Appendix B

Traffic Impact Assessment

FINAL

TRAFFIC IMPACT ASSESSMENT

FOR

JANDRA QUARRY

AT

PACIFIC HIGHWAY
POSSUM BRUSH

Ref. 13109r

25 June 2014

Prepared By

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CONTENTS

ILLUSTRATIONS

EXECUTIVE SUMMARY

This report documents the assessment of the traffic impacts of a proposal to increase production and transportation of finished quarry products at Jandra Quarry from 250,000 tonnes to 475,000 tonnes per calendar year, to meet increasing demand of the quarry products associated with the current and future road upgrade works and infrastructure projects in the area.

Jandra Quarry is located off the Pacific Highway, south of Taree on the mid north coast of NSW.

The existing quarry employs 14 full time equivalent employees and operates from 6.00am to 6.00pm Monday to Friday and 6.00am to 3.00pm on Saturdays.

The existing quarry operation generates:

- *Some 60 two way vehicle trips per day for light vehicles (employees and visitors) based on 30 inbound trips and 30 outbound trips; and*

- *58 two way heavy vehicle truck trips per day (on an average day for 250,000 tonnes per calendar year) based on 29 inbound truck trips and 29 outbound truck trips.*

The principal transport route from the quarry is via the Pacific Highway either to travel north towards Taree or south towards Bulahdelah. The split is approximately 50:50 north and south.

The Project seeks to increase production and transportation of finished quarry products to 475,000 tonnes per calendar year. The proposed hours of operation are 6.00am – 6.00pm Monday to Saturday, with extended hours between 6.00pm to 10.00pm Monday to Friday, on a campaign basis (i.e. when required to meet the needs of a particular project).

The maximum hourly number of product truck movements will be:

- *6.00am – 6.00pm truck* — *12 truck and dog trailer combinations (total of 24 movements with return trip)*

- *6.00pm – 10.00pm* — *12 truck and dog trailer combinations (total of 24 truck movements with return trip)*

The traffic assignment split between north and south is expected to remain approximately 50:50, although there will be days / periods when this will vary.

Under the Project, employees are expected to increase by 6 full time employees equivalent to a total of 20 employees.

At full production of 475,000 tonnes per calendar year the Jandra Quarry is expected to generate;

- *80 two way light vehicles per day based on 40 inbound trips and 40 outbound trips;*

- *110 two way heavy vehicle trips per day (on an average day) based on 55 inbound trips and 55 outbound trips.*

The additional traffic generation from the Project based on 475,000 tonnes per calendar year on an average day is estimated to be;

- *20 two way light vehicles per day based on 10 inbound trips and 10 outbound trips; and*

- *52 two way heavy vehicle trips per day (on an average day) based on 26 inbound trips and 26 outbound trips.*

The increase in product trips per hour for an average hour and busy hour would be 4 truck movements based on 2 inbound trips and 2 outbound trips.

During the maximum hour at the quarry, the Project would result in a total traffic generation of 24 two way heavy vehicle trips (i.e. 12 in / 12 out).

The increase in traffic volumes as a result of the Project will be relatively small and the impacts of the additional traffic on the road network are expected to be satisfactory.

Traffic modelling confirms that traffic conditions at the principal intersection of the Pacific Highway / Jandra Quarry Access Road will remain satisfactory with the additional traffic from the Project. This intersection has a seagull channelisation which provides safe traffic management for vehicles turning right out of the Quarry to join northbound traffic in the Pacific Highway.

The intersection currently performs at Level of Service A operation (i.e. very good operation) with low vehicle delays.

The intersection has plenty of spare capacity to cater for future traffic growth along the Pacific Highway for the foreseeable future.

The maximum traffic generation of the quarry with the Project will remain at 12 trucks arriving and 12 trucks departing the quarry per hour (i.e. 12 inbound trucks and 12 outbound trucks).

The existing arrangement for trucks either turning left or turning right into and out of the Pacific Highway are considered to be safe and are expected to remain so into the foreseeable future, given the relatively low volume of trucks that will turn into or out of the Quarry Access Road in the maximum hour with the Project in place.

The Pacific Highway between north of Taree and Raymond Terrace is constructed to a very high standard with dual carriageways which comprises 2 through lanes with wide shoulders as well as appropriate intersection treatments. For this reason the Project is not expected to have any adverse impacts on other road users (cyclists and school buses) or have any adverse impact on road safety on the road network.

1.0 INTRODUCTION

1.1 Introduction and Background

Holcim Australia currently operates Jandra Quarry, which is located approximately 17km south of the regional centre of Taree on the mid-north coast of NSW (refer **Figure 1**). The quarry produces high quality aggregate from a meta-greywacke source rock which is suitable for a broad range of applications including concrete, asphalt and pre-coat. The quarry produces a range of fill and roadbase products and includes a cement treatment and pugmill facility.

Currently Jandra Quarry has an estimated 13.5M tonnes of resource available within the current approved extraction boundary. This 13.5M tonnes represents over 50 years of viable resource at current approved extraction rates.

Jandra Quarry currently operates pursuant to DA231-10-99 which provided for the production and transportation of 250,000 tonnes of finished quarry products per calendar year. The consent provides for the continuation of quarrying operations until 30 March 2025.

DA231-10-99 also allowed for the extension of the product stockpile storage areas, the installation of a pugmill and asphalt plant and the relocation of the weighbridge.

Minor modifications to the consent were granted in 2002, 2007 and 2012.

Holcim is now seeking a Section 75W modification to allow production and transportation of 475,000 tonnes of finished quarry products per calendar year and extend the consent to a period of 30 years (2044) from approval of the modification.

1.2 Structure of this Report

This report has been prepared to support an Environmental Assessment, to assess the traffic impacts associated with the proposed 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.

Other technical standards/publications referenced in this assessment include:

- Austroads Guide to Road Design and RMS supplements.
- Austroads Guide to Traffic Management and RMS supplements.

The remaining sections of this report address the following;

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

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FIGURE 1

HOLCIM JANDRA QUARRY
JANDRA QUARRY ROAD, POSSUM BRUSH

SITE LOCATION

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2.0 EXISTING JANDRA QUARRY OPERATIONS AND PROJECT

2.1 Existing Operation

Hours of Operation

The approved hours for all work at the quarry site except ancillary operations are:

- 6.00am-6.00pm Monday to Friday; and
- 6.00am-3.00pm Saturdays.

Ancillary operations including refuelling, servicing and maintaining plant are allowed between 6.00am and 9.00pm Monday to Saturday.

Employees/Workplace

The current number of employees on the site is 14 full time employees, including:

- Manager and Site workers - 7 persons
- Truck drivers - 7 persons

Approved Activities

The current approved activities that generate traffic include:

- The production and transportation of finished quarry products up to a maximum of 250,000 tonnes per calendar year. This includes products from both the pugmill and asphalt plants.

Transport Routes

The principal transport route from the quarry is via the Pacific Highway either north towards Taree or south towards Bulahdelah. The split is approximately 50:50 north and south.

Traffic Generation

Traffic generation from the existing quarry site consists of:

- Up to 60 two way light vehicle trips per day by employees and visitors (30 in/30 out); and
- An average of 29 truck loads per day (i.e. 58 truck trips with the return trips) associated with the quarry operations, although this figure varies considerably from day to day, with a busy day in the order of 55 loads or 110 two way truck movements.

The current approval also allows for truck movements associated with the pugmill and asphalt plant.

Quarry product delivery trucks are typically rigid trucks with dog/pig trailers with a capacity load of 32-33 tonnes.

'Ex bin' sales associated with local deliveries typically comprise smaller capacity trucks between 12 tonnes and 18 tonnes.

The average product truck loads recorded for the 12 month period in 2012/2013 (September to September) was 29 tonnes.

