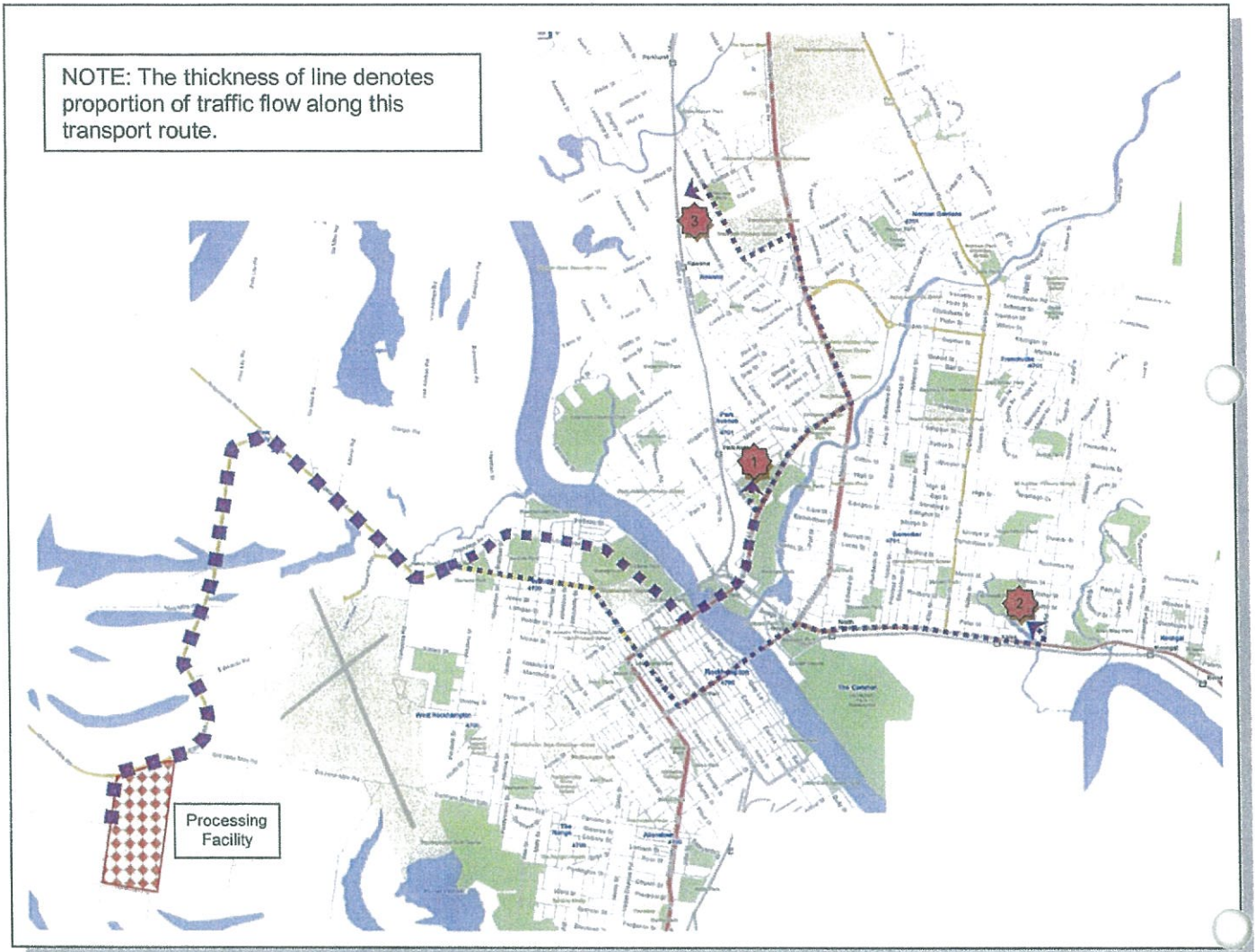
◀ Figure 4:
Proposed delivery Sites 1
and 2.

Figure 5: ▶
Proposed delivery Site 3.



The following figure details the proposed transport route to be utilized for the delivery to these major suppliers.

▼ Figure 6: Proposed Transport Route



The following details the LGR and SCR networks utilized for the delivery of quarry products to Sites 1, 2 and 3.

Site 1. Holcim (Australia) - Concrete Plant

- Fogarty Road (LGR)
- Nine Mile Road (LGR)
- Rockhampton – Ridgeland Road (SCR)
- Lion Creek Road (LGR)
- Exhibition Road (LGR)
- Bolsover Street (LGR)
- Bruce Highway (SCR)
- Knight Street (LGR)

Site 2. Tandy Concrete - Pre-Cast & Concrete Plant

- Fogarty Road (LGR)
- Nine Mile Road (LGR)
- Rockhampton – Ridgeland Road (SCR)
- Campbell Street (SCR & LGR)
- Fitzroy Street (SCR)
- Rockhampton – Emu Park Road (SCR)
- Thozet Road (LGR)
- Williamson Street (LGR)

Site 3. Holcim (Australia) - Pre-Cast Plant

- Fogarty Road (LGR)
- Nine Mile Road (LGR)
- Rockhampton – Ridgeland Road (SCR)
- Lion Creek Road (LGR)
- Exhibition Road (LGR)
- Bolsover Street (LGR)
- Bruce Highway (SCR)
- Farm Street (LGR) – one way only
- McLaughlin Street (LGR) – one way only
- Carlton Street (LGR) – one way only

Development Increase Profile

The increased product is targeted at two (2) major companies, with the following expected market demand (pre-negotiated client arrangements indicate as such):

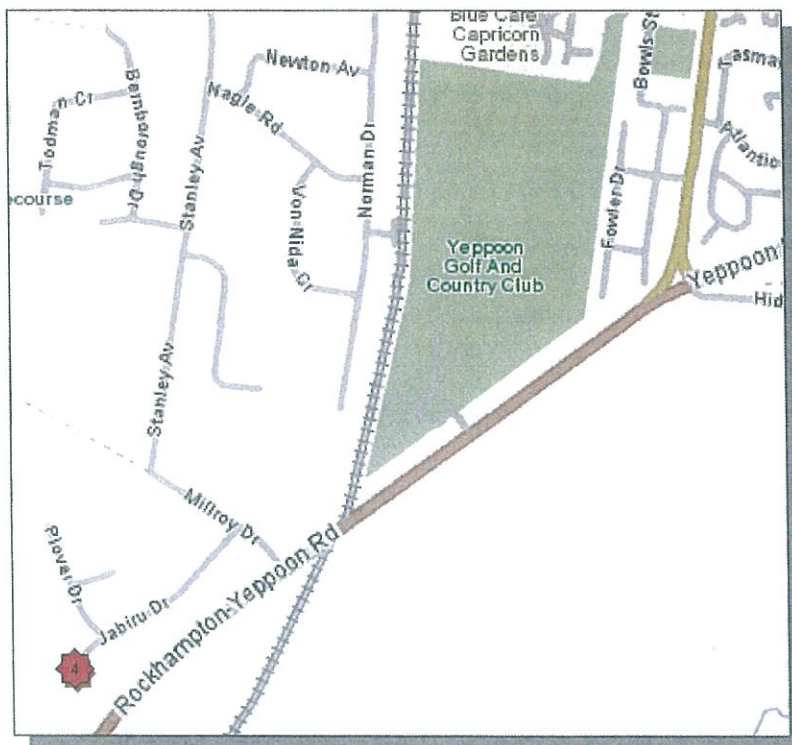
- o Holcim (Australia), Jabiru Drive, Yeppoon - 20,000t per year
- o Hansen Concrete Plants, Morgan St, Gladstone – 80,000t per year

Proposed Transport Route – SCR and LGR Networks

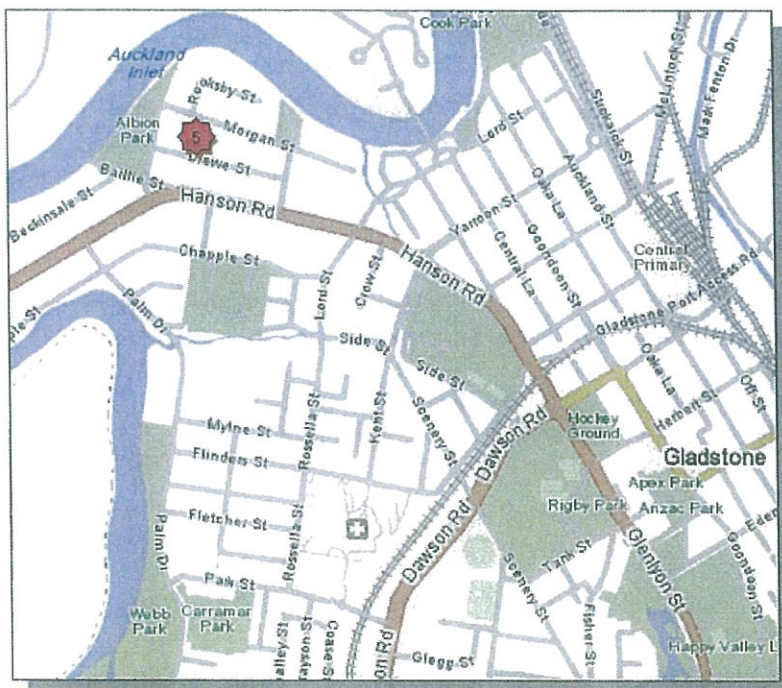
Delivery vehicles will utilize the ring road arrangement (refer Appendix G for Site Layout Plan) to access onto Fogarty Road. Trucks will then use the Nine Mile Road network to traverse over to Ridgeland Road and into the Rockhampton (Wandal) area.

