

Calga Sand Quarry
Southern Extension

Traffic Assessment

Prepared by:
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Specialist Consultant Studies Compendium
Part 7

Calga Sand Quarry Southern Extension

Traffic Assessment

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EXECUTIVE SUMMARY

Existing Situation

Rocla Materials Pty Ltd (Rocla) operates the Calga Sand Quarry ("the Quarry") on land adjacent to Peats Ridge Road, 1.7km northwest of the Calga Interchange on the F3 Freeway. It currently has approval for production, sales and transportation of sand products of up to 400 000tpa under Development Consent DA 94-4-2004 issued by the Minister for Planning on 28 October 2005.

The Quarry is located close to the F3 Freeway, which together with Peats Ridge Road forms the principal transport routes for Calga Sand Quarry products.

The principal transport route, used by 99% of trucks, is from the Quarry using Peats Ridge Road to Calga Interchange where the trucks access the F3 Freeway to travel south towards Sydney (80%) or north to Gosford (19%). A minor and occasional transport route serves local markets along Peats Ridge Road, north of the Quarry (1%).

The road network adjacent to the Quarry has been constructed to a high standard with appropriate traffic management along the roads and at the principal intersections.

The existing intersection that provides access to the Quarry at Peats Ridge Road has a high level of traffic management with right and left turn lanes in Peats Ridge Road and an acceleration lane in Peats Ridge Road for the right turn out of the Quarry.

Existing traffic volumes using Peats Ridge road on weekdays are relatively low and are typically in the order of 70 to 85 vehicles per hour (vph) in each direction of travel (i.e. 140 to 170 vph two way) during day time hours (7:00am to 6:00pm). Heavy vehicles are in the order of 25 to 35 vph in each direction of travel, during the same periods.

An assessment of the existing traffic conditions on the road network indicates that conditions are good and consistent with Level of Service A operation, with free flowing traffic conditions on Peats Ridge Road and minimal delays for the minor movements at the principal intersections.

While the F3 between Calga and Wahroonga experiences high traffic volumes for the peak direction of travel to and from Sydney in the weekday AM and PM periods, the RTA is currently widening the F3 to provide 3 lanes in each direction (6 lanes total), which will provide additional traffic capacity on the F3 by 2010.

The Proposed Southern Extension

Rocla proposes a southern extension to the existing quarry and a progressive increase in production, sales and transportation from 400 000tpa to 1 million tpa within the next four to eight years, by 2012 to 2016.

Vehicle access to and from the Quarry will continue to be via Peats Ridge Road. Due to the requirements to relocate the sand processing areas during the life of the Quarry, and separate land titles for the existing Quarry (also referred to as Stage 3) and the proposed southern extension area (Stages 4 and 5), a three (3) phase arrangement is proposed for vehicle access to the Quarry. This includes:

- (i) use of the existing vehicle access;
- (ii) development of a southern access point to Stages 4 and 5, 100m north of Jones Road, as a new entry, with the existing vehicle access used as an exit; and
- (iii) full access (i.e. entry and exit) via the southern access point.

The traffic management in Peats Ridge Road associated with the above vehicle access arrangements will be designed and constructed to RTA standards with suitable right and left turn deceleration lanes and right turn acceleration lanes provided at the intersections.

The principal transport routes and the proportion of product trucks using these routes will remain the same as the existing situation.

The proposed hours of operation are:

Extraction and Processing	Monday to Friday	6:00am to 10:00pm
	Saturday	6:00am to 6:00pm
Product Transportation	Monday to Friday	5:00am to 10:00pm
	Saturday	5:00am to 10:00pm

The workforce is expected to increase from 8 employees to a maximum of 21 employees once production and sales reach 1 000 000tpa. Truck drivers who are contractors will increase from 16 drivers up to 40 drivers when sales reach 1 000 000tpa.

Assessment of Traffic Impacts

The traffic generation of the proposed quarry operations, should sales reach 1 000 000tpa, is estimated to be:

- 21 employee trips plus 9 visitor and supplier light vehicle trips arriving and departing the site per day (i.e. up to 60 light vehicle movements); and
- 120 product truck loads or 240 truck movements on a weekday and 75 truck loads or 150 truck movements on a Saturday based on an average load of 29 tonnes.

Weekdays will have the higher traffic impacts and on an average weekday, the proposed operations (as compared to the existing approval) would increase the traffic generation of the Quarry by:

- 140 product truck movements on an average weekday (i.e. 70 trucks in and 70 trucks out); and
- 40 light vehicle movements per day associated with employee and visitor trips.

An assessment of the traffic conditions in the road network adjacent the Quarry in 2012 has found that traffic conditions will remain satisfactory with the Quarry operating at full production.

The maximum two way hourly future weekday traffic volumes of Peats Ridge Road south of the Quarry are expected to increase from 168 vph in 2006 to approximately 213 vph in 2012, accounting for base traffic growth (2% linear growth per year) and the proposed operation of the southern extension and increase in production and sales up to 1 000 000tpa. These future traffic volumes represent relatively low traffic two way volumes for a divided two way rural road and are representative of a Level of Service A operation in Peats Ridge Road between the access point to the Calga Sand Quarry and the F3.

The principal intersections between the Quarry and the F3 have been assessed for AM peak hour in 2012 with the additional traffic from the proposal as well as base traffic growth. This assessment has found that these intersections, including the proposed site access intersections, will continue to operate at a Level of Service A operation which is a satisfactory operation.

While there will be additional product trucks from Calga Sand Quarry using the F3 Freeway, these trucks in real terms would represent a very small proportion of the total vehicles using the F3 and as such would have minimal impacts. As noted above, the RTA are currently widening the F3 to provide for 3 lanes of travel in each direction (6 lanes in total) between Gosford and Wahroonga by 2010, which will provide additional traffic capacity on the F3.

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1 INTRODUCTION

1.1 Background

The Proponent, Rocla Materials Pty Ltd (Rocla), currently operates the Calga Sand Quarry (“the Quarry”) on land adjacent to Peats Ridge Road, 1.7km northwest of the Calga Interchange on the F3 Freeway. This Quarry, which has operated since the early 1990’s, currently operates under Development Consent DA 94-4-2004 (issued by the Minister for Planning on 28 October 2006) with approval to produce and despatch sand up to 400 000t each year. The currently approved area of extraction is referred to as Stage 3. Rocla is currently developing plans for a further extension of the quarry to the south (“the Southern Extension”, also referred to as Stages 4 and 5) on land purchased from the Roads and Traffic Authority. **Figure 1** shows the location of the Quarry and proposed southern extension.

Following consideration of environmental issues including groundwater, surface water, ecology and Aboriginal heritage, Rocla has developed a quarry plan for the proposed southern extension which includes the following components.

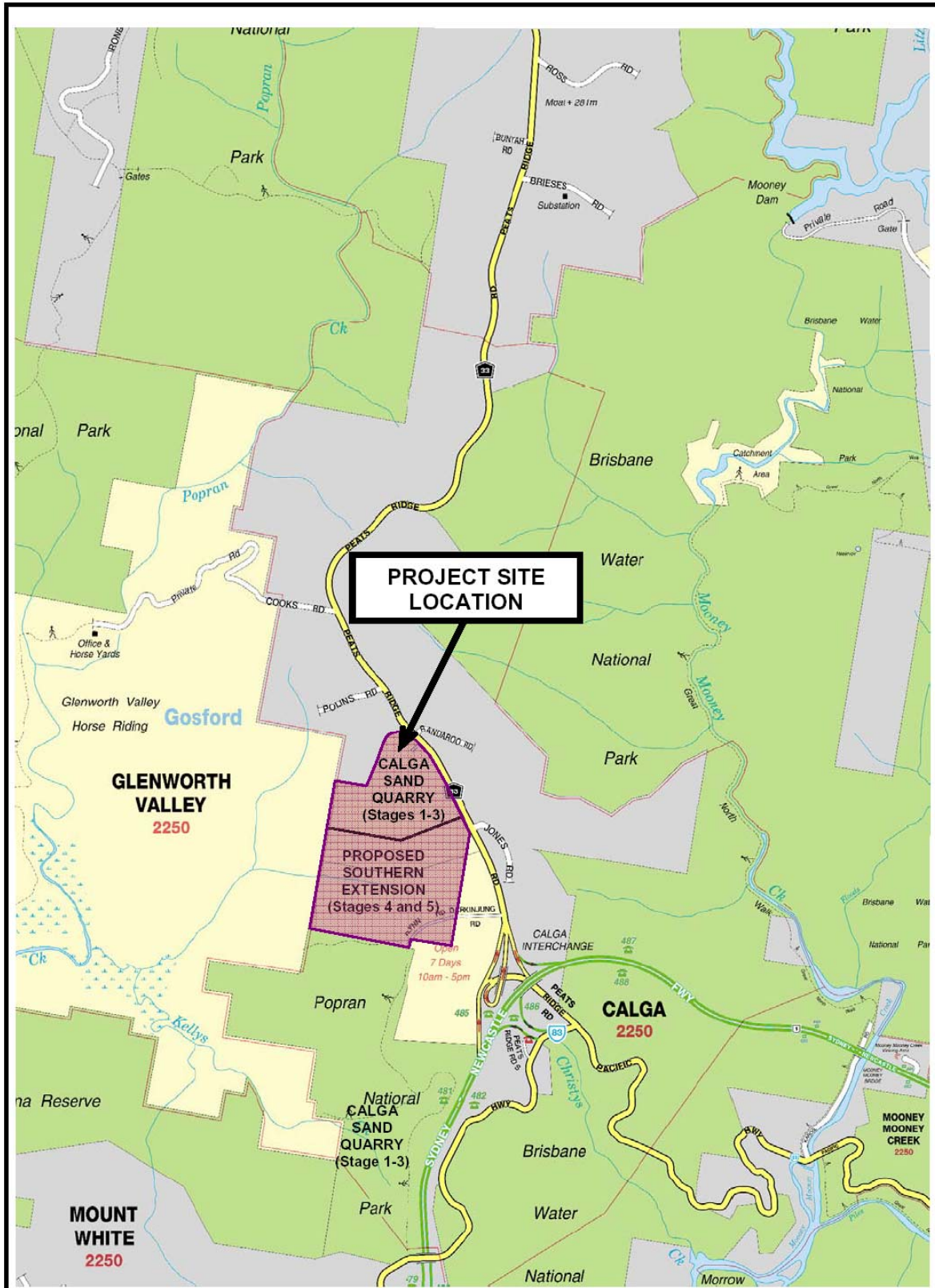
- Two extraction areas, the northern-most of which would be a direct southerly extension of the existing Calga Sand Quarry (Stage 4), and the southern-most of which would be developed as a separate pit (Stage 5).
- Sand processing plant, which would initially be relocated from its current position to the completed floor of the existing Quarry, before a second plant is constructed within Stage 4 (to allow for an increase in sand production). Ultimately both processing plant arrangements would operate within the Stage 4 extraction area (following completion of extraction from Stage 3).
- Access to the Project Site via the existing site entrance off Peats Ridge Road and an extension of the site access road. During the early stages of activities within the southern extension, a new access would be constructed from Peats Ridge Road to effectively create a one-way road in (at the new entrance) and a one-way road out (at the existing entrance). Following the completion of extraction and processing on Stage 3, the southern access point may be converted to an entrance / exit arrangement.


Rocla would continue to remove the sand on the Project Site that can be easily removed by excavator or bulldozer without any blasting.

As part of the proposed southern extension, Rocla is seeking approval to progressively increase production from 400 000tpa to 1 million tpa.

1.2 Authority Requirements

As part of the preparation of the Traffic and Transport Impact Assessment for the proposed Southern Extension and production increase (“the Project”), consideration was given to the requirements of the Director-General (of the Department of Planning), Roads and Traffic Authority and Gosford City Council, as well as any key issues identified by these authorities.