2.2 Project

An increase in production is required at Jandra Quarry to meet market demand. In the fourth quarter of 2013, Holcim turned down a significant quantity of sales as a direct result of the extraction limit imposed by the existing development consent. With average monthly sales volumes of approximately 23,500 in the first nine months of 2013, Holcim would have reached an annual production volume of at least 282,000 tonnes if not restricted by the existing development consent.

With Pacific Highway upgrade work around Port Macquarie predicted to peak in 2015 combined with other major infrastructure projects in the region related to coal and gas development predicted over the next five years, Holcim has forecast peak annual demand to exceed 400,000 tonnes, reaching as much as 475,000 tonnes in coming years.

Holcim is therefore seeking to modify the Jandra Quarry development consent (DA231-10-99) to provide for the intensification of quarry operations with a maximum production and transportation limit of 475,000 tonnes of finished quarry products per calendar year.

To support this proposed intensification in production, certain changes will be required to the existing operations as presented in Table 2.1. **Figures 2A, B & C** show the changes proposed by the Project, including staging.

The proposed increase in production and transportation will require an increase in staff numbers to:

- 10 full time employees on site (i.e. manager and site workers); and
- 10 truck drivers.

Table 2.1 provides a comparison between the existing operation and the proposed Project.

The principal transport route will continue to be the Pacific Highway (**Figure 3**) north and south of Jandra Quarry Access Road. In general, the traffic assignment for product trucks will remain approximately 50:50 north and south, although this may vary on some days.

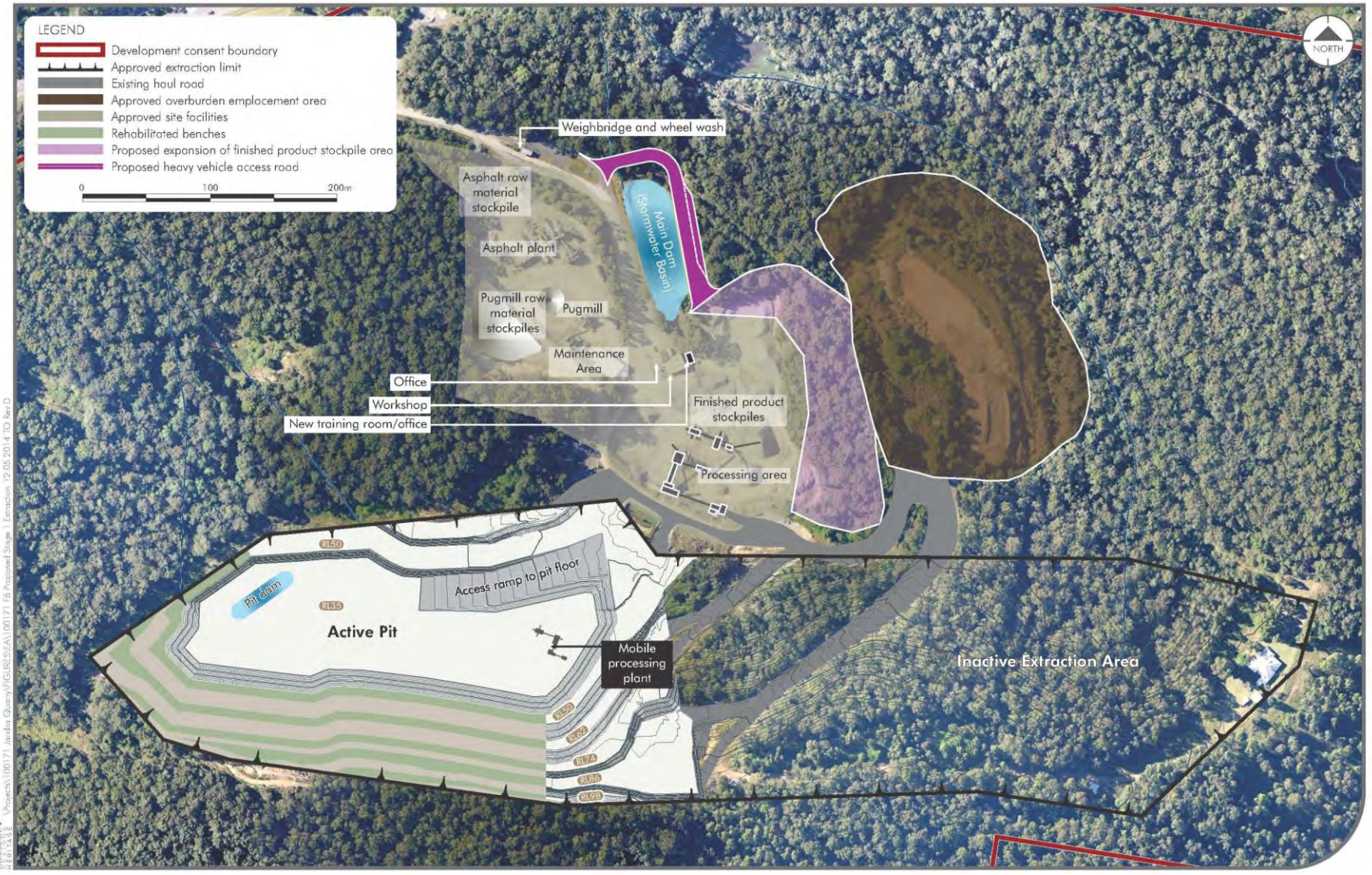

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FIGURE 2A

HOLCIM JANDRA QUARRY
JANDRA QUARRY ROAD, POSSUM BRUSH

PROJECT AREA – STAGE 1

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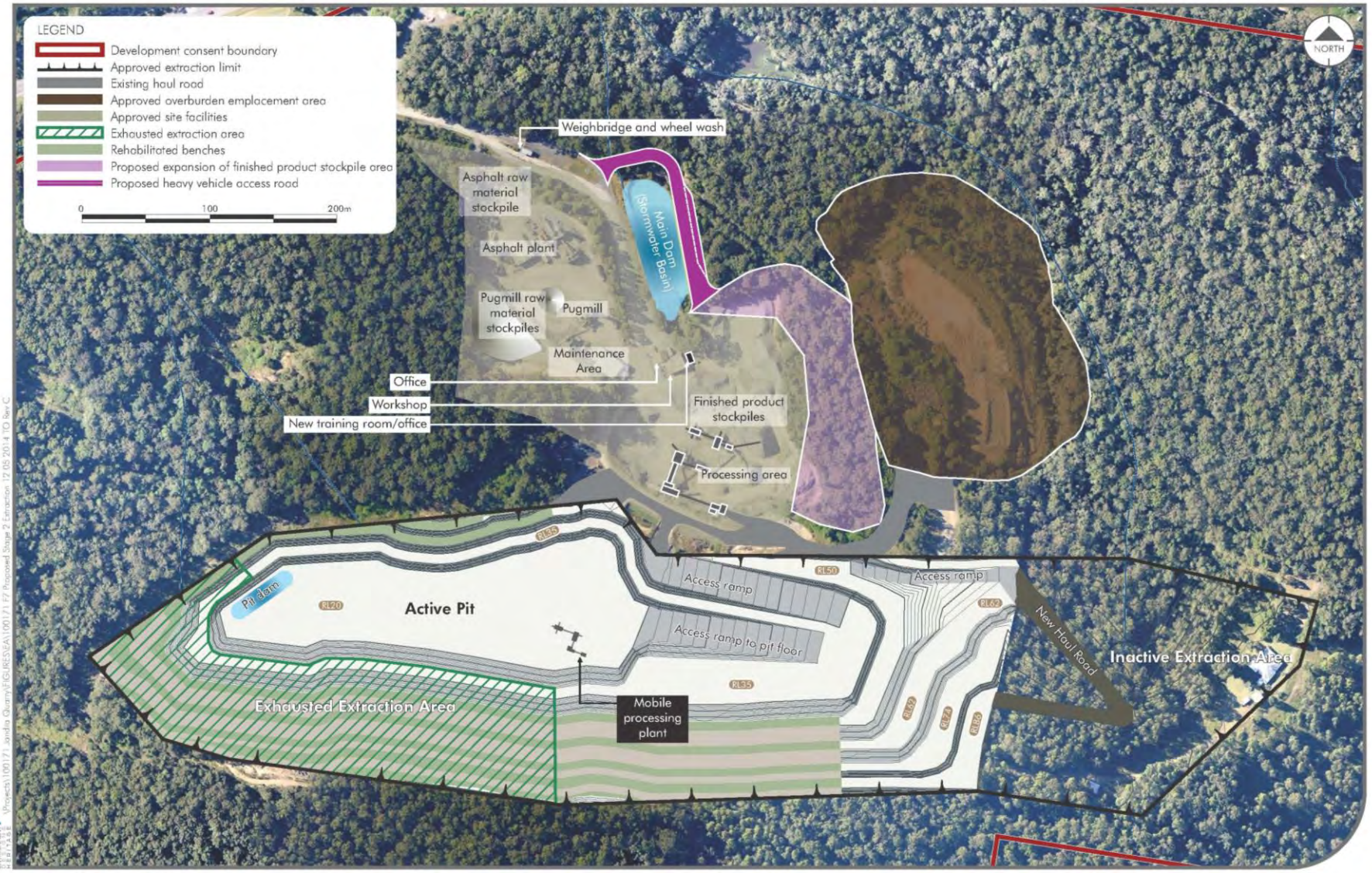