As mentioned, the increased development will focus on 2 major companies in the Central Queensland area; these additional sites are located in the figures below:

4. Holcim (Australia), Jabiru Drive, Yeppoon
5. Hansen Concrete Plants, Morgan St, Gladstone



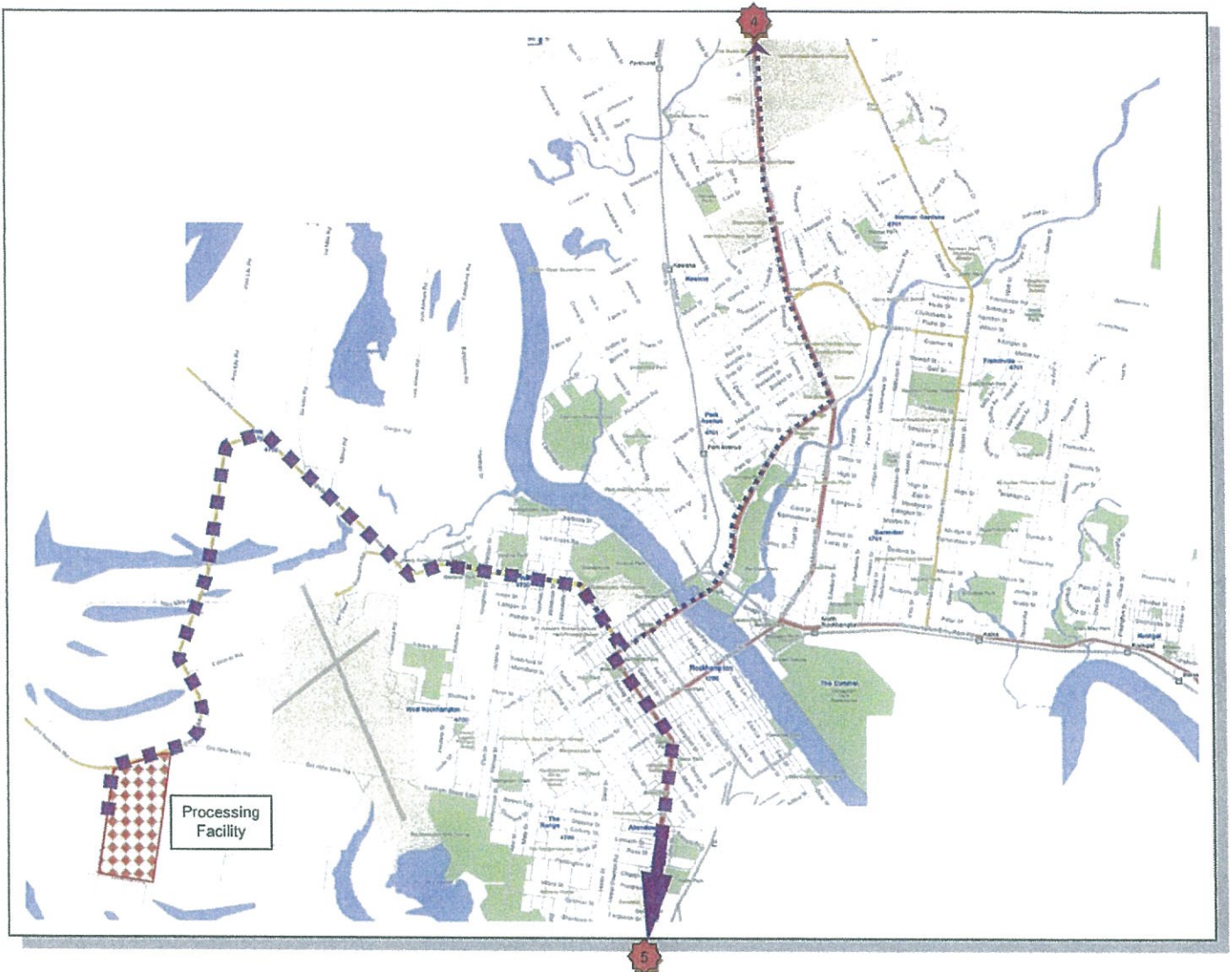
◀ Figure 3:
Proposed delivery Site 4



◀ Figure 4:
Proposed delivery Site 5

The following figure details the proposed transport route to be utilized for the delivery to these major suppliers.

▼ Figure 6: Proposed Transport Route



The following details the LGR and SCR networks utilized for the delivery of quarry products to Sites 4 and 5.

Site 4. Holcim, Jabiru Drive, Yeppoon:

- Fogarty Road (LGR)
- Nine Mile Road (LGR)
- Rockhampton – Ridgeland Road (SCR)
- Lion Creek Road (LGR)
- Exhibition Road (LGR)
- Bolsover Street (LGR)
- Bruce Highway (SCR)
- Yeppoon Road (SCR)
- Millroy Drive (LGR)
- Jabiru Drive (LGR)

Site 5. Hansen Concrete Plants, Morgan St, Gladstone:

- Fogarty Road (LGR)
- Nine Mile Road (LGR)
- Rockhampton – Ridgeland Road (SCR)
- Campbell St (LGR)
- Albert St (SCR)
- George St (SCR)
- Bruce Hwy (SCR)
- Gladstone Mt Larcom Rd (SCR)
- Port Curtis Way (SCR)
- Hanson Rd (SCR)
- Kingdon St (LGR)
- Morgan St (LGR)

From the proposed transport route the identified SCR's will be assessed in accordance with the GARID requirements for pavement and operational impacts from development generated traffic.

As Rockhampton Regional Council does not have any prescribed assessment criteria or guidelines, the LGR's will be assessed in accordance with Mr Bruce Russell's advice provided in his electronic mail dated 07/09/2010 and our meeting dated 09/09/2010. (And subsequent RFI response dated 16 April 2012).

Development Generated Traffic Volumes

The processing facility will utilise 1 x Tandem Truck with Quad Dog trailer for pre-arranged delivery of quarry products. As the general intention of the development is processing and stockpiling, it will generally be the responsibility of the purchaser to arrange transportation of the materials.

The pavement impact assessment will be based on the **maximum Extractive Industry Threshold limit of 200,000 tonnes** applied for in the Material Change of Use. Although it is not envisaged that the development will reach 200,000 tonne in the first few years, the 200,000 tonne upper limit will cater for possible future demand as business improves.

Given the 200,000 tonne annual production limit and assuming 312 working days per year (based on 52 working weeks/year x 6 working days/week), the expected heavy vehicle (HV) movements associated with the delivery of sand is 18 trips per work day. This is based on a Tandem Truck and Quad Dog trailer configuration with 36 tonne payload.

Operationally, the processing facility is plant (machinery) intensive and will only require a maximum of 3 operators / drivers onsite at any one time, no increase in staff is required for the expansion to 200,000t. As part of the forecast business operations at the proposed development, it is anticipated that no more than 21 vehicle trips (18 x HV, 2 x Workers SHIFT START/END, 1 x other LV) will be generated from the site per working day. This figure includes all staff movements, maintenance visits and product transportation shipments.

Therefore, a total of 42 daily vehicle movements (2 movements = 1 trip) are generated from the proposed site each trading day.