<p>TRANSPORT AND URBAN PLANNING TRAFFIC, TRANSPORT & PROJECT MANAGEMENT CONSULTANTS</p> <p>5/90 Toronto Parade, Sutherland NSW 2232 Phone 02 9545 1411 Fax 02 9545 1556</p> <p>tupa@tpg.com.au www.transurbanplan.com.au</p>	<p>N</p>  NOT TO SCALE	<p>FIGURE 1 PROPOSED SOUTHERN EXTENSION CALGA SAND QUARRY PROJECT SITE LOCATION</p> <p style="text-align: right;">JOB NO. 26140</p>
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Note: This figure is available in colour on the Project CD
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Director-General's Requirements

The Director-General's requirements (DGRs) indicated that the Traffic and Transport Assessment should include an assessment of the capacity and safety of the proposed transport routes and the traffic volumes.

Roads and Traffic Authority Requirements

The Roads and Traffic Authority's (RTA) primary interests in relation to the road network are to:

- maintain an efficient and safe road system (includes consideration in the SEPP for Mining, Petroleum Production and Extractive Industries, 2007);
- facilitate the integration of land use and transport (includes draft SEPP 66 considerations); and
- maintain the integrity and security of the road network, property and assets.

The RTA has indicated that a traffic impact study will need to be prepared in accordance with RTA requirements. The traffic study should consider:

- traffic generation of the project;
- road capacity;
- intersection delays; and
- road safety.

The RTA also suggested that the Proponent should discuss the above issues early in the environmental impact assessment process, with the RTA, Gosford City Council and other relevant authorities.

Gosford City Council Requirements

Gosford City Council indicated that the traffic study should provide:

- an assessment of the existing traffic and the impact of traffic generated by the project; and
- location of access driveways / intersections.

Gosford City Council also advised that any work in the road reserve requires Council approval under Section 138 of the *Roads Act 1993*.

A meeting was convened with representatives of Gosford City Council and the RTA on 15 May 2008 where details of the Project, including the proposed traffic management and staging arrangements during the life of the Project, were outlined.

1.3 Structure of this Report

This report has been prepared to support an *Environmental Assessment*, to assess the traffic impacts associated with the proposed southern extension and production increase.

The assessment has been undertaken in accordance with the requirements of Roads and Traffic Authority's Guide to Traffic Generating Developments October 2002 and Planning NSW EIS Guidelines – Road and Related Facilities.

Other technical standards / publications referenced in this assessment include:

- Roads and Traffic Authority's Road Design Guide.
- Austroads Guide to Traffic Engineering Parts 1-15 (as appropriate).

The remaining sections of this report address the following.

- Section 2 - provides an overview of the existing operations at the Quarry.
- Section 3 - describes the Project.
- Section 4 - examines the existing traffic conditions on the road network.
- Section 5 - evaluates the traffic impacts of the proposed southern extension and production increase.

2 EXISTING CALGA SAND QUARRY OPERATIONS

2.1 Re-existing Quarry

The Calga Sand Quarry has been operated by various operators since the early 1990's. Following a brief period of inactivity in 2005/2006 whilst a development application to extend the Quarry to the north was determined, the Quarry has operated under Development Consent DA 94-4-2004 since November 2006. DA 94-4-2004 approves the extraction, processing and transport of up to 400 000 tonnes of sand products from Stage 3 of the Quarry per year.

2.2 Hours of Operation

The hours of operation for the existing quarry are:

- Sales 5:00am to 10:00pm (Monday to Friday)
5:00am to 4:00pm (Saturday)
- Extraction & Production 7:00am to 6:00pm (Monday to Friday)
7:00am to 4:00pm (Saturday)

2.3 Employees / Workforce

The current number of employees is 8 persons with production of between 300 000tpa and 400 000tpa forecast in the immediate future. All truck drivers who undertake the transportation of the quarry sand products are contractors. There are currently 16 truck drivers.

2.4 Transport Routes

The principal transport route from the Quarry is via Peats Ridge Road to the Calga interchange where the trucks access the F3 Freeway and travel south towards Sydney or north to Gosford and other central coast markets. A minor and occasional transport route serves local markets along Peats Ridge Road, north of the Quarry.

2.5 Traffic Generation of the Existing Quarry

The traffic generation of the existing quarry consists of:

- 8 employee trips arriving and departing the site plus several visitor trips per day; and
- product delivery trucks which in the week of 7 to 13 December, 2006 averaged between 20 and 25 loads per day (i.e. 40 to 50 truck movements).

It should be noted that the current development consent allows for processing and transportation of 400 000tpa which is the equivalent of 50 truck loads and 100 truck movements on a weekday and 16 truck loads and 32 truck movements on a Saturday (based on 312 days of transportation per year).

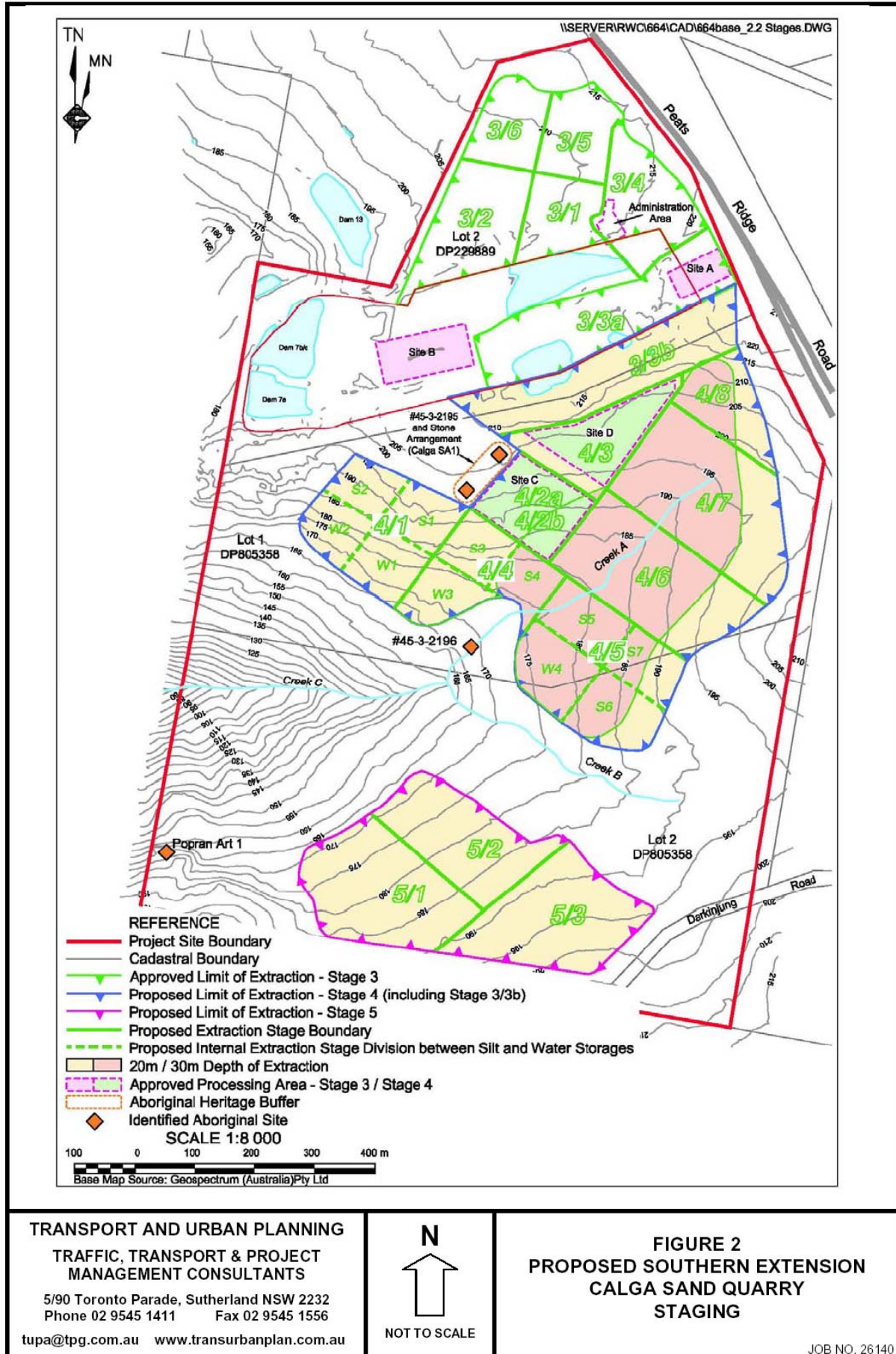
Product delivery trucks are typically single body types with trailers or semi trailers with a capacity (load) between 25 tonnes and 30 tonnes. Smaller capacity trucks between 12 tonnes and 18 tonnes are also used for local deliveries.

3 THE PROPOSED SOUTHERN EXTENSION

3.1 Description of the Project

Rocla's proposal is based on a planned extension of the Quarry to the south which includes the following components.

- Two extraction areas, the northern-most of which would be a direct southerly extension of the existing Calga Sand Quarry (Stage 4), and the southern-most of which would be developed as a separate pit (Stage 5).
- The extraction operations of Stages 4 and 5 would be concurrent with that of the existing approved area (Stage 3) and the northern section of the proposed extension (Stage 4) followed by the southern section of the extension (Stage 5). Each stage (i.e. 3, 4 and 5) will have a number of smaller extraction sub stages which are shown on **Figure 2**.



Note: This figure is available in colour on the Project CD
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Sand processing plant, which would initially be relocated from its current position to the completed floor of the existing Quarry, before a second plant is constructed within Stage 4 (to allow for an increase in sand production). Ultimately both processing plant arrangements would operate within the Stage 4 extraction area (following completion of extraction from Stage 3).

Rocla would continue to remove the sand on the Project Site that can be easily removed by excavator or bulldozer without any blasting.

As part of the proposed southern extension, Rocla is seeking approval to progressively increase production from 400 000tpa to 1 million tpa.

Maximum production levels are (1 000 000tpa) expected to be achieved by 2012 / 2013.

Vehicle access to and from the Quarry will be via Peats Ridge Road.

The proposed traffic management for access to the Quarry is based on a three (3) phase arrangement due to the following factors:

- The changing layout of the Quarry, including the requirement to relocate the processing areas during the life of the Project;
- Separate land titles for the existing approved Quarry area and the proposed southern extension area.

The details of the vehicle access and required traffic management in Peats Ridge Road for the three (3) phases are outlined in Section 5.1 of this report.

3.2 Hours of Operation

The proposed hours of operation are as follows.

Extraction and Processing	Monday to Friday	6:00am to 10:00pm
	Saturday	6:00am to 6:00pm
Product Transportation	Monday to Friday	5:00am to 10:00pm
	Saturday	5:00am to 10:00pm

3.3 Employees / Workforce

The workforce is expected to increase to a maximum of 21 employees once sales reach 1 000 000tpa. All truck drivers will continue to be contractors and up to 40 drivers would be required when sales reach 1 000 000tpa.

3.4 Transport Routes

Transport routes will remain the same as the existing transport routes (see **Figure 3**). The majority (99%) of trucks will travel to the F3 Freeway with around 80% travelling south to Sydney and 19% north to the Central Coast. The remaining 1% of product trucks will undertake local deliveries to the north of the Quarry along Peats Ridge Road.

3.5 Traffic Generation

The traffic generation when sales reach 1 000 000tpa is estimated to be:

- 21 employee trips plus 9 visitor and supplier light vehicle trips arriving and departing the site per day (i.e. up to 60 light vehicle movements); and
- 120 product truck loads or 240 truck movements on a weekday and 75 product truck loads or 150 truck movements on a Saturday.

The product delivery trucks would continue to be single body tippers with trailers or semi trailers. Larger capacity B-Double trucks may be used to deliver products from the Quarry, as well as smaller capacity trucks 12 tonne to 18 tonne for local deliveries.

The average load would remain 29 tonnes.