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FIGURE 2B

HOLCIM JANDRA QUARRY
JANDRA QUARRY ROAD, POSSUM BRUSH

PROJECT AREA – STAGE 2

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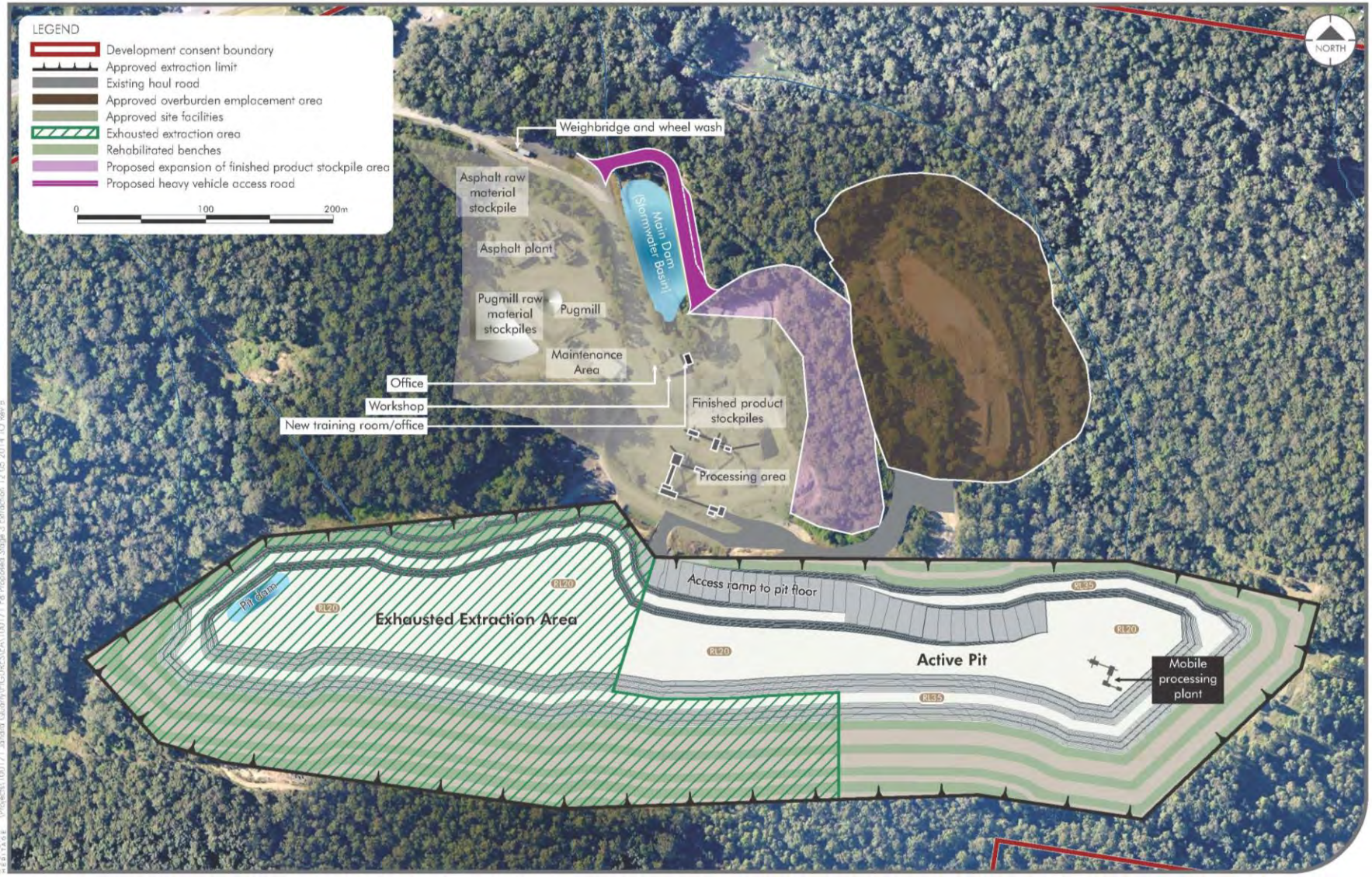

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FIGURE 2C

HOLCIM JANDRA QUARRY
JANDRA QUARRY ROAD, POSSUM BRUSH

PROJECT AREA – STAGE 3

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Table 2.1

Comparison of Existing Operations and Proposed Project

Project Component	Approved Operations	Proposed Modifications
Production and transportation limit	250,000 tonnes per calendar year	475,000 tonnes per calendar year
Consent duration	30 March 2025	30 years from modification approval i.e. 2044
Operating hours	6am - 6pm Monday to Friday	Quarry operations: 6am - 10pm Monday to Friday
	6am - 3pm Saturday	Quarry operations: 6am - 6pm Saturday
	Refuelling, servicing and maintenance approved from 6am - 9pm Monday to Saturday	Refuelling, servicing and maintenance from 6am - 10pm Monday to Saturday
		Allow for the return of trucks from Newcastle haul to midnight
Blasting hours	9am - 5pm Monday to Friday	No change
	9am - 3pm Saturday	No change
Quarrying methods	Drill & blast	No change
	Load & haul	No change
Processing methods	Primary, secondary crushing and screening plants (capacity limited to 350,000 tonnes per calendar year)	Introduction of a mobile crusher to increase processing capacity to 475,000 tonnes per calendar year
	Pug mill	No change
	Asphalt plant	Operate a mobile asphalt plant 24 hours on a campaign basis primarily to cater for night road works
		Allow for concrete recycling
Maximum hourly vehicle movements* *Maximum hourly capacity per hour	12 loads* 24 movements 12 in/12 out	12 loads* 24 movements (12 in/12 out)
Infrastructure	Workshop	No change
	Fuel Shed and maintenance area	No change
	Lunch room	No change
	Office	No change
	Training room (not built yet)	Second training room
	Ablutions (toilets and showers)	No change
	Envirocycle sewage treatment system	No change

Project Component	Approved Operations	Proposed Modifications
		Construction of a new heavy vehicle access road
		Expansion of the existing finished product stockpile area
Overburden storage	3.1 hectare overburden emplacement area.	No change
Quarry development	Benching approved to RL20	No change to current extraction footprint or to depth of extraction
Staff	7 full time employees	10 full time employees
	7 truck drivers	10 truck drivers

3.0 EXISTING TRAFFIC CONDITIONS

3.1 Principal Road Network

The principal road that provides access to Jandra Quarry is the Pacific Highway. The Pacific Highway is a State Road and National Route under the control of Roads and Maritime.