SCR Traffic and Pavement Data

Site specific traffic and pavement data required for the RIA analysis has been sourced and supplied (refer Attachment C) by DTMR and covers:

- Total Bituminous Seal Width (m)
- Average Road Roughness (counts/km)
- Average Annual Daily Traffic volume (veh/day)
- Percentage Heavy Vehicle (% of AADT)
- Through Distance identifiers (Gazettal chainage)

For the purposes of this assessment the scope of the RIA investigation and analysis has been confined to the following SCR's:

- Rockhampton – Ridgeland Road and Campbell Street (511)
- Bruce Highway (10F)
- Fitzroy Street (196)
- Rockhampton – Emu Park Road (194)
- Rockhampton – Yeppoon Road (196)
- Bruce Highway (10E)
- Port Curtis Way (181)

ROAD IMPACT ASSESSMENT (RIA)

The RIA comprises of two (2) forms of evaluation, the Pavement Impact Assessment (PIA) and the Traffic Operation Assessment (TOA). In accordance with the GARID these two evaluation criteria are detailed below:

SCR Pavement Impact Assessment (PIA)

A Pavement Impact Assessment is required when operational traffic generated from a proposed development equals or exceeds 5% of the background Equivalent Standard Axles (ESA's) loadings on the SCR network.

With the assistance of the DTMR PIA Spreadsheet the relevant traffic and pavement data has been analyzed and a summary of results are shown below:

Road Name	Section	Length (km)	HV Dev Loading (% of total)	2013 Background ESA's	2013 Development ESA's	% of Background
511	Bruce - Show Grd	0.8	43.3%	2.17×10^5	1.84×10^4	8.5%
511	Show Grd - Western St	1.2	43.3%	2.05×10^5	1.84×10^4	9.0%
511	Western St - Lion Ck Rd	0.2	43.3%	2.05×10^5	1.84×10^4	9.0%
511	Lion Ck Rd - Six Mile Rd	1.8	100.0%	2.05×10^5	4.26×10^4	20.8%
511	Six Mile Rd - Nine Mile Rd	0.7	100.0%	1.09×10^5	4.26×10^4	38.9%
10F	Bolsolver St - Knight St	1.5	43.3%	9.65×10^5	1.84×10^4	1.9%
10F	Knight St - Alexandra St	0.7	26.6%	9.65×10^5	1.13×10^4	1.2%
10F	Alexandra St - Shopping Fair	0.8	26.6%	9.65×10^5	1.13×10^4	1.2%
10F	Shopping Fair - Richardson Rd	1.2	26.6%	1.02×10^6	1.13×10^4	1.1%
10F	Richardson Rd - Farm St	0.7	26.6%	8.12×10^5	1.13×10^4	1.4%
196	Cambell St - QEII Drv	1.4	16.6%	1.09×10^6	7.07×10^3	0.6%
196	Farm St - Headlow ck	14.8	10.0%	3.33×10^5	4.26×10^3	1.3%
196	Headlow ck - 3.9k SW of INT 196/197	11.9	10.0%	4.51×10^5	4.26×10^3	0.9%
194	QEII Drv - Dean St	1.4	16.6%	8.40×10^5	7.07×10^3	0.8%
194	Dean St - Thozet Rd	1.1	16.6%	6.22×10^5	7.07×10^3	1.1%
181	CALLIOPE RVR - INT 46A/181	5.3	40.0%	6.10×10^5	1.70×10^4	2.8%
181	RLY O/BRIDGE - CALLIOPE RVR	13.4	40.0%	1.06×10^6	1.70×10^4	1.6%
181	10E/ 181 -RLY O/BRIDGE	13.5	40.0%	1.3×10^6	1.70×10^4	1.3%
10E	INT 10E/10D/185 - INT 10E/181	46.0	40.0%	8.15×10^5	1.70×10^4	2.1%
10E	INT 10E/181 - INT 10E/188	40.0	40.0%	1.16×10^6	1.70×10^4	1.5%
10E	INT 10E/188 - End 10E	35.1	40.0%	1.52×10^6	1.70×10^4	1.1%
10F	INT 10F/196/10E - Bolsover St	0.8	40.0%	9.69×10^5	1.70×10^4	1.8%

A summary of the assessment criteria and payment contributions is detailed below:

Development Starting Year:	2013
Assessment Period:	10 Years
Road Rehabilitation Contribution:	0.85 ¢/tonne
Routine Maintenance Contribution:	4.00 ¢/tonne
Total Contribution:	4.85 ¢/tonne

The results from the PIA Spreadsheet (refer Appendix D) indicates that the proposed Extractive Industry Threshold limit of 200,000 tonne/annum transported on the SCR **will trigger** both Routine Maintenance and Road Rehabilitation Contributions according to the assessment criteria in the GARID.

SCR Traffic Operation Assessment (TOA) – Network Assessment

A TOA - Network Assessment is required when operational traffic generated from a proposed development equals or exceeds 5% (trigger volume) of the existing Average Annual Daily Traffic (AADT) volume on the SCR network.

As part of the forecast traffic operations for the proposed development, it is estimated that no more than 42 vehicle trips (refer Development Generated Traffic Volumes above) will be generated from the site per trading day.

The table below compares the AADT volumes with the forecast development generated traffic volumes:

Road Name	Section	2012 AADT	Development Generated Traffic (Veh / day)	% of Background
511	Bruce - Show Grd	5100	42	0.82%
511	Show Grd - Western St	4822	42	0.87%
511	Western St - Lion Ck	3205	42	1.31%
511	Lion Ck Rd - Six Mile	3205	42	1.31%
511	Six Mile Rd - Nine Mile	2000	42	2.10%
10F	Bolsolver St - Knight St	33220	42	0.13%
10F	Knight St - Alexandra	33220	42	0.13%
10F	Alexandra St -	33220	42	0.13%
10F	Shopping Fair -	23549	42	0.18%
10F	Richardson Rd - Farm	15891	42	0.26%
196	Cambell St - QEII Drv	34000	42	0.12%
196	Farm St - Headlow ck	8024	42	0.52%
196	Headlow ck- 3.9k SW of INT 196/197	10894	42	0.39%
194	QEII Drv - Dean St	16915	42	0.25%
194	Dean St - Thozet Rd	11511	42	0.36%
181	CALLIOPE RVR - INT	4385	42	0.96%
181	RLY O/BRIDGE -	7434	42	0.56%
181	10E/ 181 -RLY	10781	42	0.39%
10E	INT 10E/10D/185 - INT	4880.5	42	0.86%
10E	INT 10E/181 - INT	6565	42	0.64%
10E	INT 10E/188 - End	14041	42	0.30%
10F	INT 10F/196/10E -	25145	42	0.17%

From the DTMR traffic data (refer Appendix C) the above table shows that no sections along the SCR will have development generated traffic greater than 2.1% of the background volume.

SCR Traffic Operation Assessment (TOA) – Intersection Assessment

The TOA also investigates turn warrant treatments at all intersections where the development generated traffic equals or exceeds the 5% threshold.

The table below compares the existing turn volumes at the indicated intersections between the hours of 6:00 to 18:00 (requested and supplied by DTMR officer Mr Chris Murphy) with the forecast development generated traffic volumes for each intersection:

	Intersection	Intersection No.	Date of Count	Turn	6:00am - 6:00pm Traffic (year of count)	Traffic (projected 3% to current) converted to AADT (*1.25 conversion)	Development Generated Traffic (Veh/day)	% of Background
COMMON ROUTES TO ALL SITES	Rockhampton Ridglands & Nine Mile Rd	2003	20/07/2010	Right out	189	256.25	21	8.2
		2003	20/07/2010	Left in	186	253.75	21	8.28
	Campbell (511) & Albert Street (10F)	562	28/04/2010	Thru in	636	872.5	3	0.4
		562	24/04/2010	Thru out	980	1343.75	3	0.3
		562	24/04/2010	Right in	236	323.75	7.2	2.3
		562	28/04/2010	Left out	213	292.5	7.2	2.5
	Campbell & Fitzroy St	457	14/01/2010	Left in	69	96.25	3	3.2
		457	14/01/2010	Right out	865	1196.25	3	0.3
	Queen Elizabeth Dr & Lakes Crk Rd	66	22/06/2010	Right out	5286	7200	3	0.1
		66	22/06/2010	Left in	6838	9313.75	3	0.1
	Thozet Rd & Lakes Crk Rd	383	24/06/2010	Left in	2458	3347.5	3	0.1
		383	24/06/2010	Right out	2670	3636.25	3	0.1
	Albert & Bolsover St	571	27/07/2010	Left in	3250	4413.75	7.8	0.2
		571	27/07/2010	Right out	2037	2766.25	7.8	0.3
	Bruce Hwy & Knight St	572	27/07/2010	Left in	1918	2605	3	0.2
		572	27/07/2010	Right out	1712	2325	3	0.2
	Yaamba Rd & Moores Crk Rd	823	21/11/2009	Left in	3901	5408.75	5	0.1
		823	21/11/2009	Right out	4556	6316.25	5	0.1
	Yaamba Rd & Farm St	579	22/07/2010	Left in	479	652.5	3	0.5
		579	22/07/2010	Right out	810	1103.75	3	0.3
	**Rockhampton Ridglands & Exhibition Drv			Thru in	1275	1608.75	2	0.2
				Thru out	1275	1608.75	2	0.2
TO SITE 4	Bruce Hwy & Yeppoon Rd	827	2/08/2012	Right in	2154	2757.5	2	0.1
		827	2/08/2012	Left out	2249	2878.75	2	0.1
	***Yeppoon Rd & Millroy Drv			Left in	108.94	136.25	2	1.5
				Right Out	108.94	136.25	2	1.5
TO SITE 5	Albert St & George St	560	19/02/2013	Left in	4964	6261.25	8	0.2
		560	19/02/2013	Right out	5511	6951.25	8	0.2
	Bruce Highway & Gladstone Mt Larcom Rd	51	1/03/2011	Left in	1116	1493.75	8	0.6
		51	1/03/2011	Right out	1136	1520	8	0.6
	Bruce Hwy & Port Curtis Way	1997	6/03/2012	Right in	2433	3151.25	8	0.3
		1997	6/03/2012	Left out	2547	3298.75	8	0.3
	Hanson Rd & Kingdon St	1719	4/05/2011	Left in	244	312.5	8	2.6
		1719	4/05/2011	Right out	373	477.5	8	1.7

* As per Chapter 13, Appendix D - 24 hour/12 hour volume ratios are typically 1.20 to 1.25 for rural roads.

** Traffic data unavailable. Turns calculated as 25% (% assumed for Thru in & Thru out) of AADT for Rockhampton Ridglands Rd (Bruce Hwy to show grounds).

*** Traffic data unavailable. Turns calculated as 1% (% assumed for Left in/ Right out) of AADT for Rockhampton Yeppoon Rd (Headflow ck to 3.5% SW of INT 196/197).

Traffic generation is based on an equal traffic split to each delivery location. As noted previously, there are 18 daily HV trips with 3 LV trips for a total of 21 daily trips (or 42 movements).

Traffic generation splits for the original approval of 100,000t are still based on equal distribution to each of Site 1, 2 and 3. This equates to approx. 3 vehicle trips to each location per day.

Traffic generated to Site 4 will be based on the delivered 20,000t annually and equate to approx. 2 vehicle trips per day.

Traffic generated to Site 5 will be based on the delivered 80,000t annually and equate to approximately 8 vehicle trips per day.

From the DTMR traffic data (refer Appendix C) the preceeding table shows that SCR Intersection No. 2003, Rockhampton Ridgeland and Nine Mile Road has a development impact greater than that considered background growth (8.2%).

A review of the turn warrant treatment at this intersection (refer to Attachment F for proposed Layout) proves that for both pre and post development the existing BAL does not cater for the turn volumes experienced. As this is an existing condition that the development generations only slightly exacerbate our client is agreeable to providing a contribution to assist in the upgrade of the intersection to an AUL standard (refer to Attachment E). It is also considered that a SIDRA analysis is not warranted at this stage reasoned upon the following:

- It is unlikely a SIDRA analysis will reveal any traffic deficiencies that DTMR are not already aware of;
- Our client's contribution will assist DTMR in any future analysis, design and upgrading to the appropriate standard of this intersection.

All other turn movements on impacted intersections will produce development generated traffic less than 2.6% of the background volume. Therefore, in accordance with the GARID and from both a network and an intersection perspective, development volumes are not considered significant (defined as expected growth) and as a result further detailed intersection investigation (including SIDRA) is not warranted. Notwithstanding the above, it is the intention of this development to limit HV movements during peak hours (ie: 7–9am and 4–6pm) to reduce inner city congestion

LGR & SCR Traffic Operation Assessment (TOA) – Network Trafficability

The proposed transport route has a number of LGR and SCR intersections/roundabouts with confined geometry which have been assessed by vehicle swept path analysis (Appendix I). Simulations on these confined intersections have been completed for both a 'Truck and Dog trailer' (design vehicle) and '19m Semi Trailer' (check vehicle) configuration. The results are as follows:

Fogarty Road

The proposed transport route will utilize a number of key LGR in both rural and urban areas. To provide access to the processing facility, Fogarty Road has been upgraded to a standard suitable for heavy vehicle traffic.

▼ Figure 7: Fogarty Road looking south at 'unmade' section



To achieve the operational access requirements, the following minimum road design elements have been considered:

- Less than 42 veh/day
- 20.117m Road Reserve (existing Fogarty Road)
- 8m Formation
- 8m Pavement Width
- No Seal (Gravel)
- Minimum 1 on 6 batters
- 40km/hr Desirable Speed Environment (with 60km/hr Design Elements)

Fogarty Road (and the surrounding road network) is subject to significant inundation during moderate flood events; as a result the proposed road formation will be raised by approximately 600mm although it is not the intention of this development to provide a flood immune road access. Table drains will be provided along the road formation to divert overland flow toward to the existing wetland area towards Newman Road.

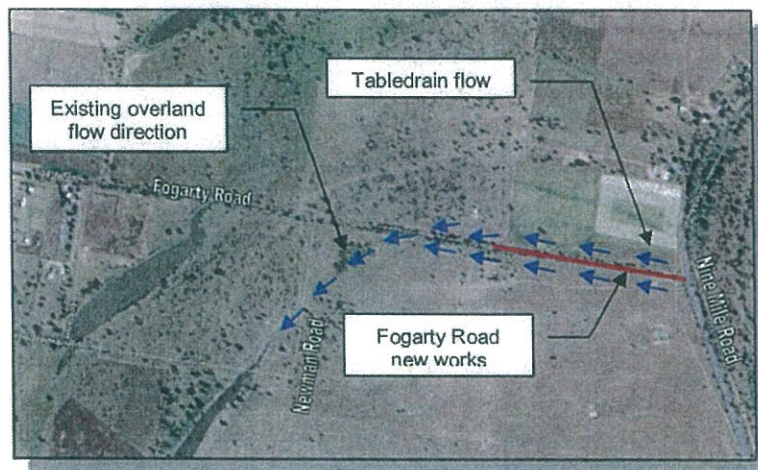
Due to the isolated traffic catchment (road predominately used by this development only), extremely poor subgrade conditions (typically black soil) and the high content of heavy vehicle movements, bituminous surfacing has been omitted in lieu of regular maintenance grading and gravel re-sheeting by the Applicant.

To limit the likelihood of thoroughfare traffic utilizing the new formation to access Fogarty Lane, the development access road will terminate at the intersection of the unnamed road reserve (approximately 540m from the Nine Mile Road and Fogarty

Road intersection. The end of the development access road will have a U-turn provision (unsealed widening) to allow vehicles to return to Nine Mile Road should they inadvertently drive down Fogarty Road. Warning signage will also be placed at the Fogarty Road and Nine Mile Road intersection to caution motorists that this is a 'No Through' Road.

The Applicant has established responsibility for the maintenance of Fogarty Road (from Nine Mile Road to the Unnamed Road reserve) for the duration of the Extractive Industry operation (on Lot 432 on LIV401245 and Lot 250 on R2621). To further indemnify Council from any potential litigation, the Applicant holds a Public Liability insurance policy over this section of Fogarty Road reserve.

▼ Figure 8: Fogarty Road proposed upgrade works



Fogarty Road and Nine Mile Road Intersection

The current Fogarty Road and Nine Mile Road intersection is unformed (refer photos below), however the Nine Mile thru road is bitumen sealed. As part of the development generated vehicle movements (turning east) this intersection will require upgrading to a minimum standard of unsealed Basic Left-turn (BAL) which will provide a deceleration taper from Nine Mile Road into Fogarty Road. This BAL should also provide adequate turning radius in accordance with Road Planning and Design Manual (RPDM) Figure 13.79: 'Basic Left-turn Treatment (BAL) on Rural Roads where the side road AADT is less than 50'.