4 EXISTING TRAFFIC CONDITIONS

4.1 Principal Road Network

The principal road network that is adjacent to and or provides access to Calga Sand Quarry includes:

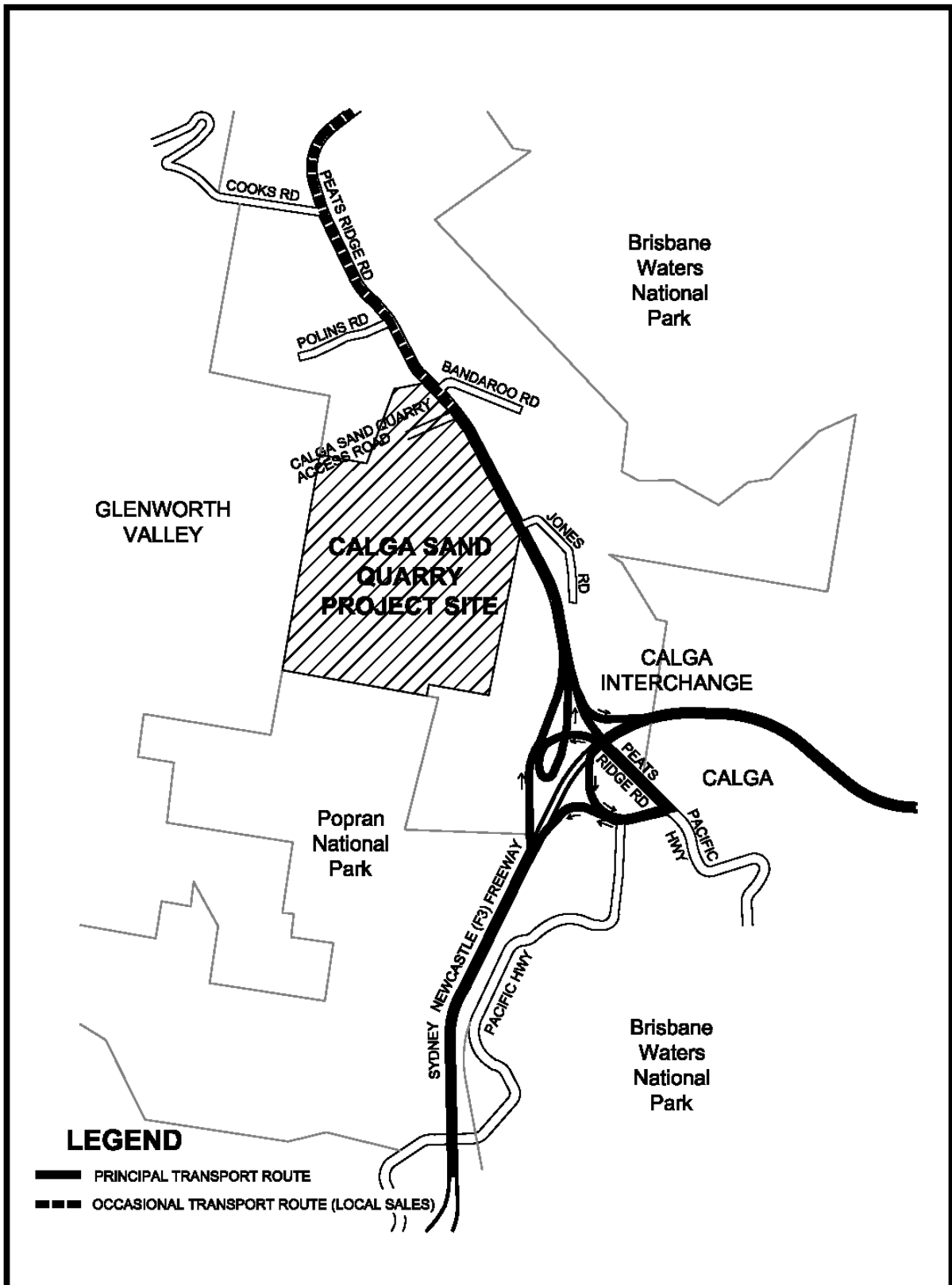
- Peats Ridge Road;
- The Calga Interchange; and
- F3 Freeway.

Figure 4 shows the principal road network adjacent to the Calga Sand Quarry.

4.2 Description of Existing Roads

4.2.1 Peats Ridge Road

Peats Ridge Road is a major north-south road which links between the F3 Freeway and the Pacific Highway at Calga and Wiseman's Ferry Road and George Downes Drive at Central Mangrove.



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FIGURE 3
PROPOSED SOUTHERN EXTENSION
CALGA SAND QUARRY
TRANSPORT ROUTES
 JOB NO. 28140

In the section adjacent to the Calga Sand Quarry, Peats Ridge Road is:

- a 4 lane divided road between south of the Quarry and Calga Interchange of the F3 Freeway; and
- a 2 or 3 lane rural road north of the Quarry, which provides overtaking opportunities for each direction of travel.

Peats Ridge Road has a high level of traffic management implemented including sealed shoulders, centre line, lane lines and edge line road markings, guide posts / reflectors (in the 2 or 3 lane sections), RPMs and advisory warning signs. Prior to the F3 being constructed, Peats Ridge Road was formerly the Pacific Highway and the main road for travelling between Sydney and the Central Coast and as such was constructed to a high standard.

The speed limit on Peats Ridge Road is 80km/h south of the Quarry and 100km/h adjacent to and north of the Quarry.

There are several minor T-intersections with Peats Ridge Road in the vicinity of the Quarry including Jones Road and Bandaroo Road. These provide access to a number of local properties.

Access to the existing Quarry is located just south of Bandaroo Road. A full description of this intersection is contained in Section 4.2.4.

Peats Ridge Road has a flat (level) grade adjacent to the Project Site.

4.2.2 Calga Interchange

Calga Interchange provides access to the F3 Freeway to travel north towards Gosford and Newcastle or south towards Sydney.

Traffic exiting or entering the F3 northbound carriageway, travelling to / from the north along Peats Ridge Road, use direct ramp connections.

Traffic exiting or entering the F3 southbound carriageway, travelling to / from the north along Peats Ridge Road travel via two intersections on Peats Ridge Road and the Pacific Highway, between the ramps and Peats Ridge Road.

The speed limit at the Calga Interchange is 60km/h and 80km/h.

4.2.3 F3 Freeway

The F3 Freeway is a multi-lane divided freeway which travels between the Sydney suburb of Wahroonga and the Newcastle District. Two to three traffic lanes are provided for each direction of travel. The speed limit on the F3 is 90km/h to 110km/h. The RTA is currently widening the F3 to provide three lanes in each direction (six lanes total).

4.2.4 Principal Intersections

The principal intersections that provide access for Calga Sand Quarry traffic to and from the principal transport routes are:

- Peats Ridge Road / Calga Sand Quarry Access Road;
- Peats Ridge Road / Pacific Highway; and
- Pacific Highway / F3 Freeway southbound carriageway on / off ramps.

Peats Ridge Road / Calga Sand Quarry Access Road

The Calga Sand Quarry Access Road forms a T junction intersection with Peats Ridge Road. The existing geometry at the intersection provides a high level of traffic management, including the following.

- A Seagull channelisation for the right movements into and out of Calga Sand Quarry providing a protected right turn bay, 150 metres long for the right turn in and a full acceleration lane for the right turn out.
- 2 through lanes northbound in Peats Ridge Road plus a left turn deceleration lane, 150 metres long for the left turn into the Calga Sand Quarry Access Road.

For trucks entering Peats Ridge Road from the Calga Sand Quarry Access Road, the available sight distance to the south is a minimum of 250 metres and in excess of 250 metres to the north. The sight distance is considered to be satisfactory. The speed limit at the intersection is 100km/h.

Give Way control is provided on the Calga Sand Quarry Access Road and advance truck warning signs are provided in Peats Ridge Road.

Peats Ridge Road / Pacific Highway

This intersection is a T junction intersection with a Seagull channelisation for the right turn movements.

Two (2) lanes are provided in all approaches at the intersection with dedicated lanes for all turning movements. The available sight distance exceeds 160 metres and is considered satisfactory for the operating vehicle speeds and the posted speed limit. The speed limit at the intersection is 60km/h.

Pacific Highway / F3 Southbound Carriageway On / Off Ramps

This intersection is a T junction intersection with a seagull channelisation for the right turns to and from the Pacific Highway. Two lanes are provided in all approaches with dedicated turning lanes.

The speed limit is 60km/h and the available sight distance at the intersection, which exceeds 200 metres, to and from the east and 150 metres to and from the west is considered satisfactory for the operating vehicle speeds and the posted speed limit.

4.3 Existing Traffic Conditions on the Road Network

4.3.1 Traffic Volumes on Road Network

Traffic volumes using the principal road network in and around the Calga Sand Quarry were collected as part of this assessment. This included published RTA traffic volumes on the F3 Freeway, as well as daily volumes and vehicle classification counts on Peats Ridge Road and the Calga Sand Quarry Access Road. Peak hour traffic volumes were also collected at the principal intersections on the road network that adjoins the Project Site. **Figure 4** shows the traffic count locations.

The traffic volume and classification counts were undertaken between 7 and 13 December, 2006. The intersection counts were undertaken during the same period.

4.3.2 Peats Ridge Road

Table 4.1 shows the traffic volumes using Peats Ridge Road south of the Calga Sand Quarry Access Road.

Reference to **Table 4.1** shows that on a typical weekday (5 day average) Peats Ridge Road, south of the Calga Sand Quarry Access Road carries two way traffic volumes of 2,408 vehicles (vpd). Heavy vehicles (Austroad Classes 3 to 12) total 814 vpd south of the Calga Sand Quarry. Heavy vehicles represent around 33.8% of the total volumes using this section of Peats Ridge Road on an average weekday. During the period 7 to 13 December, the heavy vehicles travelling to and from Calga Quarry accounted for 5.7% of the heavy vehicles south of the Calga Sand Quarry Access Road on an average weekday.

Table 4.1
Peats Ridge Road, South of Calga Sand Quarry Access Road
5 Day Average and 7 Day Average Traffic Volumes and Vehicle Classification

Direction of Travel	Weekday					
	5 Day Average			7 Day Average (AADT)		
	Light ¹	Heavy ²	Total	Light ¹	Heavy ²	Total
North	829	373	1202	919	291	1210
South	765	441	1206	864	358	1222
Total	1594	814	2408	1783	649	2432
Proportion of Total	66.2%	33.8%	100%	73.3%	26.7%	100%

Source – Traffic Counts 7 to 13 December 2006

¹ Light vehicles - Austroads 1 & 2 vehicle classifications & Motorbikes

² Heavy vehicles - Austroads 3-12 vehicle classifications

Table 4.2 shows the hourly traffic volumes on a typical weekday (5 day average) and per day (7 day average) in Peats Ridge Road, south of the Calga Sand Quarry Access Road.