The other minor road that provides direct access to Jandra Quarry is Jandra Quarry Access Road which forms a 'T' junction intersection with the Pacific Highway.

3.2 Description of Existing Roads

3.2.1 Pacific Highway

The Pacific Highway, in the section between Bulahdelah and north of Taree is a high standard four lane divided road with a dual carriageway. The Pacific Highway is the main road corridor between Sydney and Tweed Heads, and services those towns/communities located in the north and far north coast of NSW.

Adjacent to the Project Site, the carriageways are separated by a wide median and storage/holding areas are provided at intersections and crossovers to queue/store turning traffic.

The speed limit on this section of the Pacific Highway varies between 90km/h and 110km/h. A high level of traffic management is provided in the Pacific Highway including wide shoulders, delineation and signage.

At the intersection of the Pacific Highway and Jandra Quarry Access Road, the speed limit is 110km/h.

Jandra Quarry Access Road forms a seagull 'T' junction intersection on the eastern side of the Highway approximately 5.2 kilometres north of Failford Road.

In the section of the Pacific Highway immediately north of the Jandra Quarry Access Road intersection, the vertical alignment of the highway has a relatively steep up grade for a distance of approximately 1.5 kilometres, followed by a down grade north of this point.

South of the Jandra Quarry Access Road the highway is constructed around a large radius sweeping left hand bend on a relatively flat grade.

In the southbound carriageway a left turn entry loop road into a rest area is located approximately 650 metres south of the Jandra Quarry Access Road.

Other intersections south of the Jandra Quarry Access Road (**Figure 3**) include:

- Joes Cutting Road which is a very minor road that intersects with the northern carriageway of the highway, approximately 370 metres south of Jandra Quarry Access Road;

- The right turn Access Road from the northern carriageway into the rest area which is located approximately 960 metres south of Jandra Quarry Access Road and forms a T junction intersection with the highway;

- Tritton Road which forms a minor T junction intersection 1.63kms south of the Jandra Quarry Access Road;

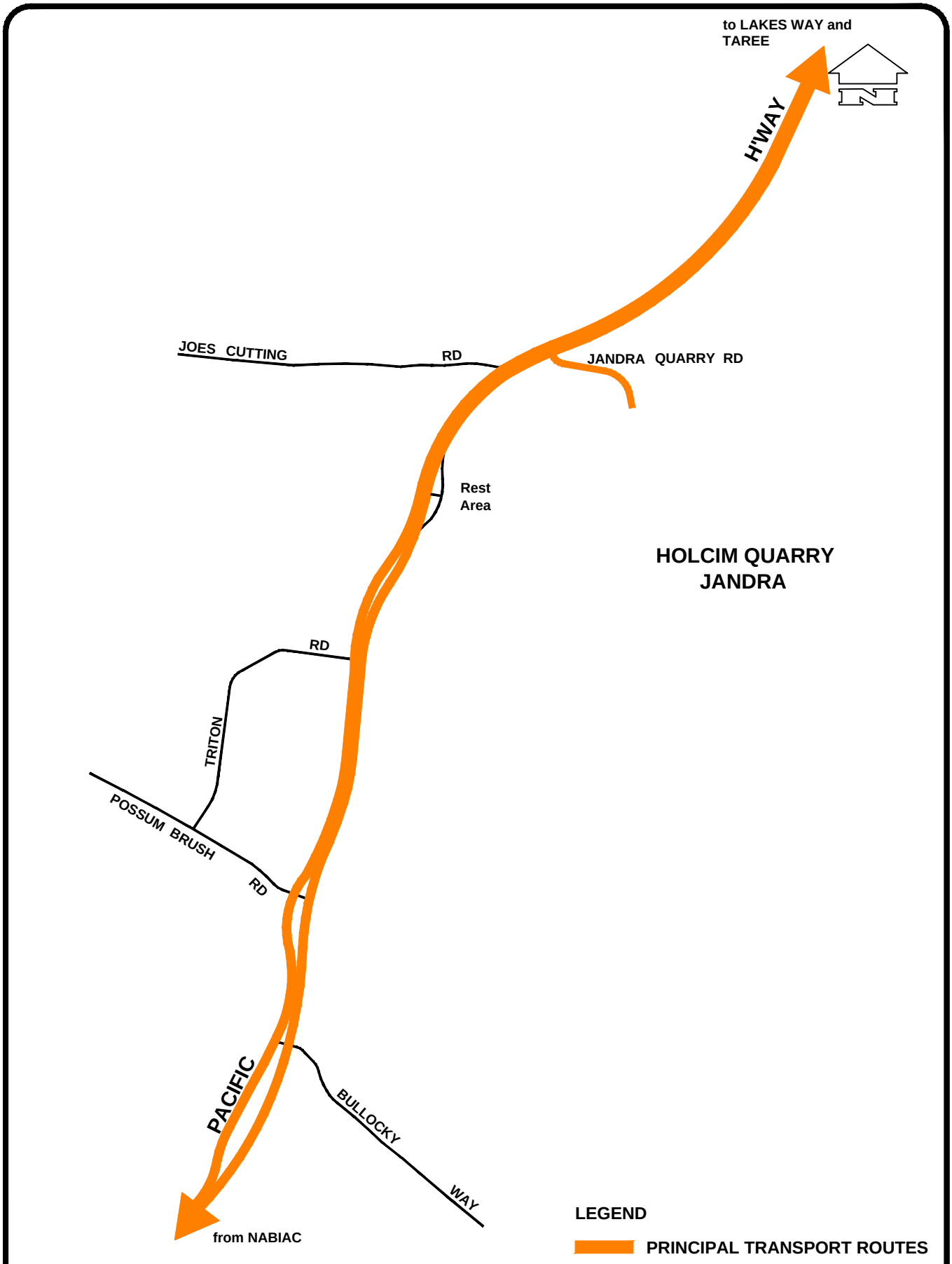

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FIGURE 3

HOLCIM JANDRA QUARRY
JANDRA QUARRY RD, POSSUM BRUSH

TRANSPORT ROUTES

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- Possum Brush Road which forms a T junction intersection 2.77kms south of the Jandra Quarry Access Road;

- Bullocky Way which forms a T junction intersection, approximately 3.37kms south of Jandra Quarry Access Road; and

- Failford Road (a state road) which forms a major T junction intersection with the highway, some 5.2kms south of Jandra Quarry Access Road.

North of the Jandra Quarry Access Road intersections include:

- Blacksmiths Road, which forms a minor T junction intersection approximately 1.38kms north of Jandra Quarry Access Road;

- Rochester Road which forms a minor T junction intersection, approximately 3.6kms north of Jandra Quarry Access Road; and

- The Lakes Way (a regional road) which forms a grade separated intersection with the highway, approximately 4.24kms north of Jandra Quarry Access Road.

3.2.2 Pacific Highway/Jandra Quarry Access Road Intersection

The Jandra Quarry Access Road intersection with the Pacific Highway was upgraded in accordance with the development consent conditions for the Integrated DA No 231-10-99 of 30 March 2000. **Figure 4** shows the current configuration.

The intersection is constructed as a Seagull T junction incorporating:

- A right turn bay 130 metres long including taper in the southern approach of the Pacific Highway for the right turn into Jandra Quarry Access Road;

- A right turn acceleration lane 250 metres long including taper in the northern departure of the intersection for the right turn out of Jandra Quarry Access Road to travel north;

- A left turn deceleration lane 190 metres long including taper in the northern approach of the Pacific Highway to cater for the left turn movement into Jandra Quarry Access Road;

- Separate road carriageways with two through lanes northbound and two through lanes southbound;

- Priority control on the Jandra Quarry Access Road; and

- Intersection warning signs in both approaches of the Pacific Highway.