Figure 10: ►
Fogarty Road and Nine Mile Road
intersection looking west

◀ Figure 9:
Fogarty Road and Nine Mile
Road intersection looking east



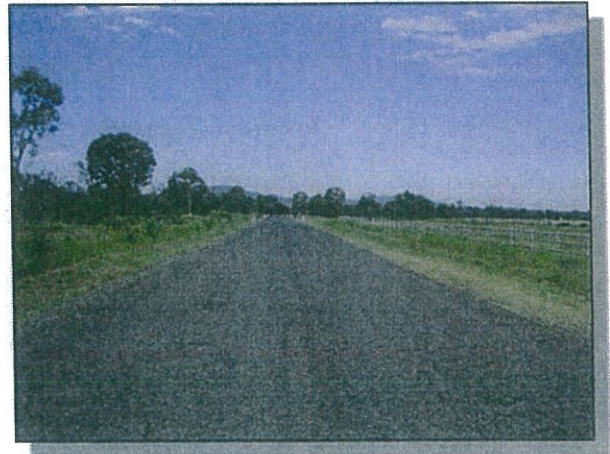
Nine Mile Road

The section of Nine Mile Road leading back to Ridgелands Road has a 7.0m wide bitumen seal with sealed shoulders varying between 0.0m to 0.5m. The vertical geometry is flat with a number of floodway and creek crossings, while the horizontal geometry is moderately winding with large sweeping bends.



Figure 12: ►
Nine Mile Road looking north

◀ Figure 11:
Nine Mile Road looking south



Nine Mile Road and Ridgелands Road

The Nine Mile Road and Ridgелands Road intersection was upgraded in 1999 – 2000 to an Auxiliary Right-turn (AUR) configuration. In addition, the turn movements into Nine Mile Road have a 50m deceleration lane (from the east) and a 35m acceleration lane (to the west).



Figure 14: ►
Nine Mile Road and Ridgелands
Road intersection looking east
showing AUR lane

◀ Figure 13:
Nine Mile Road and Ridgелands Road
intersection looking north



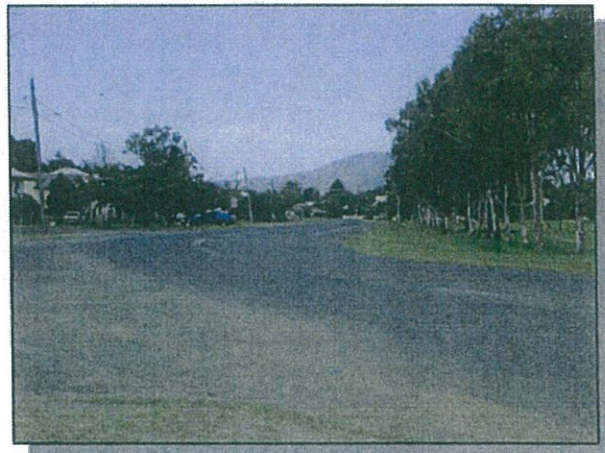
Ridgelands Road and Lion Creek Road

The Ridgelands Road and Lion Creek Road intersection consists of an offset Tee configuration controlled by a give-way sign from Lion Creek Road. This section of the Ridgelands Road was recently upgraded by Rockhampton Regional Council in 2009-2010 to include a 1.0m sealed shoulder and full width slurry seal. No modifications were done to the existing intersection treatment.



Figure 16: ►
Lion Creek Road looking north-east
from intersection

◄ Figure 15:
Ridgelands Road and Lion Creek Road
intersection looking east



Lion Creek Road

Lion Creek Road consists of 2 x 3.5m traffic lanes with sealed shoulders varying between 1.0m to 3.5m and very wide verges. The road alignment is flat with wide sweeping bends and traverses a mix of residential, commercial, and sporting zones. It is also noted that Pink Lilly Sands currently carts quarry materials along this road.



Figure 18: ►
Lion Creek Road looking east
showing flat terrain

◄ Figure 17:
Lion Creek Road looking west showing
wide verges



Bolsover Street and Bruce Highway Intersection

This signalized intersection has raised concrete central medians with a 'free' left-turn CHL (with acceleration lane) from Bolsover Street onto the Bruce Highway. Vehicles turning right from the Bruce Highway are serviced by a signalized CHR. Both Truck & Dog trailer and Semi trailer HV movements are catered for at this intersection.



◀ Figure 19:
Bolsover Street and Bruce
Highway intersection HV
swept paths
Top: Truck and Dog Trailer,
Bottom: Semi Trailer

Bruce Highway and Knight Street

The Bruce Highway and Knight Street intersection is a 4-way signalized intersection with raised concrete central medians. There is a 'free' left-turn lane (High entry angle CHL) into Knight Street from the Bruce Highway (northbound). Vehicles turning right from Knight Street are serviced by a signalized CHR.

Knight Street is approximately 12.0m wide and bounded by mountable kerb and channel on both sides. Within the proposed transport route along Knight Street, the abutting area is commercial and industrial only. Both Truck & Dog trailer and Semi trailer HV movements are catered for at this intersection.

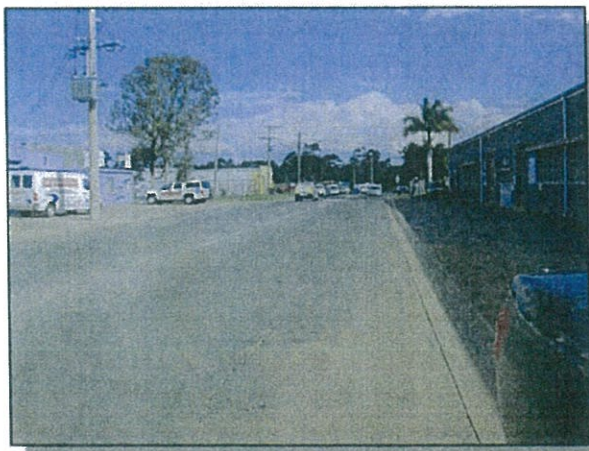
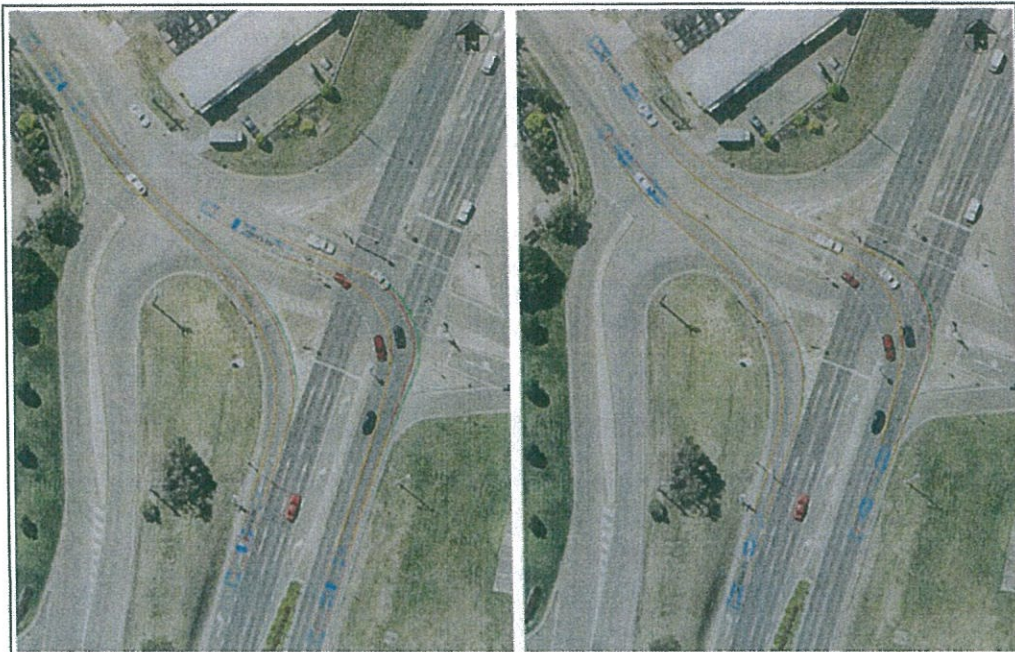


Figure 21: ▶
Knight Street looking north-west showing existing
commercial and industrial development