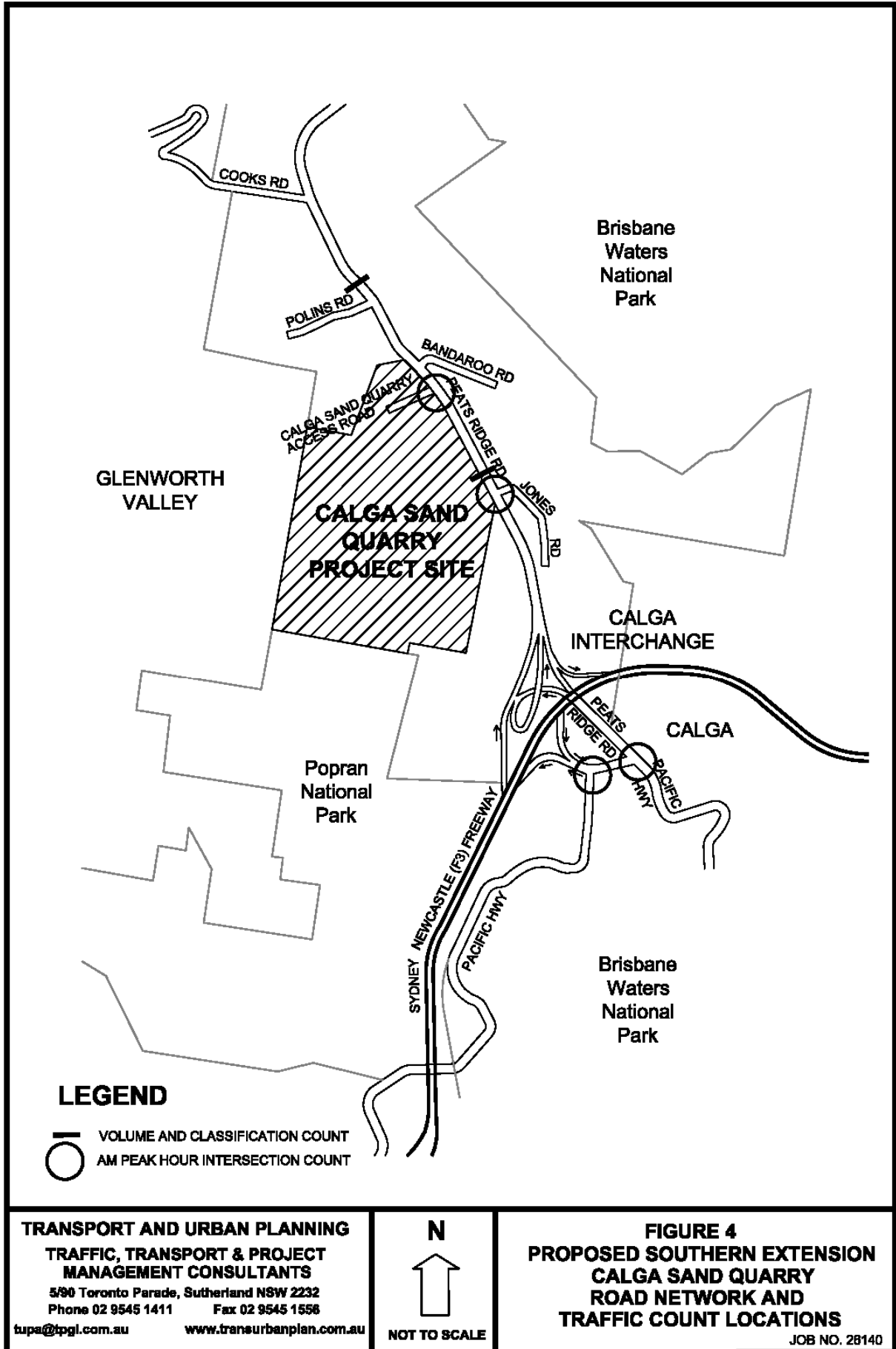


Table 4.2
Peats Ridge Road, South of Calga Sand Quarry Access Road – Hourly Traffic Volumes

Time	5 Day Average (Weekday)			7 Day Average (AADT)		
	North	South	Total	North	South	Total
Midnight – 1am	12	8	20	13	8	21
1am – 2am	7	9	16	6	9	15
2am – 3am	5	7	12	5	7	12
3am – 4am	4	15	19	4	14	18
4am – 5am	24	35	59	20	28	48
5am – 6am	43	61	104	36	49	85
6am – 7am	62	86	148	51	69	120
7am – 8am	74	87	161	70	73	143
8am – 9am	69	86	155	83	73	156
9am – 10am	83	85	168	88	78	166
10am -11am	79	81	160	90	82	172
11am – Midday	74	77	151	89	84	173
Midday – 1pm	70	73	143	80	82	162
1pm – 2pm	71	80	151	79	81	160
2pm – 3pm	71	69	140	69	80	149
3pm – 4pm	78	83	161	76	91	167
4pm – 5pm	91	71	162	86	84	170
5pm – 6pm	86	60	146	77	75	152
6pm – 7pm	58	44	102	58	51	109
7pm – 8pm	47	26	73	43	32	75
8pm – 9pm	32	23	55	28	27	55
9pm -10pm	22	15	37	20	19	39
10pm – 11pm	23	13	36	20	15	35
11pm – Midnight	17	12	29	19	11	30
Total	1202	1206	2408	1210	1222	2432

Source: Traffic Counts 7-13 December 2006

Reference to **Table 4.2** shows that the AM and PM peak hours on average weekdays generally occurs between 9am and 10am (AM peak hour) and 4pm and 5pm (PM peak hour). At these times, Peats Ridge Road, south of the Calga Sand Quarry Access Road carries:

- two way traffic volumes of 168 vehicles per hour (vph) with 83 vph northbound and 85 vph southbound in the 9am and 10am hour; and
- two way traffic volumes of 162 vehicles per hour (vph) with 91 vph northbound and 71 vph southbound in the 4pm to 5pm hour.

The highest number of heavy vehicles using this section of Peats Ridge Road on a weekday occur between 5am and 3pm and typically number between 25 and 35 vph in each direction of travel during these times.

Table 4.3 shows the hourly volumes on a typical weekday (5 day average) and per day (7 day average) in Peats Ridge Road, north of Calga Sand Quarry Access Road.

Table 4.3
Peats Ridge Road, North of Calga Sand Quarry Access Road – Hourly Traffic Volumes

Time	5 Day Average (Weekday)			7 Day Average (AADT)		
	North	South	Total	North	South	Total
Midnight – 1am	12	6	18	12	6	18
1am – 2am	7	9	16	6	8	14
2am – 3am	5	7	12	5	6	11
3am – 4am	3	15	18	3	13	16
4am – 5am	19	31	50	16	25	41
5am – 6am	36	58	94	31	46	77
6am – 7am	56	83	139	47	67	114
7am – 8am	71	84	155	67	71	138
8am – 9am	67	83	150	80	70	150
9am – 10am	78	78	156	83	72	155
10am -11am	76	78	154	86	80	166
11am – Midday	69	71	140	84	80	164
Midday – 1pm	62	68	130	73	78	151
1pm – 2pm	66	74	140	76	77	153
2pm – 3pm	67	66	133	66	79	145
3pm – 4pm	70	71	141	69	82	151
4pm – 5pm	88	66	154	84	81	165
5pm – 6pm	80	58	138	72	72	144
6pm – 7pm	56	40	96	55	47	102
7pm – 8pm	47	26	73	43	31	74
8pm – 9pm	31	21	52	28	26	54
9pm -10pm	21	14	35	19	18	37
10pm – 11pm	21	11	32	18	14	32
11pm – Midnight	15	8	23	16	9	25
Total	1123	1126	2249	1139	1158	2297

Source: Traffic Counts 7-13 December 2006

Reference to **Table 4.3** shows that the peak hour traffic volumes on weekdays using Peats Ridge Road, north of Calga Sand Quarry Access Road are in the order of:

- two way volumes of 156 vph, with 78 vph northbound and 78 vph southbound in the 9am-10am hour; and
- two way traffic volumes 154 vph, with 88 vph northbound and 66 vph southbound in the 4pm to 5pm hour.

In summary, the traffic volumes using Peats Ridge Road in the vicinity of the Project Site are relatively low and traffic conditions are considered to be good with free flowing traffic in both directions of travel. Overall, the traffic conditions on the road network adjacent the project site are representative of Level of Service A operation.

4.3.3 Calga Sand Quarry Access Road

Two way weekday volumes using the Calga Sand Quarry Access Road for the week 7 to 13 December 2006 ranged between 49 and 78 vpd with an average for the week of 60 vpd. Average number of heavy vehicles (Austroad Classes 3 to 12) was 46 vpd (two way). The highest number of heavy vehicles on any weekday was 50 vpd (two way).

4.3.4 F3 Freeway

The RTA's Publication Traffic Volume Data for Hunter and Northern Regions 2004 provides AADT traffic volumes on the F3 Freeway.

The two way 2004 volumes on the F3 at Mooney Mooney (north of Hawkesbury River Bridge) was 73 401 vehicle equivalents. There was no recorded AADT volume in 2004 for the F3 at Somersby (Reeves Street Overpass). The 2001 AADT volume at this location was 47,860 vehicle equivalents.

Twenty Four (24) hour traffic counts for August 2006 obtained from the RTA indicate that the section of the F3 north of Hawkesbury Bridge experiences high traffic volumes (3500 to 4100 vehicle equivalents per hour, [veph]) in the southbound direction in the weekday AM peak hours between 6:00am and 8:00am and high traffic volumes (3500 to 3900 veph) for the northbound direction on weekdays between 4:00pm and 6:00pm. This would indicate that the 2 lane sections of the F3 between Calga and Wahroonga would operate close to capacity during these periods.

The section of the F3 at Somersby at Reeves Road Overpass carries lower traffic volumes during weekday AM and PM periods with the southbound direction in the 6:00am to 8:00am period in the order of 2100 to 2300 veph and the northbound direction in the 4:00pm to 6:00pm period in the order of 2400 to 2600 veph.

4.3.5 Intersection Traffic Volumes and Operating Conditions

Intersection traffic counts were undertaken at the intersection of Peats Ridge Road / Calga Sand Quarry Access Road, Peats Ridge Road / Pacific Highway and Pacific Highway / F3 Southbound Carriageway On / Off Ramp on Thursday 7 December 2006 between 5am and 10am.

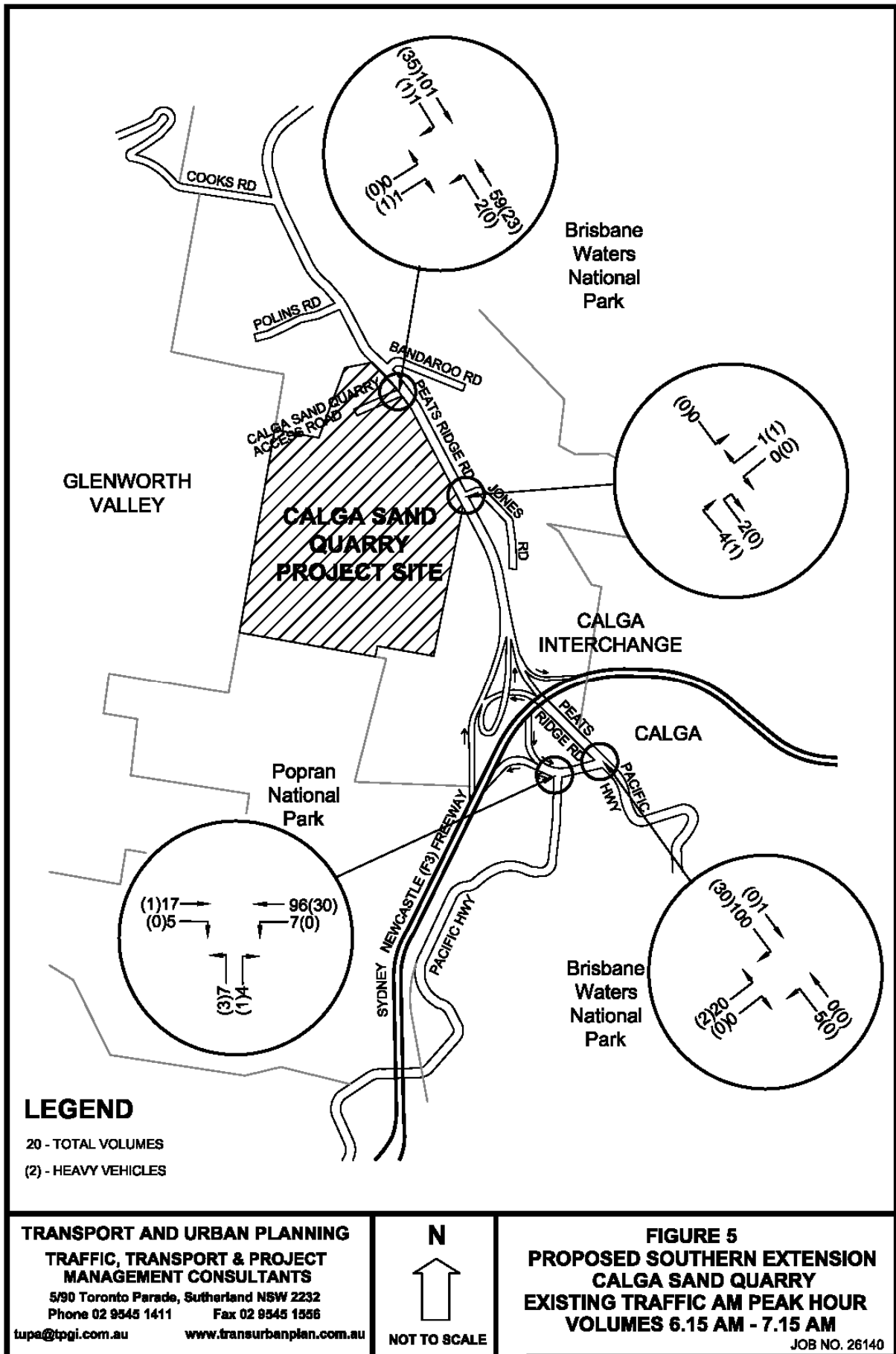
All three intersections carry relatively low levels of traffic in the AM period. The peak hour generally occurs in the period between 6.15am to 7.30am at all three intersections at which time total vehicles using the intersections was in the order of 96 vph to 135 vph.