The sight distance for vehicles turning out of Jandra Quarry Access Road is estimated to be 380 metres to the north and 200 metres to the south.

The sight distance to the north easily meets Austroad requirements for Safe Intersection Sight Distance for 110km/h which is 282 metres. While the sight distance to the south is less than this, this is not critical as the northbound acceleration lane at the intersection allows vehicles turning right out of Jandra Quarry Access Road to join the Pacific Highway in its own lane, which is separated from the northbound through traffic lanes. The acceleration lane also allows right turning cars exiting the quarry to accelerate to a speed where they can merge safely with northbound through vehicles. Right turning

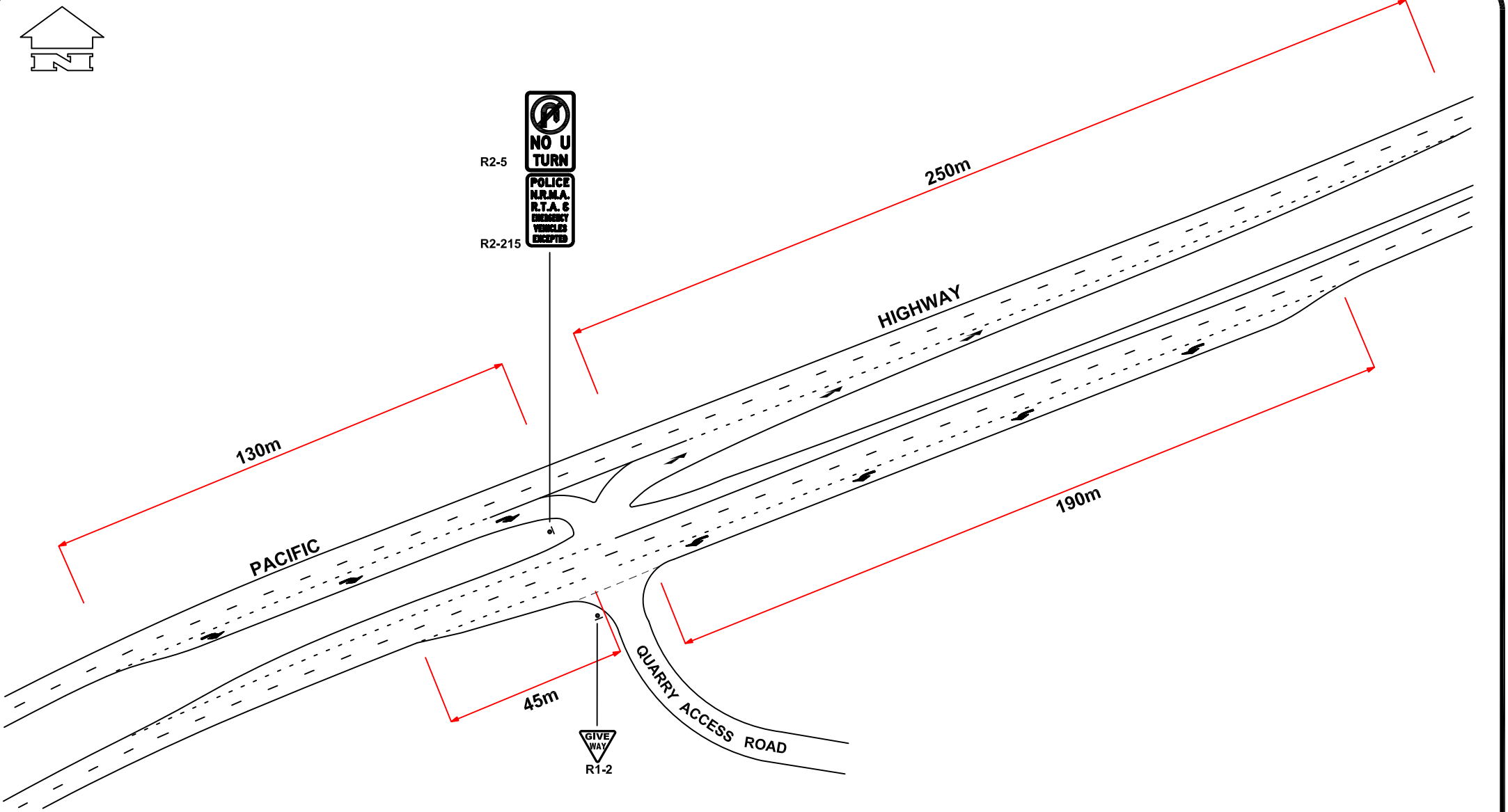

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FIGURE 4

HOLCIM JANDRA QUARRY

JANDRA QUARRY RD, POSSUM BRUSH

PACIFIC HIGHWAY - JANDRA ACCESS ROAD INTERSECTION

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trucks normally enter the acceleration lane and then when suitable gaps appear in the north bound traffic they change lanes into the adjacent through lane and then into the kerbside or left through lane.

3.3 Existing Traffic Conditions on the Road Network

3.3.1 Existing Traffic Volumes

Traffic counts in the Pacific Highway and at the Jandra Quarry Access Road and Pacific Highway intersection were undertaken in May 2011. This included daily volume and vehicle classification counts in the Pacific Highway, as well as peak hour turning volumes at the Jandra Quarry Access Road intersection. As there has been no change to Jandra Quarry's operation and or the road network adjacent Jandra Quarry since this time, the traffic counts are still representative of current traffic conditions. The traffic counts are also consistent with the most recent AADT volumes published by the RMS which are for 2012.

Figure 5 shows a summary of the daily volume and vehicle classification counts in the Pacific Highway. **Figure 6** shows the weekday peak hour volumes at the intersection of Pacific Highway and Jandra Quarry Access Road.

3.3.2 Daily Volumes

Jandra Quarry Access Road

Table 3.1 shows the daily volumes including heavy vehicles using Jandra Quarry Access Road.

Reference to Table 3.1 shows that on a typical weekday (5 day average) the Quarry Access Road carries two way traffic volumes of 170 vehicles per day (vpd). Heavy vehicles (Austroad Class 3 to 12) total 110vpd. Heavy vehicles represent around 64.7% of the total volumes using the Quarry Access Road on an average weekday.