◀ Figure 20:
Bruce Highway and Knight Street
intersection looking south-east

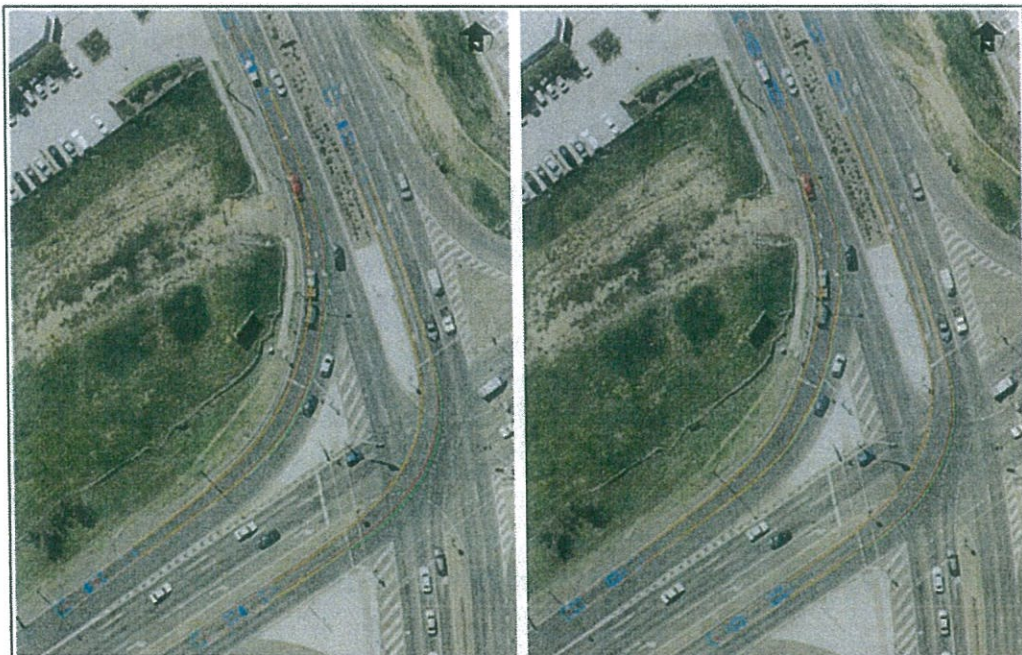




▲ Figure 22:
Bruce Highway and Knight Street intersection HV swept paths
Left: Truck and Dog Trailer, Right: Semi Trailer

Bruce Highway and Musgrave Street Intersection

The Bruce Highway and Musgrave Street Intersection is a major junction between the Fitzroy River Bridge and Neville Hewitt Bridge road corridors. The intersection is signal controlled and has a dual lane 'high entry angle' left-turn (CHL) for north-bound movements. Vehicles turning right from the Bruce Highway are serviced by a dual signalized CHR. Both Truck & Dog trailer and Semi trailer HV movements are catered for at this intersection.



▲ Figure 23:
Bruce Highway and Musgrave Street intersection HV swept paths
Left: Truck and Dog Trailer, Right: Semi Trailer

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Bruce Highway and Farm Street

The Bruce Highway and Farm Street intersection has a 4-way signal controlled configuration with raised central concrete medians. A 'free' left-turn (CHL) exists for movement off the Bruce Highway into Farm Street. Both Truck & Dog trailer and Semi trailer HV movements are catered for at this intersection.

Farm Street provides 2 x 3.5m traffic lanes with 2.5m parking bays on both sides. The road abuts both residential and schools zones and is the major connector between the suburb of Kawana and the Bruce Highway. As shown on the proposed transport route, vehicle movements along this section will only be in the west-bound direction

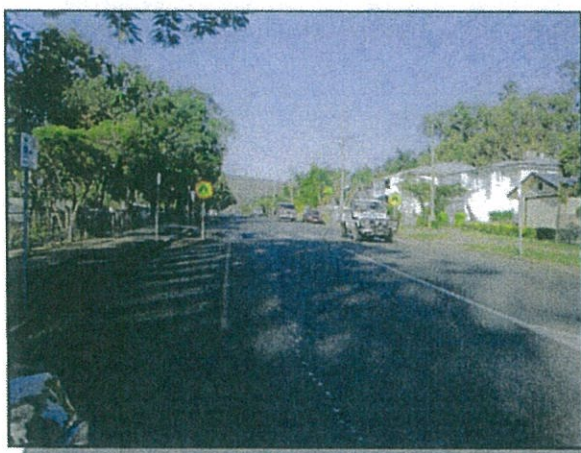
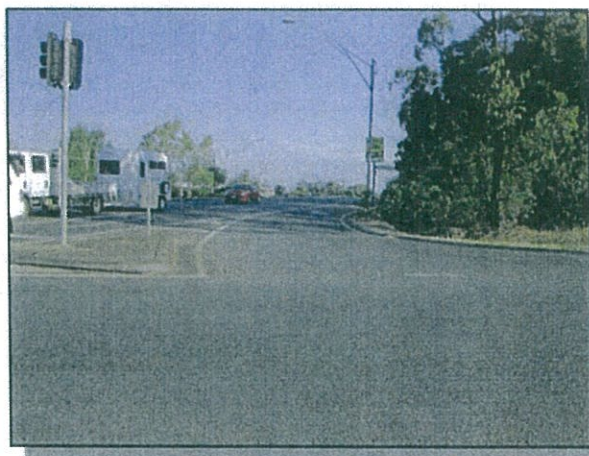


Figure 25: ►
Bruce Highway and Farm Street
intersection looking south showing free
CHL into Farm Street

◀ Figure 24:
Farm Street looking east at pedestrian
crossing facility opposite Glenmore
Primary School



▲ Figure 26:
Bruce Highway and Farm Street intersection HV swept paths
Left: Truck and Dog Trailer, Right: Semi Trailer

Farm Street and McLaughlin Street

This intersection consists of a basic 4-way signalized treatment with a right-turn (CHR) from Farm Street into McLaughlin Street. Both Truck & Dog trailer and Semi trailer HV movements are catered for at this intersection.

Access along McLaughlin Street passes through industrial, commercial, sporting and school zones. Towards the Farm Street intersection the road is abutted by a one-way service road for Glenmore Primary School as well as on-street parking bays on the opposite side. Traffic lanes along this section vary between 3.0m – 3.5m.



Figure 28: ►
Farm Street and McLaughlin Street
intersection looking south at
service road

◀ Figure 27:
McLaughlin Street looking north at
pedestrian crossing facility opposite
Glenmore State Primary School



▲ Figure 29:
Farm Street and McLaughlin Street intersection HV swept paths
Left: Truck and Dog Trailer, Right: Semi Trailer

Carlton Street and Bruce Highway

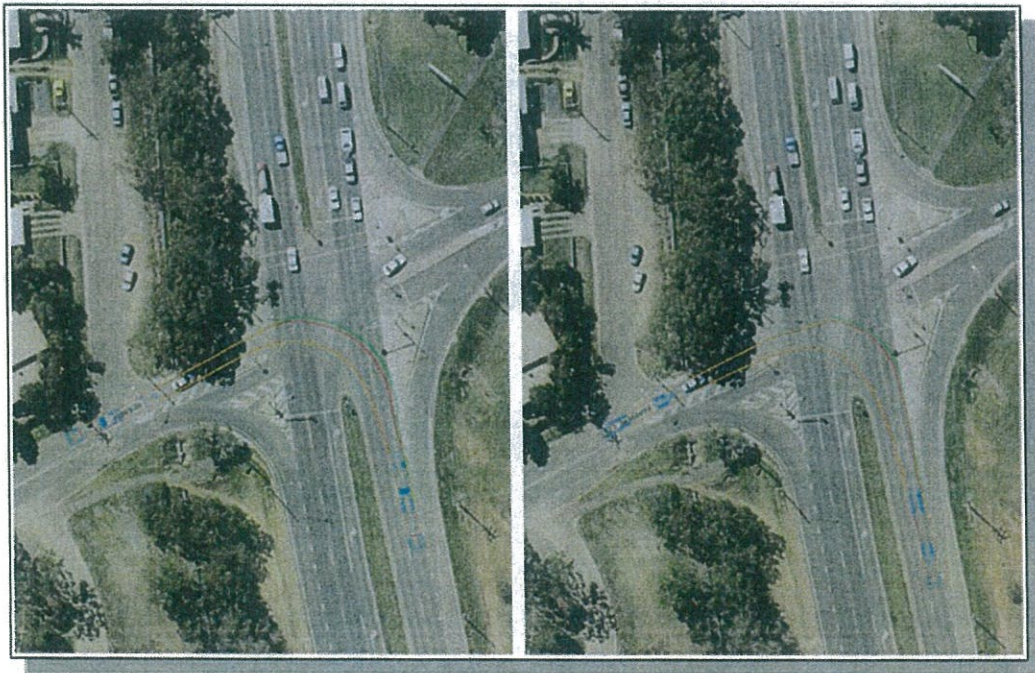
The Carlton Street and Bruce Highway intersection is a 4-way signalized configuration with raised concrete central medians. Left-turn movements from Carlton Street onto the Bruce Highway are catered for by a signalized CHR. Both Truck & Dog trailer and Semi trailer HV movements are catered for at this intersection.