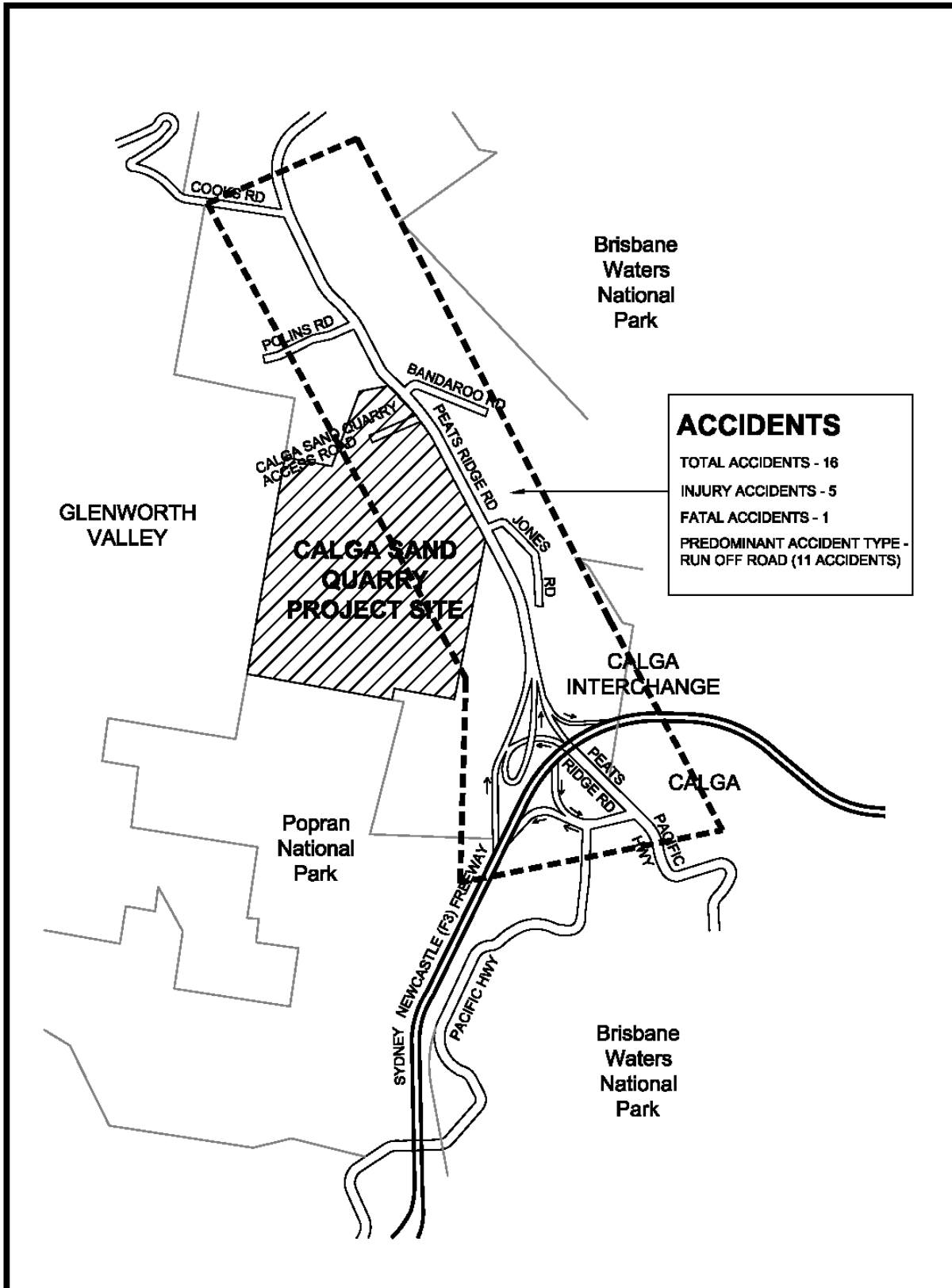
Figure 5 shows the peak hour volumes at the three intersections, for the 6.15am to 7.15am one hour period. Traffic conditions at all three intersections are good with minimal delays to the minor movements. Traffic conditions are representative of a Level of Service A operation.

4.4 Road Safety

The RTA road crash statistics were provided by the RTA for those sections of road network adjacent the Calga Sand Quarry for the 5 year period from 1 January 2001 to 31 December 2005.

The road section examined included Peats Ridge Road between Cooks Road and the Calga Interchange (see **Figure 6**).





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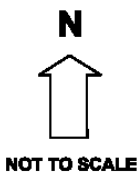


FIGURE 6
PROPOSED SOUTHERN EXTENSION
CALGA SAND QUARRY
ACCIDENT ANALYSIS
5 YEAR PERIOD 2001 - 2005

JOB NO. 26140

There was a total sixteen (16) accidents during this period of which one (1) was a fatal accident and five (5) were injury accidents. Of the sixteen (16) accidents, ten (10) were single vehicle run off the road type accidents, one (1) of which involved an articulated truck. The fatal accident was a single vehicle run off the road accident involving a car. An additional run off the road accident involved a car hitting a truck.

There were five (5) intersection accidents including one (1) injury accident and these were spread between the Pacific Highway / Peats Ridge Road intersection and the Pacific Highway / F3 Southbound Carriageway On / Off Ramps intersection, or elsewhere on the Calga Interchange.

There is no treatable pattern to the intersection accidents and or a single treatable location where the run off the road accidents occurred.

There were no accidents at the Peats Ridge Road / Calga Sand Quarry Access Road during the 5 year period.

4.5 Current RTA Road Upgrade Proposals

The RTA has the following proposals on the principal road network used by the Calga Sand Product trucks:

- Widening of F3 Freeway from 2 lanes to 3 lanes in each direction (i.e. widening from 4 lanes to 6 lanes) between Gosford and Wahroonga. This work is progressively being undertaken and scheduled for completion by 2010 (subject to no extended delays from bad weather).
- The signalisation of the intersection of Pacific Highway and the Southbound On / Off Ramps to the F3 at Calga which is currently scheduled to be implemented in the 2008/09 or 2009/10 financial years. The traffic signals would only operate when there was an incident on the F3 which caused congestion and queuing at this intersection.

4.6 Summary

The existing traffic conditions on the road network adjacent to the Calga Sand Quarry are considered to be good. While the F3 between Calga and Wahroonga experiences high traffic volumes for the peak direction of travel to and from Sydney in the weekday AM and PM periods, the RTA is currently widening the F3 to provide 3 lanes in each direction (6 lanes total), which will provide additional traffic capacity on the F3.

The road network in this area has been constructed to a high standard with appropriate traffic management along the roads and at the principal intersections.

The existing intersection that provides access for Calga Sand Quarry at Peats Ridge Road has a high level of traffic management with right and left turn lanes in Peats Ridge Road and an acceleration lane in Peats Ridge Road for the right turn out of the Quarry.

The Quarry is located close to the F3 Freeway which along with Peats Ridge Road forms the principal transport routes for Calga Sand Quarry products.

Traffic volumes using Peats Ridge road on weekdays are relatively low and are typically in the order of 70 to 85 vph in each direction of travel (i.e. 140 to 170 vph two way) during the day time hours. Heavy vehicles are in the order of 25 to 35 vph in each direction of travel, at the same times.

An assessment of traffic conditions on the road network indicates that conditions are good with free flowing traffic conditions on Peats Ridge Road and minimal delays for the minor movements at the principal intersections. Prior to the F3 being constructed, Peats Ridge Road was formerly the Pacific Highway and the main road travelling between Sydney and the Central Coast and as such carried substantially higher traffic volumes than it does today.

A review of the accident levels that occurred on the road network for the 5 year period between 2001 and 2005 does not indicate any significant or treatable accident problem on the road network.

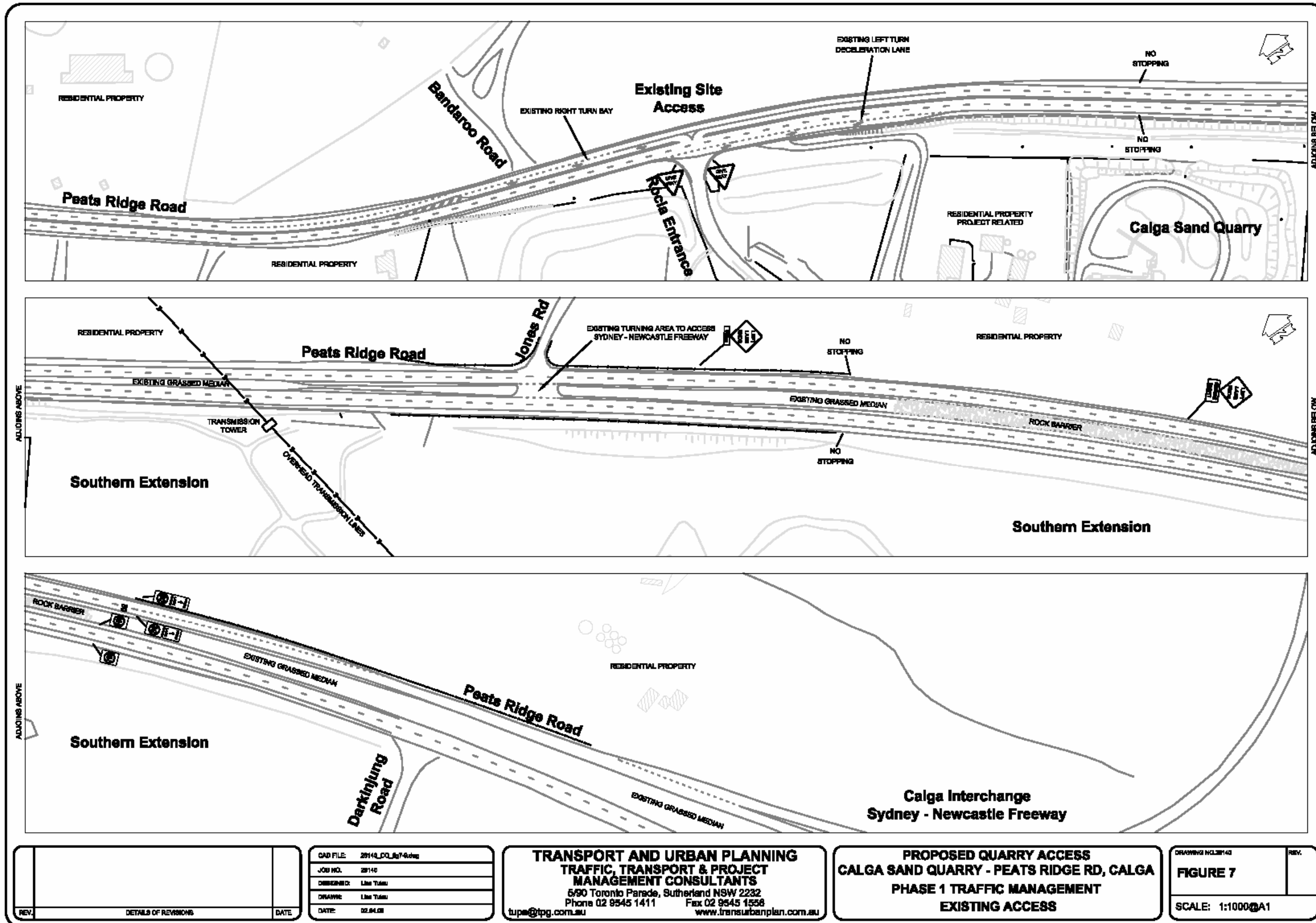
5 ASSESSMENT OF TRAFFIC IMPACTS OF PROPOSAL

5.1 Proposed Traffic Management in Peats Ridge Road

As noted in Section 3.1. a three phase arrangement for vehicle access to the Quarry from Peats Ridge Road is proposed over the life of the Project due to the progress of extraction and processing activities and land title / ownership issues.