TABLE 3.1

JANDRA QUARRY ACCESS ROAD
5 DAY AVERAGE AND 7 DAY AVERAGE TRAFFIC VOLUMES
AND VEHICLE CLASSIFICATION

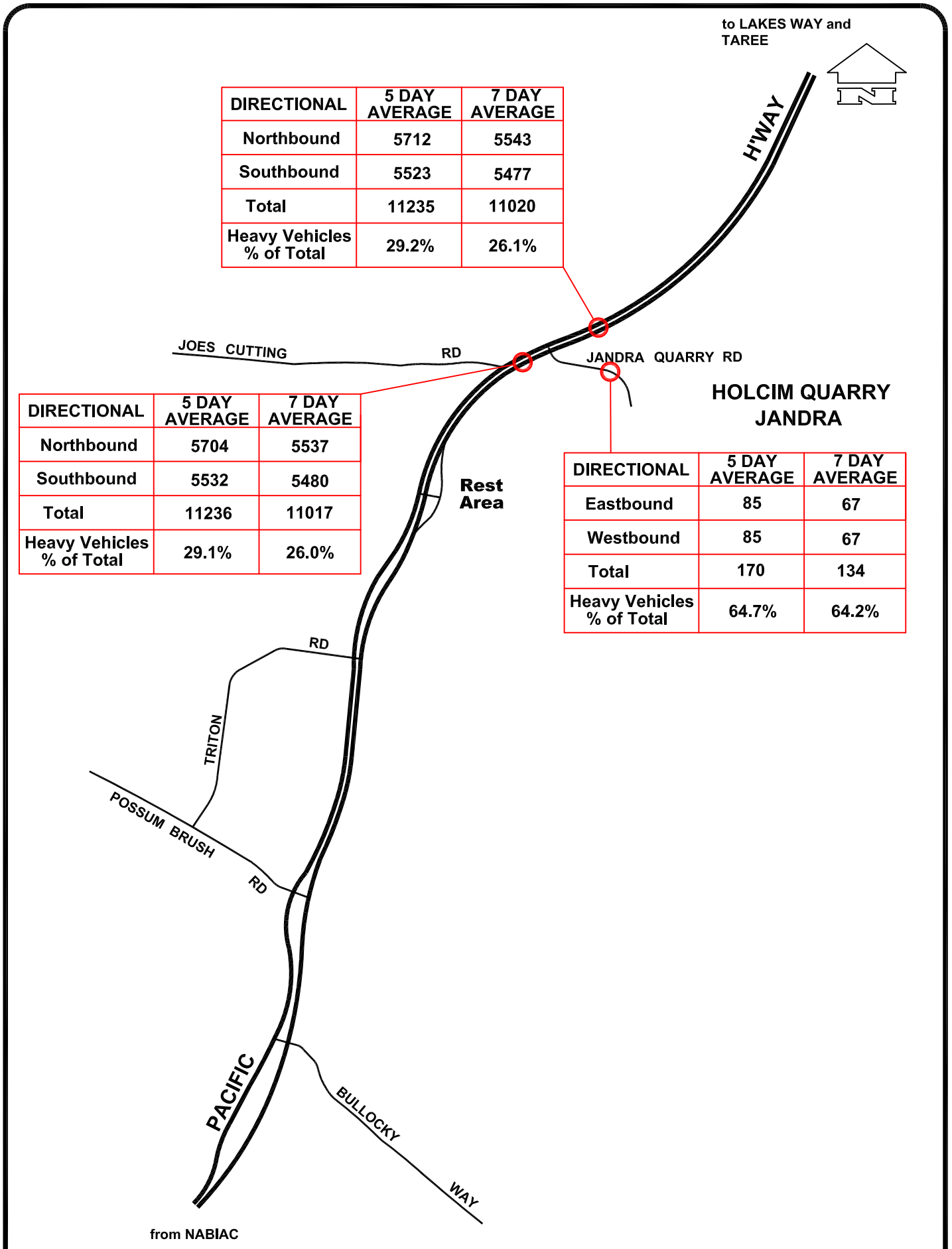
Direction of Travel	5 Day Average (Weekday)			7 Day Average (ADT)		
	Light[1]	Heavy[2]	Total	Light[1]	Heavy[2]	Total
East	30	55	85	24	43	67
West	30	55	85	24	43	67
Total	60	110	170	48	86	134
Proportion of Total	35.3%	64.7%	100%	35.8%	64.2%	100%

Source: Traffic Counts undertaken 14-20 May 2011
[1]Light Vehicles – Austroads 1 and 2 vehicle classification and motorbikes
[2]Heavy Vehicles – Austroads 3-12 vehicle classifications

Pacific Highway

Table 3.2 shows the daily traffic volumes including heavy vehicles using Pacific Highway, north of Jandra Quarry Access Road.

Reference to Table 3.2 shows that on a typical weekday (5 day average) the Pacific Highway, north of Jandra Quarry Access Road, carries two way traffic volumes of 11235vpd. Heavy vehicles (Austroad Classes 3 to 12) total 3279vpd. Heavy vehicles represent around 29.2% of total volumes using Pacific Highway, north of the quarry, on an average weekday.



DIRECTIONAL	5 DAY AVERAGE	7 DAY AVERAGE
Northbound	5712	5543
Southbound	5523	5477
Total	11235	11020
Heavy Vehicles % of Total	29.2%	26.1%

DIRECTIONAL	5 DAY AVERAGE	7 DAY AVERAGE
Northbound	5704	5537
Southbound	5532	5480
Total	11236	11017
Heavy Vehicles % of Total	29.1%	26.0%

DIRECTIONAL	5 DAY AVERAGE	7 DAY AVERAGE
Eastbound	85	67
Westbound	85	67
Total	170	134
Heavy Vehicles % of Total	64.7%	64.2%

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FIGURE 5

HOLCIM JANDRA QUARRY

JANDRA QUARRY RD, POSSUM BRUSH

EXISTING DAILY VOLUMES AND VEHICLE CLASSIFICATION

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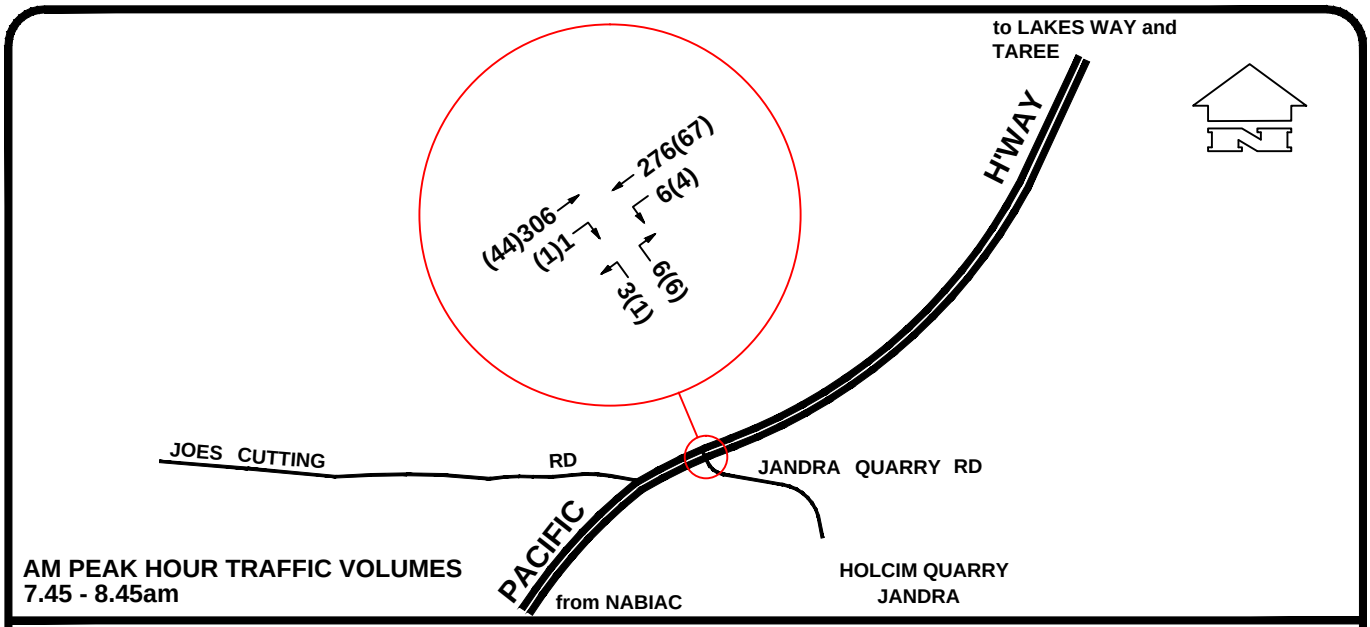