Carlton Street consists of 2 x 3.5m traffic lanes with sealed shoulders / parking bays varying between 0.0m to 2.5m. The road alignment is hilly and traverses a mix of residential, commercial, and school zones. It is also noted that Holcim (Australia) Pre-Cast Plant, currently carts products along this road.



Figure 31: ▶
McLaughlin Street and Bruce
Highway intersection looking east

◀ Figure 30:
Carlton Street looking west
showing wide traffic width

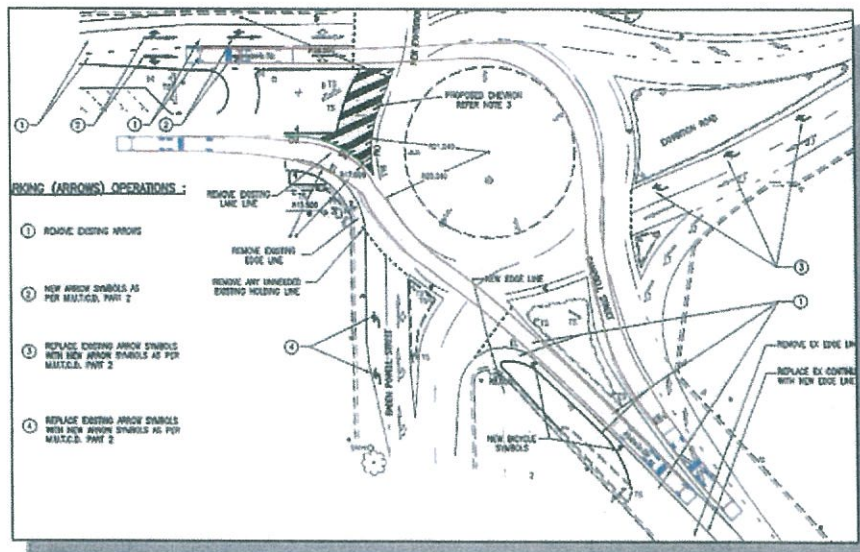


▲ Figure 32:
Carlton Street and Bruce Highway intersection HV swept paths
Left: Truck and Dog Trailer, Right: Semi Trailer

Rockhampton- Ridglands Road and Campbell Street

The intersection consists of a 5-way roundabout configuration with single/dual circulating lane/s. Both Truck & Dog trailer and Semi trailer HV movements are catered for at this intersection.

Rockhampton-Ridglands Road consists of 2 x 3.5m traffic lanes with sealed shoulders / parking bays varying between 0.0m to 2.5m. The road alignment is flat and traverses a mix of rural, residential and commercial zones. It is also noted that Pink Lilly Sands currently carts quarry materials along this road.



▲ Figure 33:
Ridglands Road and Campbell Street intersection HV swept paths
Truck and Dog Trailer only

Campbell Street and Archer Street

The Campbell Street and Archer Street intersection has a roundabout configuration with single circulating lane. Both Truck & Dog trailer and Semi trailer HV movements are catered for at this roundabout.



◀ Figure 34:
Campbell Street and Archer Street
intersection HV swept paths
Truck and Dog Trailer only

Campbell Street and Fitzroy Street

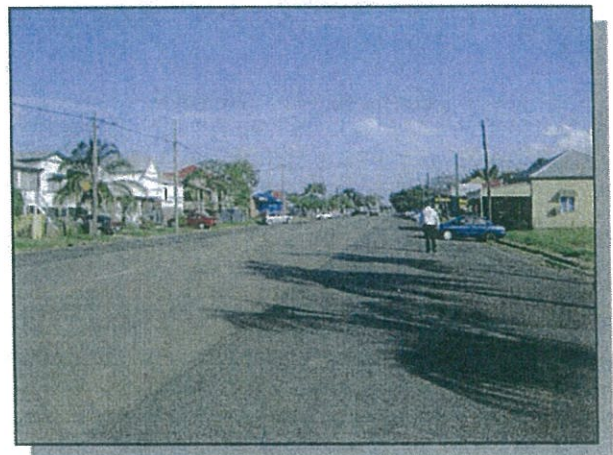
The Campbell Street and Fitzroy Street intersection has a 4-way signalized configuration with raised concrete central medians on the SCR. It is noted that Semi trailers **cannot** legally turn left from the Campbell Street AUL onto Fitzroy Street without encroaching over adjacent traffic islands. Vehicles turning right from Fitzroy Street are serviced by a signalized CHR.

Campbell Street consists of 2 x 3.5m traffic lanes with sealed shoulders / parking bays varying between 2.5m to 3.0m and very wide verges. The road alignment is flat and traverses a mix of residential and commercial zones. It is also noted that Pink Lilly Sands currently carts quarry materials along this road.



Figure 36: ►
Campbell Street looking west
showing flat terrain

◀ Figure 35:
Campbell Street looking west
showing wide verges



▲ Figure 37:
Campbell Street and Fitzroy Street intersection HV swept paths
Truck and Dog Trailer only

Fitzroy Street, Queen Elizabeth Drive and Lakes Creek Road

This intersection is a 4-way signalized configuration with raised concrete central medians. Right-turn movements from Queen Elizabeth Drive onto Lakes Creek Road are catered for by dual signalized CHR. Vehicles turning left from Lakes Creek Road onto the Fitzroy River Bridge are serviced by dual signalized 'high entry angle' CHL.

Fitzroy Street / Queen Elizabeth Drive traffic lanes vary between 4 x 3.0m undivided lanes (on the Fitzroy River Bridge) and 4 x 3.5m divided lanes (through the Central Business District - CBD). The road traverses the heart of the CBD which is a mix of retail, commercial and entertainment zones. It is also noted that a high proportion of HV (including quarry and cattle transport companies) cart materials along this road.



▲ Figure 38:
Fitzroy Street and Lakes Creek Road intersection HV swept paths
Truck and Dog Trailer only

Lakes Creek Road and Thozet Road Intersection

The Lakes Creek Road and Thozet Road intersection is a signalized Tee configuration with a left-turn AUL. Right-turn movements from Thozet Road are catered for by signalized right-turn lane.

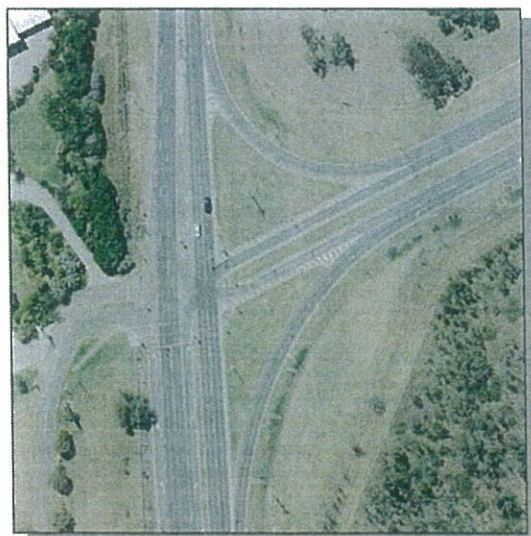
Lakes Creek Road traffic lanes are 2 x 3.5m wide with sealed shoulders between 2.0m and 2.5m. The road traverses a mix of residential and commercial zones with some areas accessed by service roads. It is also noted that a high proportion of HV (including quarry and cattle transport companies) cart materials along this road.