The proposed traffic management for vehicle access is as follows.

- Phase 1 involves the continued use of the existing northern entrance from Peats Ridge Road (in its current arrangement) for inbound and outbound traffic movements and would continue to be used for Stages 3/1 to 3/3, and the earlier stages of Stage 4, 4/1 to 4/3. This arrangement would continue until such time as an area for the construction of a processing plant within Stage 4/2a and access road linking Stage 4/2a to Peats Ridge Road is complete. It is anticipated the Phase 1 arrangement would operate for approximately 2 to 3 years but would ultimately be dependent on production and sales levels. Production levels during Phase 1 could be up to 600 000tpa. **Figure 7** shows this arrangement.
- Phase 2 requires the development of a new entrance to the southern extension area south of the existing entrance and would use the two entrances (the existing entrance / exit would be retained) as a one way pair with the new or southern entrance being used for inbound or returning trucks and the northern (existing) entrance being used for outbound trucks (i.e. trucks leaving the Quarry). Creating and maintaining the two access points would assist in the efficiency of transport operations by ensuring all movements of product trucks on site is in a single direction, with the number of movements at each access point effectively halved. The proposed Phase 2 access arrangement are shown on **Figure 8** and include the new vehicle entrance 100 metres north of Jones Road together with a right turn bay and left turn deceleration lane in Peats Ridge Road. A right turn bay is also proposed for the existing right turn and U turn movements that occur at Jones Road. The proposed location for the southern vehicle entrance was nominated in the sale contract for the land, when purchased from the RTA.



REV.	DETAILS OF REVISIONS	DATE

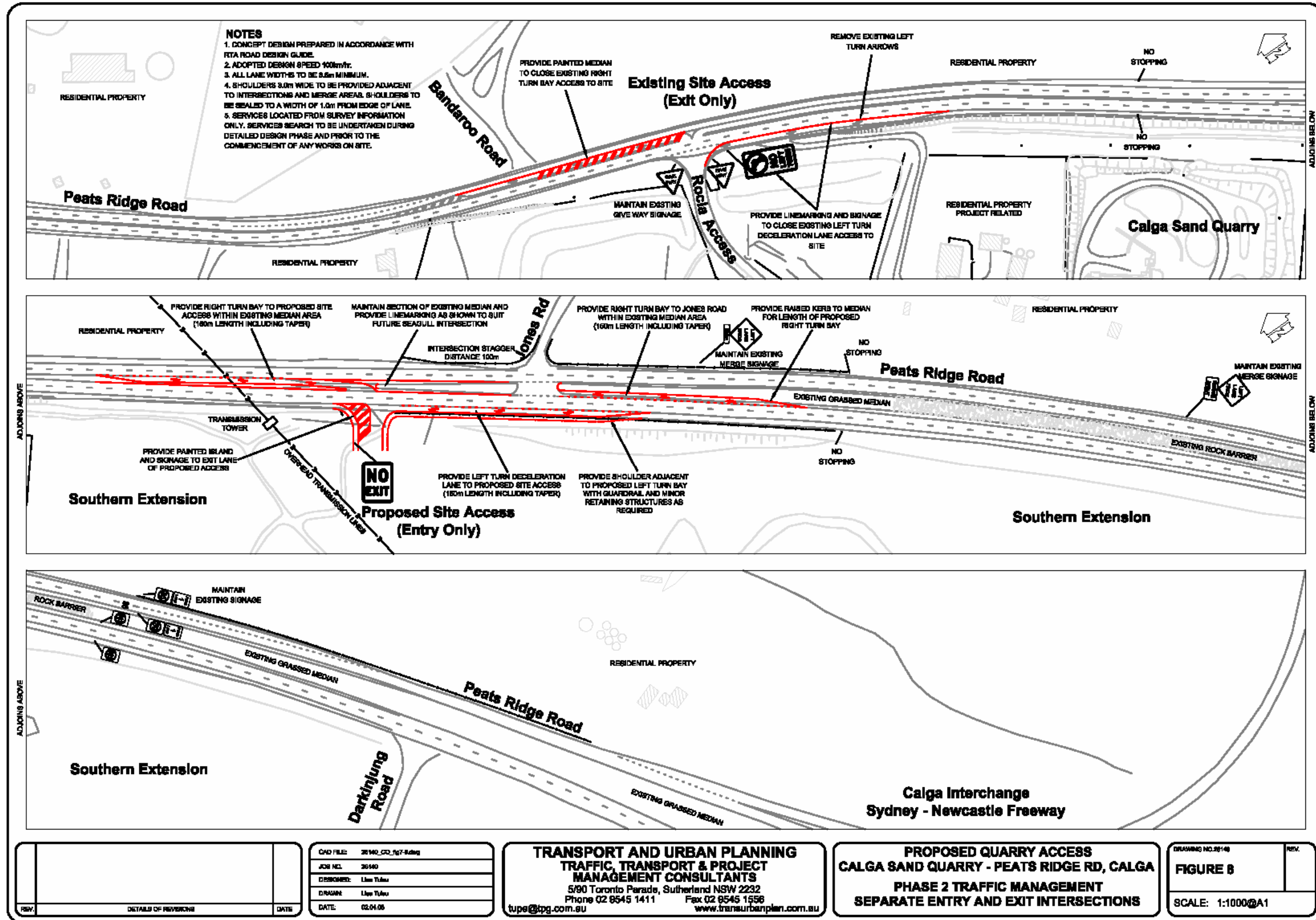
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DESIGNED BY:	Lin Tulu
DRAWN BY:	Lin Tulu
DATE:	02.04.08

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PROPOSED QUARRY ACCESS
CALGA SAND QUARRY - PEATS RIDGE RD, CALGA
PHASE 1 TRAFFIC MANAGEMENT
EXISTING ACCESS

DRAWING NO. 29140	REV.
FIGURE 7	
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REV	DETAILS OF REVISIONS	DATE

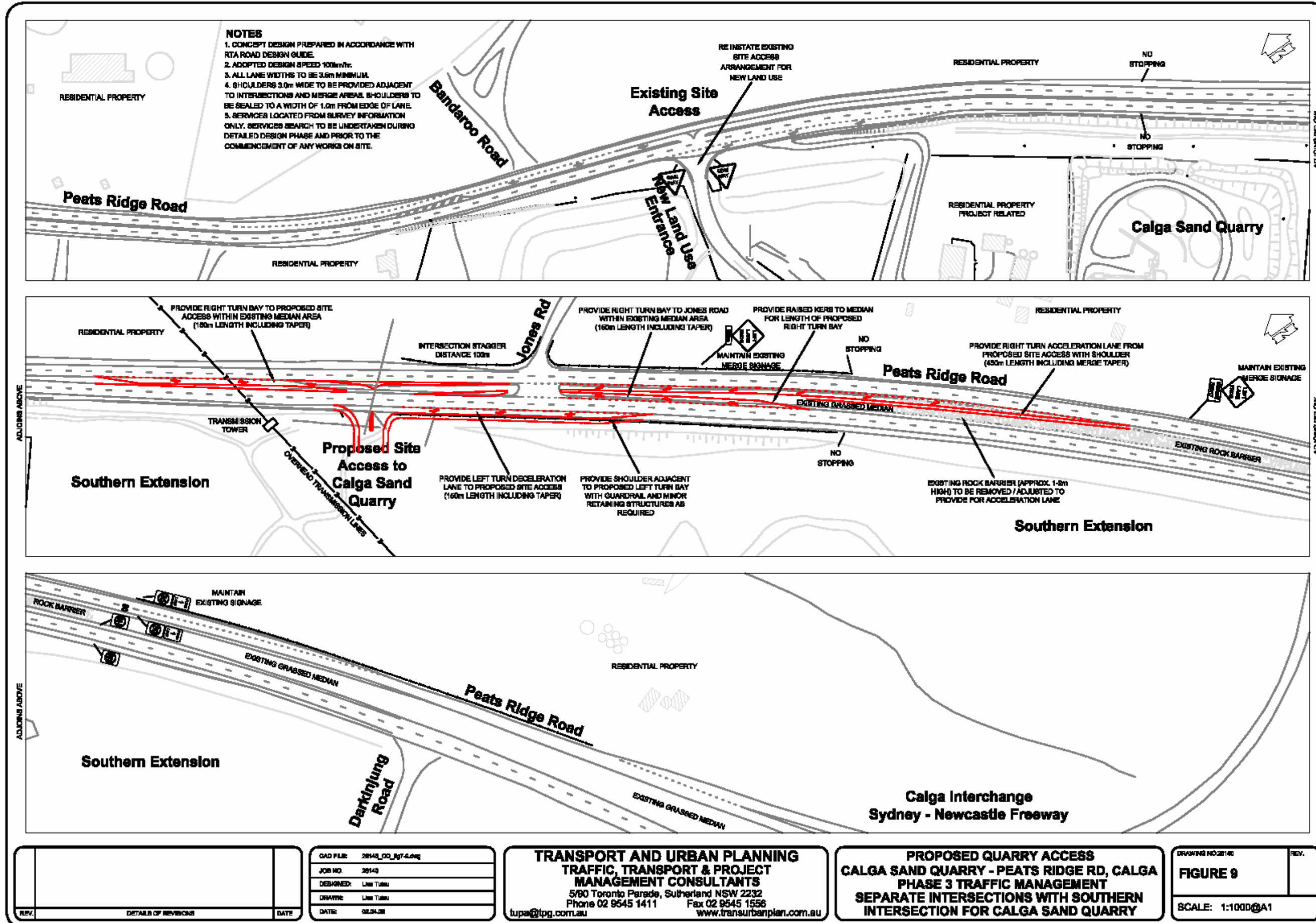
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JOB NO.:	26140
DESIGNED:	Liam Tolan
DRAWN:	Liam Tolan
DATE:	02.04.06

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PROPOSED QUARRY ACCESS
CALGA SAND QUARRY - PEATS RIDGE RD, CALGA
PHASE 2 TRAFFIC MANAGEMENT
SEPARATE ENTRY AND EXIT INTERSECTIONS

DRAWING NO. 26140	REV.
FIGURE 8	
SCALE: 1:1000@A1	

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- The Phase 2 arrangement would be maintained until at least the completion of extraction from Stage 3/6 which will coincide with Stage 4/5 and may continue until the completion of the Project (depending on future land use and ownership arrangements on the existing quarry land (Lot 2, DP 229889)). This arrangement would provide for production and transportation (depending on sales) of up to 1 000 000tpa.
- Phase 3 may occur when operations cease on Stage 3 of the Quarry (at the completion of Stage 3). As noted above, the northern and southern portions of the Project Site are under separate land titles.
- Under the Phase 3 arrangement, which is shown in **Figure 9**, Rocla would use the southern access point for entry / exit for the Quarry and the additional improvements including the seagull channelisation and a right turn acceleration lane in Peats Ridge Road for the right turn out of the Quarry would be implemented.
- Under Phase 3, the northern access could be reinstated to its existing channelisation to provide access to the northern portion of the land for a future (unknown) land use. Any future land use on this land would be subject to a new (separate) development application.