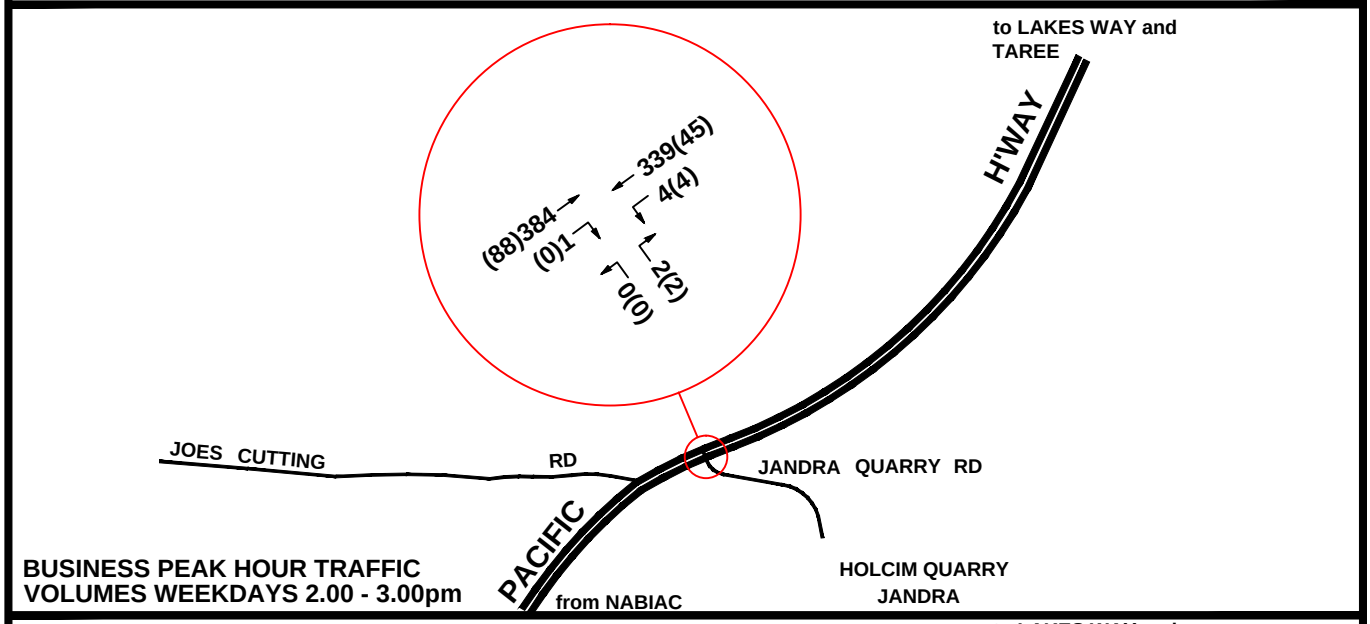

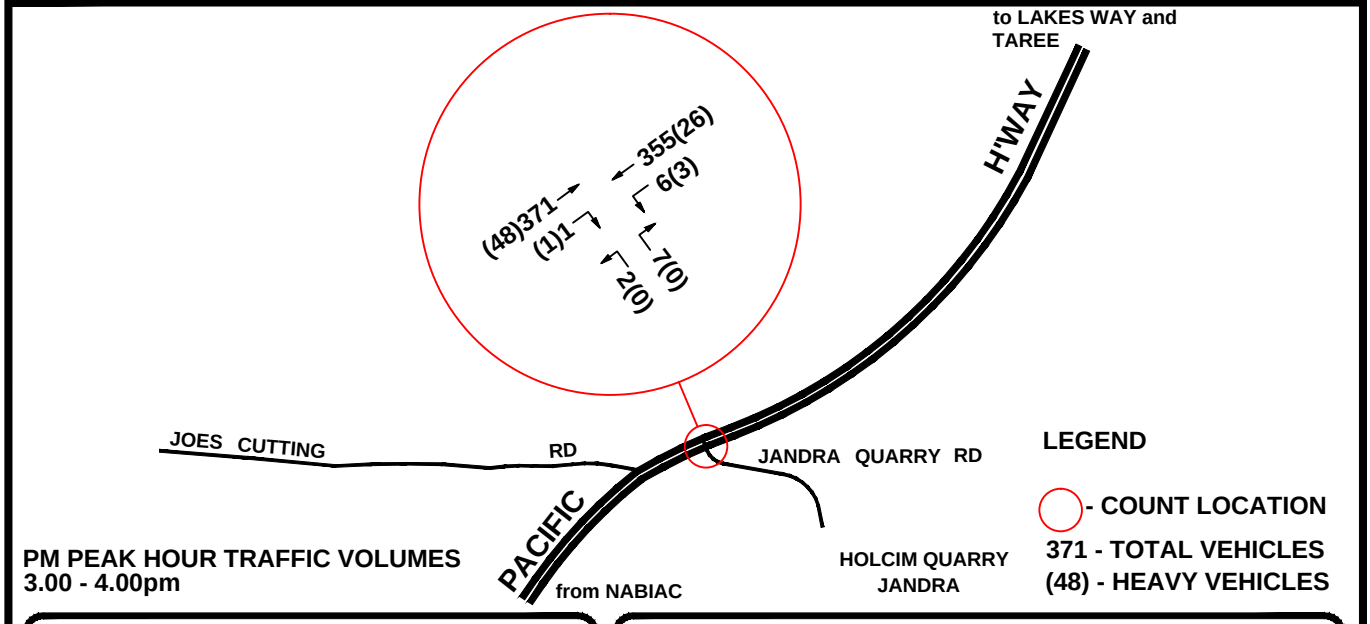

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FIGURE 6

HOLCIM JANDRA QUARRY

JANDRA QUARRY RD, POSSUM BRUSH

WEEKDAY AM, PM AND BUSINESS PEAK HOUR VOLUMES

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TABLE 3.2

**PACIFIC HIGHWAY NORTH OF JANDRA QUARRY ACCESS ROAD
5 DAY AVERAGE AND 7 DAY AVERAGE TRAFFIC VOLUMES
AND VEHICLE CLASSIFICATION**

Direction of Travel	5 Day Average (Weekday)			7 Day Average (ADT)		
	Light[1]	Heavy[2]	Total	Light[1]	Heavy[2]	Total
North	4078	1634	5712	4149	1394	5543
South	3878	1645	5523	4000	1477	5477
Total	7956	3279	11235	8149	2871	11020
Proportion of Total	70.8%	29.2%	100%	73.9%	26.1%	100%

Source: Traffic Counts undertaken 314-20 May 2011
[1]Light Vehicles – Austroads 1 and 2 vehicle classification and motorbikes
[2]Heavy Vehicles – Austroads 3-12 vehicle classifications

Table 3.3 shows the daily traffic volumes using Pacific Highway, south of Jandra Quarry.

Reference to Table 3.3 shows that on a typical weekday (5 day average) the Pacific Highway, south of Jandra Quarry, carries two way traffic volumes of 11236vpd. Heavy vehicles (Austroads Classes 3 to 12) total 3264vpd and represent around 29.1% of total volumes using this section of Pacific Highway, on an average weekday.

TABLE 3.3

**PACIFIC HIGHWAY SOUTH OF JANDRA QUARRY ACCESS ROAD
5 DAY AVERAGE AND 7 DAY AVERAGE TRAFFIC VOLUMES
AND VEHICLE CLASSIFICATION**

Direction of Travel	5 Day Average (Weekday)			7 Day Average (ADT)		
	Light[1]	Heavy[2]	Total	Light[1]	Heavy[2]	Total
North	4075	1629	5704	4145	1392	5537
South	3897	1635	5532	4005	1475	5480
Total	7972	3264	11236	8150	2867	11017
Proportion of Total	70.9%	29.1%	100%	74.0%	26.0%	100%

Source: Traffic Counts undertaken 14-20 May 2011
[1]Light Vehicles – Austroads 1 and 2 vehicle classification and motorbikes
[2]Heavy Vehicles – Austroads 3-12 vehicle classifications

Figure 5 shows the intersection turning volumes at the Pacific Highway/Jandra Quarry Access Road intersection for the AM (7.45am – 8.45am), business hours (2.00pm – 3.00pm) and PM (3.00pm – 4.00pm) peak hours as recorded on Tuesday 17 May 2011.