▲ Figure 39:
Lakes Creek Road and Thozet Road intersection HV swept paths
Truck and Dog Trailer only

Bruce Highway and Yeppoon Rockhampton Road

The Bruce Highway and Yeppoon Road intersection is a 4-way signalized configuration with raised concrete central medians. Right-turn movements from the Bruce Highway onto Yeppoon Road are catered for by a CHR and left turn movements onto the Bruce Highway are facilitated by a 'high entry angle' CHL.



◀ Figure 40:
Bruce Highway and Yeppoon
Rockhampton Road Intersection

Yeppoon Rockhampton Road and Milroy Drive

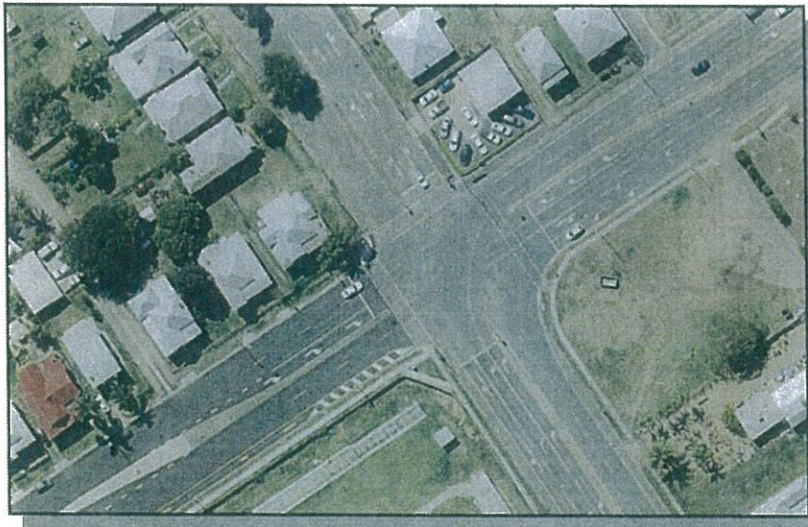
The Yeppoon Rockhampton Road and Milroy Drive intersection is a 4-way configuration with painted central medians. Left-turn movements from Yeppoon Road into Milroy Drive are catered for by a CHL. A Basic-Right turn (BAR) is provided for right-turn movements out of Milroy Drive.



▲ Figure 41:
Yeppoon Rockhampton Road and Milroy Drive

Albert Street and George Street

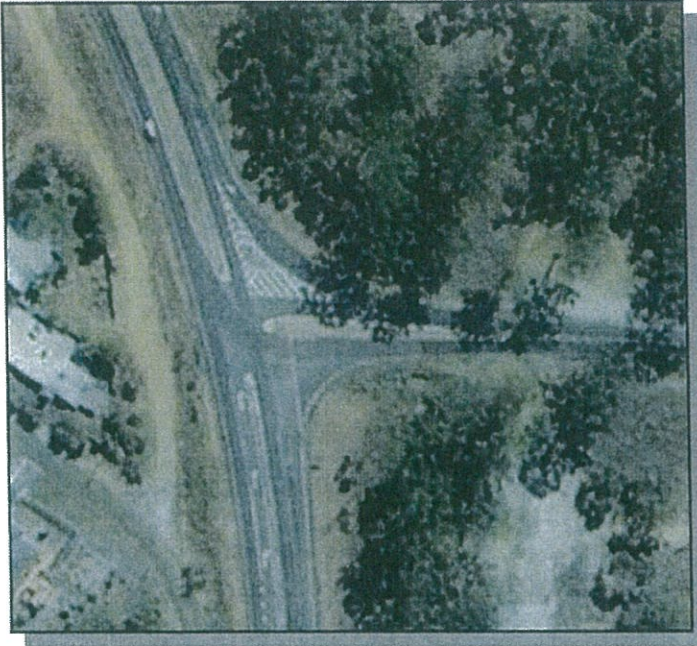
The Albert Street and George Street intersection has a 4-way signalized configuration with raised concrete central medians. Vehicles turning left from Albert Street into George Street are serviced by a signalized dual lane AUL. Right-turn movements from George Street into Albert Street are facilitated by a signalized dual lane CHR.



▲ Figure 42:
Albert Street and George Street intersection.

Bruce Highway and Gladstone Mt Larcom Road

The Bruce Highway and Gladstone Mt Larcom Road intersection is a Tee configuration with central medians. Left-turn movements from the Bruce Highway into Gladstone Mt Larcom Road are catered for by a 'high entry angle' CHL. A Basic-Right turn (BAR) is provided for vehicles turning right onto the Bruce Highway.



◀ Figure 43:
Bruce Highway and Gladstone Mt
Larcom Road intersection

Gladstone Mt Larcom Road and Port Curtis Way

The intersection of Gladstone Mt Larcom Road and Port Curtis Way is a 3 way Tee configuration with central medians. Right-turn movements from Gladstone Mt Larcom Road into Port Curtis Way are catered for by a wide angle Basic-Right turn (BAR). Vehicles turning Left from Port Curtis Way onto Gladstone Mt Larcom Road are serviced by a wide angle AUL.



▲ Figure 44:
Gladstone Mt Larcom Road and Port Curtis Way Intersection.

Hanson Road and Kingdon Street

The Hanson Road and Kingdon Street intersection is a Tee configuration. A Basic-Left turn (BAL) is provided for traffic turning into Kingdon Street from dual laned Hanson Road. Right-turn movements from Kingdon Street are catered for by a Basic-Right turn (BAR).



▲ Figure 45:
Hanson Road and Kingdon Street intersection.

Conclusion and Recommendation

An assessment of the pavement and operational traffic impacts of a proposed sand quarry on Fogarty Road, Fairy Bower has been completed. A summary of the findings are provided below:

- Truck & Dog trailer and/or Semi trailer vehicles will be used to cart the material to the (proposed) 5 major supplier sites.
- Utilization of both LGR and SCR will be required for the delivery of the quarry materials.
- It is anticipated that the proposed development will generate no more than 42 daily vehicle movements each working day.
- Proposed transport movements shall be scheduled for non-peak periods to reduce LGR and SCR congestion.
- In accordance with the DTMR GARID the proposed development will trigger pavement impact contributions of 4.85 ¢/tonne for SCR.
- Rockhampton Ridgeland and Nine Mile Road (SCR Intersection No. 2003) has a development impact greater than that considered standard growth (8.2%). A detailed intersection analysis is therefore required.
- The anticipated traffic operations volumes for all other intersections are less than 5% of the background traffic volume which is considered as expected standard growth, thus not requiring a detailed intersection analysis on SCR.
- Fogarty Road will be upgraded to a rural road standard (without seal) and shall remain the liability and responsibility of the Applicant for the duration of the development period.
- Fogarty Road and Nine Mile Road intersection shall be upgraded to an unsealed BAL with adequate turning radius to accommodate the proposed design vehicle.
- In accordance with the proposed transport route, all intersections and roads can cater for the turning requirements of the design vehicle, however only Site 1, 3, 4 and 5 can cater for Semi trailer deliveries.

In accordance with the findings above, it is the recommendation of McMurtrie Consulting Engineers that the proposed sand quarry MCU application be approved subject to the abovementioned findings being addressed prior to commencement.

I hope this assessment meets with your approval and should you have any questions please do not hesitate to call Ian McMurtrie on (07) 49 211 780.

Yours Sincerely,



Certified by Ian McMurtrie (RPEQ: 1347)
(Director)

Reference Material

- Austroads – Guide to Road Design
- Department of Transport and Main Roads – Road Planning and Design Manual
- Department of Transport and Main Roads – Guidelines for Assessment of Road Impacts of Developments
- Department of Transport and Main Roads – Pavement Impact Assessment Spreadsheet
- Department of Transport and Main Roads – Low Level Aerial Photography
- Department of Transport and Main Roads – Intersection Plans
- Rockhampton Regional Council – Capricorn Municipal Development Guidelines
- Tapsell Consulting Engineers – Proposed Site Development Layout
- Schlencker Surveying – Detail and Level Survey Plan
- Where is.com - Sensis Maps

Appendices

- Appendix A – Preliminary Traffic Evaluation
- Appendix B – Original Approval D/394-2011
- Appendix C – DTMR Pavement, Road and Traffic Data
- Appendix D – PIA (Spreadsheet Results)
- Appendix E – Turn Warrant Assessment
- Appendix F – Proposed Intersection Upgrade Layout
- Appendix G – Tapsell Consulting Engineers - Proposed Site Development Layout
- Appendix H – Schlencker Surveying – Detail and Level Survey Plan
- Appendix I – Vehicle Swept Path Plans