5.2 Proposed Intersection Arrangements for Phases 2 and 3

The proposed traffic management arrangements in Peats Ridge Road for Phase 2 (see **Figure 8**) includes:

- The painting out of the right and left turn lanes in Peats Ridge Road at the existing northern entrance and the provision of signage to convert this access to exit only movements from the Quarry;
- A new southern entry road to the Quarry 100 metres north of Jones Road to provide for the entry movements into the Quarry together with:
 - a left turn deceleration lane 150 metres long including taper;
 - a right turn bay 150 metres long including taper; and
- A dedicated right turn bay 150 metres long including taper in Peats Ridge Road at Jones Road for the right turn into Jones Road and U turn movements.

The proposed traffic management arrangements in Peats Ridge Road for Phase 3 (see **Figure 9**) includes:

- converting the southern access road to entry / exit movements and retaining the right and left turn bays in Peats Ridge Road for the entry movements; and
- providing seagull channelisation at the intersection and a right turn acceleration lane 450 metres long in Peats Ridge Road for the right turn out of the Quarry.

The sight distance at the proposed southern access road in Peats Ridge Road has been examined and is in excess of 250 metres to the north and south and considered to be satisfactory for the existing 100km/h speed limit.

5.3 Traffic Generation

5.3.1 Product Trucks

Table 5.1 shows the projected traffic generation in 2 hour intervals of the product trucks for the current approval of 400 000tpa and the proposed 1 000 000tpa (as well as an interim 600 000tpa) for the average weekday and Saturdays based on average loads of 29 tonnes.

Table 5.1
Projected Truck Movements (Average) - Monday to Saturday

Time Period	Current (Stage 3) - 400 000tpa		Proposed (Stage 3, 4 & 5) - 600 000tpa		Proposed (Stage 3, 4 & 5) - 1 000 000tpa	
	Monday to Friday	Saturday	Monday to Friday	Saturday	Monday to Friday	Saturday
5:00 am to 7:00 am	14	8	21	12	35	20
7:00 am to 9:00 am	18	10	27	15	45	25
9:00 am to 11:00 am	18	6	27	9	45	15
11:00 am to 1:00 pm	18	4	27	6	45	10
1:00 pm to 3:00 pm	12	2	18	3	30	5
3:00 pm to 6:00 pm	10	2	12	3	20	5
6:00 pm to 8:00 pm	6	-	6	3	12	5
8:00 pm to 10:00 pm	4	-	6	3	8	5
Total*	100	32	144	54	240	90
Av. Tonnes per day	1 450	464	2 088	783	3 480	1 305

* One truck movement equates to a single, one-way journey, ie. a round trip equates to two truck movements. Each truck exiting the Calga Sand Quarry would carry an average of 29t of sand.

Source: Rocla Materials Pty Ltd

The scheduling of the truck movements entering and exiting the Project Site reflects both Rocla's preference to avoid, where practicable, the morning peak period on the F3 Freeway and other Sydney roads, as well as the 2.5 to 3 hour return trip time for trucks between the Quarry and Sydney markets.

In order to import additional raw friable sandstone from nearby excavations and neighbouring properties, as well as soil and fine aggregates, a small number of additional trucks would enter and exit the Quarry. The frequency of these movements would depend on demand for the various sand products at any given time but it is unlikely that the maximum number of truck movements, as provided in **Table 5.1** would be increased given the likely emphasis upon back-loading the bulk of trucks delivering the imported raw materials.

Reference to **Table 5.1** shows that when sales reach 1 000 000tpa, the project will generate:

- 240 truck movements per day, i.e. on an average weekday (120 trucks in and 120 trucks out);
- 90 truck movements on an average Saturday (i.e. 45 trucks in and 45 trucks out).

The maximum hourly volumes on an average weekday will be higher than for a Saturday and will be in the order of 22 to 23 truck movements per hour (i.e. 11 to 12 trucks in and 11 to 12 trucks out). Allowing for some bunching of product truck movements and / or fluctuating daily sales, the maximum hourly product truck volume is estimated to be 28 to 30 truck movements or 14 to 15 trucks in and 14 to 15 trucks out in a busy one hour period.

Table 5.2 shows the increase in product truck movements attributable to the project in 2 hour intervals from the approved 400 000tpa and when sales levels reach the interim 600 000tpa and ultimately 1 000 000tpa.

Table 5.2
Increase in Product Truck Movements Due to the Project at 600 000tpa and 1 000 000tpa
Monday to Saturday (Average Day)

Time Period	Proposed (Stage 3, 4 & 5) - 600 000tpa Increase in Product Trucks from Current Approval		Proposed (Stage 3, 4 & 5) - 1 000 000tpa Increase in Product Trucks from Current Approval	
	Monday to Friday	Saturday	Monday to Friday	Saturday
5:00 am to 7:00 am	+7	+4	+21	+12
7:00 am to 9:00 am	+9	+5	+27	+15
9:00 am to 11:00 am	+9	+3	+27	+9
11:00 am to 1:00 pm	+9	+2	+27	+6
1:00 pm to 3:00 pm	+6	+1	+18	+3
3:00 pm to 6:00 pm	+2	+1	+10	+3
6:00 pm to 8:00 pm	+0	+3	+6	+5
8:00 pm to 10:00 pm	+2	+3	+4	+5
Total*	+44	+22	+140	+58

* One truck movement equates to a single, one-way journey, ie. a round trip equates to two truck movements. Each truck exiting the Calga Sand Quarry would carry an average of 29t of sand.

Reference to **Table 5.2** shows that when sales and production reach 1 000 000tpa, the increase in the number of product trucks from the existing approval would be:

- an additional 140 product truck movements per day on an average weekday (i.e. 70 trucks in and 70 trucks out); and
- an additional 58 product truck movements on an average Saturday (i.e. 29 trucks in and 29 trucks out).

The increase in the maximum hourly volumes on the average weekday is estimated to be:

- an additional 13 to 14 product truck movements per hour (i.e. 6 to 7 trucks in / 6 to 7 trucks out) on an average day; and
- an additional 19 to 20 product truck movements per hour (i.e. 9 to 10 trucks in / 9 to 10 trucks out in a busy one hour period).

5.3.2 Employee and Visitors

In addition to the product trucks, employee and visitor trips will increase from the existing 20 trips (10 in / 10 out) up to an estimated 60 trips (i.e. 30 in / 30 out) per day on a weekday when sales reach 1 000 000tpa.

These trips will be light vehicle trips. Employee trips will occur at shift start and finish times, ie. 6:00am, 12:00pm, 4:00pm and 10:00pm. Visitor trips will generally be spread through the day between 7:00am to 5:00pm.

5.4 Assessment of Impacts Associated with Increased Traffic Levels

5.4.1 Road Network

The assessment of the traffic impacts of the Project on the road network has been undertaken when sales reach maximum levels of 1 000 000tpa, which is anticipated to occur between 2012 and 2016. For the purpose of the traffic assessment, 2012 has been adopted. Traffic volumes associated with the Project would be higher on weekdays and therefore the impacts associated with the Project have been assessed for weekdays. In 2012, there would be an increase of:

- 140 product truck movements on an average weekday (i.e. 70 trucks in and 70 trucks out); and
- 40 light vehicle movements per day associated with employee and visitor trips.

Based on the traffic assignment outlined in Section 3.4, where 99% of all trucks are expected to travel to the F3 Freeway, there would be no discernible increase in truck movements north of Calga Sand Quarry and the only traffic increase would be associated with any increase in work / employee trips from the area, north of the Quarry on Peats Ridge Road. This is estimated to be in the order of 2 to 4 trips per day (i.e. 1 to 2 in and 1 to 2 out).

The increase in traffic volumes using the road network south of the Quarry on an average weekday is expected to be a total of 178 vehicle trips consisting of 140 truck movements and 38 employee / visitor trips in Peats Ridge Road.

The majority, if not all of these trips, would travel to / from F3 ramps and then either south towards Sydney or north towards the Central Coast.

Assuming that the employee / visitor trips are split relatively evenly between north and south movements on and off the F3, the estimated increase of traffic from the Project on an average weekday will be in the order of:

- a total of 50 (two way) trips per day (i.e. 25 trips in each direction) using the F3 towards the Central Coast consisting of 30 truck movements and 20 employee / visitor trips; and
- a total of 128 (two way) trips per day (i.e. 64 trips in each direction) using the F3 towards Sydney consisting of 110 truck movements and 18 employee / visitor trips.

The maximum hourly volume of product trucks using the F3 in the AM period from 5:00am to 9:00am would be:

- a total of 6 product truck movements (ie. 3 trips in each direction) travelling to and from the Central Coast; and
- a total of 24 product truck movements (ie. 12 trips in each direction) travelling to and from Sydney.

In terms of impacts, the increase in vehicle movements using the F3 would be insignificant given the existing and likely future traffic volumes that currently use, or will use the F3.

The total product truck volumes associated with the project on an average weekday and during the maximum 1 hour period would represent:

- less than 1% of the total existing volume of traffic using the F3 at Mooney Mooney on an average weekday; and
- less than 1% of the total existing southbound traffic volume travelling in the AM peak hour at Mooney Mooney for that directions of travel.

These proportions would reduce further with future traffic growth on the F3.

As noted in Section 4.5, the F3 is currently being widened to 6 lanes, providing 3 lanes in each direction between Gosford and Wahroonga. This work is expected to be completed by 2010 and will provide additional traffic capacity on the Freeway.

The impacts in the section of Peats Ridge Road between the Quarry entrance(s) and the F3 are also assessed to be satisfactory due to the relatively low traffic volumes that use Peats Ridge Road.

The 2006 average weekday traffic volume in Peats Ridge Road south of Calga Sand Quarry access road is 2 408 vehicles per day of which 33.8% are heavy vehicles (**Table 4.1**).

Adjusting this volume for the daily traffic generation of the current approval for Calga Sand Quarry provides an average weekday volume of 2 478 vpd of which 35.4% would be heavy vehicles.

Assuming future traffic growth on Peats Ridge Road is a linear 2% per year between 2006 and 2012 (i.e. 12% increase) would provide a weekday base volume in 2012 (without Calga Sand Quarry Extension Proposal) of 2 933 vpd of which 35.4% would be heavy vehicles.

By 2012, Calga Sand Quarry is estimated to increase the weekday traffic volume in Peats Ridge Road, south of the Quarry by 178vpd on an average weekday of which 140 trips will be truck movements. At this time, the total weekday traffic volume is estimated to be 2 953 vpd of which 38.0% are estimated to be heavy vehicles.

Therefore by 2012, the Project is estimated to increase traffic volumes in this section of Peats Ridge Road by 6.4% from the future 2012 base volumes and would increase the proportion of heavy vehicles by 2.6% on an average weekday.

The maximum two way hourly future weekday traffic volumes in Peats Ridge Road south of the Quarry are expected to increase from 168 vph in 2006 to around 213 vph in 2012 with base traffic growth (2% linear growth per year) and with the sales at the Quarry approaching 1 000 000tpa.

These future traffic volumes represent relatively low traffic two way volumes for a divided two way rural road and are representative of a Level of Service A operation in Peats Ridge Road between the Quarry and the F3.

5.4.2 Intersections

To examine the impacts of the additional traffic from the proposal, traffic modelling has been undertaken using the SIDRA software package at the principal intersections used by Project trucks between the Quarry and the F3 which are:

- Peats Ridge Road / Calga Sand Quarry Access Road;
- Peats Ridge Road / Pacific Highway; and
- Pacific Highway / F3 Freeway southbound carriageway on / off ramps.

The modelling has been undertaken for the 6:15am to 7:15am period for the existing (2006) and projected future 2012 traffic volumes at these intersections (see **Figures 5 and 10**) using the existing and future traffic management that is proposed for these intersections. For the future 2012 scenario, it is assumed that the maximum traffic hour for the Quarry would overlap with the AM peak hour on the road network.

For the proposed access to Calga Sand Quarry in Peats Ridge Road, both the Phase 2 and Phase 3 traffic management arrangements have been modelled.

The existing priority control has been maintained at the Pacific Highway / F3 Southbound On / Off Ramps intersection, as the proposed traffic signals at this intersection will only operate when there is an incident on the F3, which would affect this intersection.

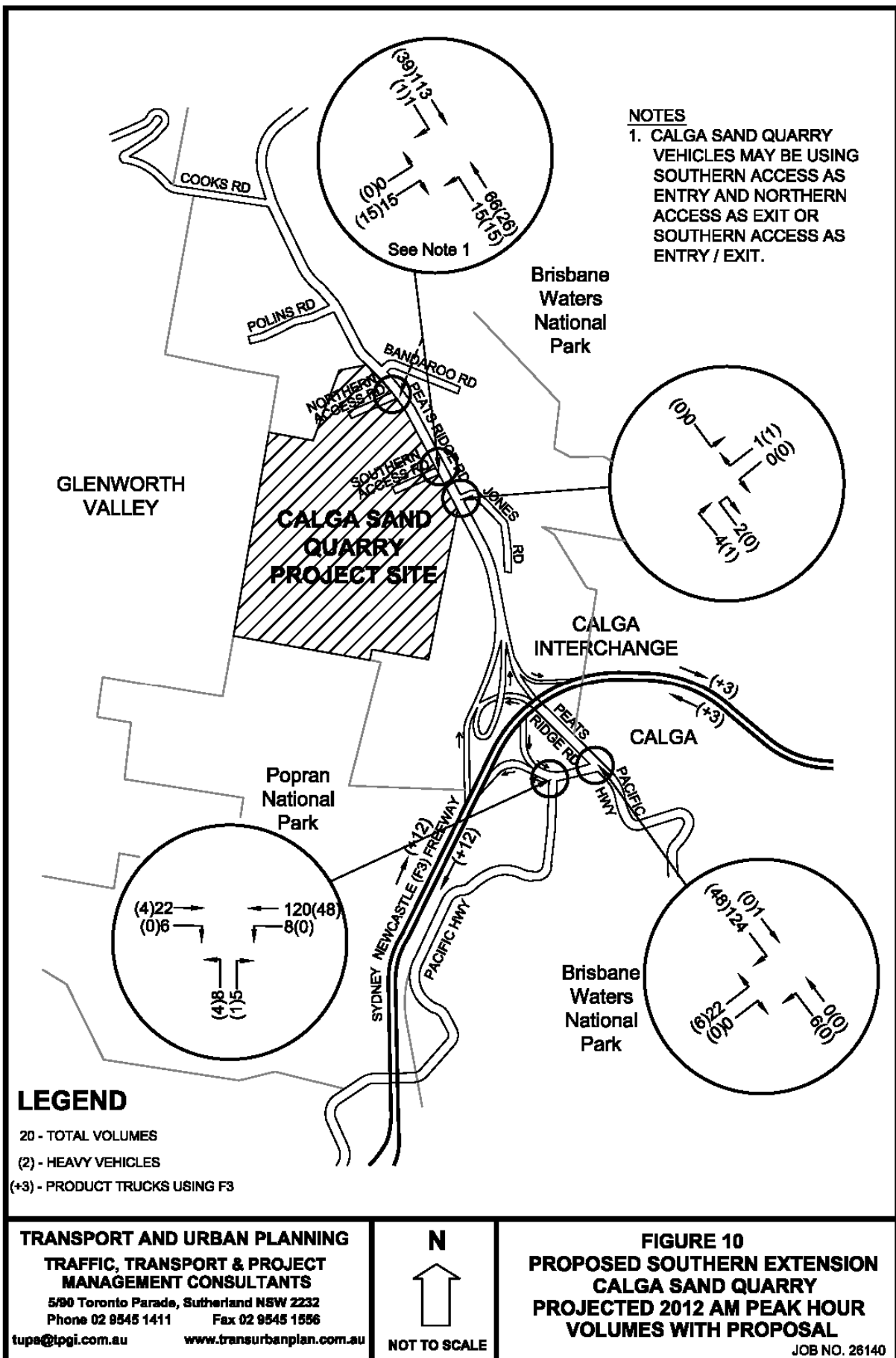
SIDRA assesses the operational performance of intersections under traffic signal, roundabout or sign control. The best criteria for assessing intersections controlled by sign control are Level of Service (LS), Degree of Saturation (DS), and Average Vehicle Delay (AVD). **Table 5.3** shows the Level of Service Criteria for intersections as reproduced from the RTA's Guide to Traffic Generating Developments. The desirable design criteria for intersections is a Level of Service C or better.

For intersections controlled by Give Way / Stop signs, the Level of Service of the intersection is determined by the movement with the highest average vehicle delay and not the average vehicle delay for all vehicles using the intersection.

Table 5.3
Level of Service Criteria for Intersections

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode

Source: Table 4.1 RTA Guide to Traffic Generating Developments October 2002



The results of the traffic modelling are shown in **Tables 5.4, 5.5, 5.6 and 5.7.**

Table 5.4
SIDRA Modelling - Peats Ridge Road & Calga Sand Quarry Access
Existing AM Peak Hour and for 2012 AM Peak Hour with Project
and Phase 3 Traffic Management

Movement	Existing				2012 With Proposal & Phase 3 Traffic Management			
	DS	AVD	LS	95% Queue Length (m)	DS	AVD	LS	95% Queue Length (m)
Calga Sand Quarry Access								
Left	0.015	12.5	A	1	0.002	12.2	A	0
Right	0.015	12.4	A	1	0.044	13.3	A	3
Peats Ridge Rd South Leg								
Left	0.003	10.4	A	0	0.008	10.4	A	0
Through	0.016	0	A	0	0.018	0	A	0
Peats Ridge Rd North Leg								
Through	0.054	0	A	0	0.031	0	A	0
Right	0.003	12.6	A	0	0.003	12.6	A	0
All Vehicles	0.54	0.8	A	1	0.044	1.8	A	3
Where:								
DS	Degree of Saturation							
AVD	Average Vehicle Delay in Seconds							
LS	Level of Service							
95%tile Queue Length	95%tile Back of Queue Length in metres							

Table 5.5
SIDRA Modelling - Peats Ridge Road & Calga Sand Quarry Access
2012 AM Peak Hour with Project and Phase 2 Traffic Management

Movement	2012 With Project & Phase 2 Traffic Management Entry Intersection				2012 With Project & Phase 2 Traffic Management Exit Intersection			
	DS	AVD	LS	95% Queue Length (m)	DS	AVD	LS	95% Queue Length (m)
Calga Sand Quarry Access								
Left	-	-	-	-	0.045	12.8	A	3
Right	-	-	-	-	0.045	13.4	A	3
Peats Ridge Rd South Leg								
Left	0.008	10.4	A	0	-	-	-	-
Through	0.018	0	A	0	0.018	0	A	0
Peats Ridge Rd North Leg								
Through	0.035	0	A	0	0.062	0	A	0
Right	0.003	13.1	A	0	-	-	-	-
All Vehicles	0.035	0.8	A	0	0.062	1.1	A	3
Where:								
DS	Degree of Saturation							
AVD	Average Vehicle Delay in Seconds							
LS	Level of Service							
95%tile Queue Length	95%tile Back of Queue Length in metres							

Table 5.6
SIDRA Modelling - Peats Ridge Road & Pacific Highway
Existing AM Peak Hour and 2012 AM Peak Hour with Project

Movement	Existing				2012 With Project			
	DS	AVD	LS	95% Queue Length (m)	DS	AVD	LS	95% Queue Length (m)
Pacific Highway South Leg								
Left	0.003	7.6	A	0	0.003	7.6	A	0
Through	0.000	0	A	0	0.001	0	A	0
Peats Ridge Rd North Leg								
Through	0.001	0	A	0	0.001	0	A	0
Right	0.111	9.3	A	6	0.157	9.7	A	10
Pacific Highway West Leg								
Left	0.018	7.9	A	1	0.029	8.3	A	1
Right	0.001	8.6	A	0	0.002	8.9	A	0
All Vehicles	0.111	8.9	A	6	0.157	9.2	A	10
Where:								
DS	Degree of Saturation							
AVD	Average Vehicle Delay in Seconds							
LS	Level of Service							
95%tile Queue Length	95%tile Back of Queue Length in metres							

Table 5.7
SIDRA Modelling - Pacific Highway & Southbound On/Off Ramps to F3
Existing AM Peak Hour and 2012 AM Peak Hour with Project

Movement	Existing				2012 With Project			
	DS	AVD	LS	95% Queue Length (m)	DS	AVD	LS	95% Queue Length (m)
Pacific Highway South Leg								
Left	0.010	10.8	A	1	0.014	11.4	A	1
Right	0.005	9.9	A	0	0.006	10.2	A	0
Pacific Highway East Leg								
Left	0.004	7.6	A	0	0.004	7.6	A	0
Through	0.052	0	A	0	0.068	0	A	0
On/Off Ramps West Leg								
Through	0.009	0	A	0	0.010	0	A	0
Right	0.003	8.5	A	0	0.004	8.7	A	0
All Vehicles	0.052	1.5	A	1	0.068	1.5	A	1
Where:								
DS	Degree of Saturation							
AVD	Average Vehicle Delay in Seconds							
LS	Level of Service							
95%tile Queue Length	95%tile Back of Queue Length in metres							

Tables 5.4 and 5.5 show the operation for Peats Ridge Road and the Calga Sand Quarry Access Road for the existing and future operation with Phase 3 traffic management (**Table 5.4**) and for Phase 2 traffic management, which will have separate entry and exit intersections in Peats Ridge Road (**Table 5.5**).

These intersections will continue to operate at a Level of Service A operation with low vehicle delays for all movements under the proposed traffic arrangements in Peats Ridge Road and with the project in place. For the Phase 3 traffic management, which is the new consolidated intersection north of Jones Road, the modelling reflects that the new Calga Sand Quarry Access Road will have sufficient room to accommodate a left and right turn vehicle at the intersection in the Access Road, which will reduce the overall delay for these movements.

Tables 5.6 and **5.7** show the modelling results for Peats Ridge Road / Pacific Highway (**Table 5.6**) and Pacific Highway / Southbound On/Off Ramps to F3 (**Table 5.7**). Reference to these tables shows that both these intersections will also continue to operate at a Level of Service A operation with low vehicle delays with the Project in place.

5.4.3 Road Safety

The Project would increase the number of heavy vehicles accessing the Calga Sand Quarry and using Peats Ridge Road to the F3, as well as the F3.

All of these roads are engineered to current standards and the RTA are currently improving the F3 Freeway to provide additional lanes and capacity between Gosford and Wahroonga. The proposed changes to Calga Sand Quarry vehicle access in Peats Ridge Road would be designed and constructed to RTA standards.

In addition, Rocla have a Code of Conduct for all its employees including truck drivers. Rocla requires each driver to sign the Code which, among other things, stipulates safe driving practices at all times, when making deliveries for Rocla.

Based on the above, it is considered that there should be no detrimental impact on road safety from the Project.

5.5 Summary

The assessment has found that the increased traffic generation associated with the Project would have relatively small impacts on the road network adjacent the Calga Sand Quarry site and that traffic conditions would remain satisfactory with the Project in place.

While there would be additional product trucks from Calga Sand Quarry using the F3 Freeway, these trucks in real terms would represent a very small proportion of the total vehicles using the F3. The total volume of product trucks when compared to the existing total traffic volumes using the F3 at Mooney Mooney represents less than 1% of daily volumes and less than 1% of the existing southbound AM peak hour volume at this location. This proportion will reduce as traffic volumes increase on the F3.

It is noted that the RTA are currently widening the F3 to provide for 3 lanes of travel in each direction (6 lanes in total) between Gosford and Wahroonga, which will provide additional traffic capacity on the F3.