Reference to **Figure 6** shows that:

- The north bound through movement in the Pacific Highway numbers between 306 – 381vph during these periods;
- The southbound through movement in the Pacific Highway numbers between 276 – 355vph;
- Relatively low number of vehicles turned into and out of Jandra Quarry. On the day of the traffic count less than 10vph turned into or out of the Quarry Access Road.

Table 3.4 shows the hourly traffic volumes using the Pacific Highway north of Jandra Quarry Access Road on an average weekday (5 day average) and daily (7 day average).

TABLE 3.4

HOURLY TRAFFIC VOLUMES IN PACIFIC HIGHWAY NORTH OF JANDRA QUARRY ACCESS ROAD FOR AVERAGE WEEKDAY AND AVERAGE DAY

Time	5 Day Average		7 Day Average	
	Northbound	Southbound	Northbound	Southbound
Midnight – 1am	82	75	79	60
1am – 2am	60	93	58	77
2am – 3am	55	105	50	86
3am – 4am	39	82	38	72
4am – 5am	47	97	44	83
5am – 6am	87	168	75	143
6am – 7am	150	202	130	177
7am – 8am	261	244	231	232
8am – 9am	362	285	330	280
9am – 10am	349	351	336	366
10am – 11am	399	400	398	418
11am – 12 noon	390	409	397	425
12 noon – 1pm	386	365	399	381
1pm – 2pm	408	390	408	413
2pm – 3pm	412	390	420	406
3pm – 4pm	432	415	432	426
4pm – 5pm	401	373	402	372
5pm – 6pm	350	324	347	314
6pm – 7pm	256	201	259	198
7pm – 8pm	208	155	200	159
8pm – 9pm	173	124	161	126
9pm – 10pm	151	114	137	110
10pm – 11pm	134	91	114	87
11pm - Midnight	119	70	99	66
TOTAL	**5712**	**5523**	**5543**	**5477**

Source: Traffic Counts undertaken 14-20 May 2011

3.4 Road Safety

Road crash statistics were provided by the RMS for the section of the Pacific Highway between Wallambah Road Nabiac and the Lakes Way at Rainbow Flat/Purfleet, for the period between 1 July 2010 and 11 December 2013.

On this section of the Pacific Highway which covers a distance of 15km, there were a total of 69 crashes, with 21 injury crashes including two fatal crashes.

The majority of the crashes were single vehicle accidents with vehicles leaving the road carriageway and crashing into objects, such as the road embankment, fences, etc. These numbered 53 crashes of which 15 were injury crashes, including one (1) fatal crash.

There were 5 intersection crashes which occurred at three intersections including Failford Road and two intersections in Nabiac. Two (2) of these crashes were injury accidents.

There were also 5 midblock rear end crashes, all of which were injury accidents, including one fatal crash. These mostly involved vehicles stopping and the following vehicle crashing into the rear of the stationery vehicle.

There was one (1) crash involving a cyclist which was an injury crash.

There were also three crashes involving a vehicle hitting an animal and or an object on the road carriageway and two side swipe/change lane crashes. None of these were injury crashes.

There were no crashes at the intersection of Pacific Highway and Jandra Quarry Access Road.

A review of crashes indicates that there is no particular pattern to the crashes and or the locations, although the RMS identified excessive speed and or fatigue as factors in 38 of crashes.

3.5 Bus Routes and Other Road Users

Busways operate the 154 bus route between Bulahdelah and Taree along the Pacific Highway. This provides four bus services on a weekday generally between 7.00am and 5.00pm.

In addition, both Busways and Deannes Coaches operate a number of school bus services along the Pacific Highway on school days between 7.00am – 9.00am and 3.00pm – 5.00pm. Most of the buses operate between Nabiac and Tritton Road (south of Jandra Quarry) with deviations via Failford Road and Bullocky Way.

Several buses operate between Taree and Nabiac. Pick up and drop off movements in the Pacific Highway typically occur at / near intersections where provision is generally available in the road shoulder area.

Deannes Coaches also operates a 309 bus route between Forster and Gloucester which uses the Pacific Highway between Failford Road and Nabiac. This bus route provides one service in either direction in the AM and PM on school days only.

During the traffic counts and times of inspections of Pacific Highway adjacent Jandra Quarry, no cyclists using the Pacific Highway were observed.

Notwithstanding, the upgraded sections of the Pacific Highway generally have wide sealed shoulders that can accommodate cyclists.

4.0 ASSESSMENT OF TRAFFIC IMPACTS OF PROJECT

4.1 Existing Traffic Generation

Based on Holcim's records for a 12 month period in 2012/2013 (September to September) the average product truck load during this period was 29 tonnes.

For a busy week in May 2011, traffic counts indicate that the average weekday traffic generation of Jandra Quarry was:

- 170 two way trips per day based on 85 inbound and 85 outbound trips with
  - Light vehicles numbering 60 two way trips ie. (30 in/30 out); and
  - Heavy vehicles numbering 110 two way trips (55 in/55 out).

The existing traffic generation at Jandra Quarry varies considerably from day to day, as well as by each hour during the day, based on sales, load sizes and required delivery times. Typically the busiest hours occur in the mornings with deliveries tapering off in the afternoon.

Average hourly traffic generation is calculated to be 5 loads (ie. 10 truck trips) per hour for an average hour ie. 5 inbound trucks/5 outbound trucks.

A busy hour is currently 8 loads (ie. 16 truck trips per hour) with 8 inbound trucks and 8 outbound trucks, although inbound and outbound truck numbers can vary by hour.

A maximum hour occurs when full loading capacity is used and this is 12 truck and dog loads per hour (ie. 24 truck trips per hour) with 12 inbound trucks/12 outbound trucks.

A number of customers use their own trucks to pick up quarry product material which allows maximum truck numbers of 12 loads per hour being achieved.

4.2 Traffic Generation of Project

The Project seeks approval for the production and transportation of up to 475,000 tonnes of finished quarry products per calendar year.

Additional employees will be six persons, taking the total to 20 persons (FTEP).

Light vehicle trips, assuming that some increase in visitor trips also occurs, is estimated to be a total of 80 two way trips per day based on 40 trips in/40 trips out which is an increase of 20 light vehicle trips per day (i.e. 10 in/10 out).

Product truck trips for 475,000 tonnes per calendar year based on sales and transport occurring 300 days per year, with average truckloads of 29 tonnes, (same as the existing loads) calculates to 55 loads per day or 110 truck movements per day, between 6.00am and 10.00pm.

While the mobile pugmill will allow variations to the quarry product, this has been factored into the overall sales and transportation numbers for the Project.

Similarly there will be no increase in traffic generation due to the concrete recycling, as material to be recycled will be part of the back/return trip from product trucks making deliveries to customers or the concrete batching plants.

For a busy day (representative of the 85th percentile day) the calculated traffic generation of the product trucks from the quarry is estimated as 93 loads (i.e. 186 two way truck trips based on 93 in/93 out).

Table 4.1 shows the estimated traffic generation for the Project of the product trucks for an average day and busy day based on average loads of 29 tonne and an assumed 300 days of transport per year.

TABLE 4.1

DAILY PRODUCT TRUCK LOADS AND TRIPS WITH PROJECT FOR AVERAGE AND BUSY DAYS

Average Day		Busy Day	
Loads	**Two Way Trips**	**Loads**	**Two Way Trips**
55	110	93	186

The mobile asphalt plant could also increase the traffic generation particularly when providing asphalt for major road works at night, which would be typically between the hours of 6.00pm and 10.00pm. However such days would not be typical and are only expected to occur for short periods during a year.

Whilst the proposal seeks to increase its hours of operation on Monday to Friday to up to 10pm (i.e. 6.00am – 10.00pm), as noted above the additional four hours from 6.00pm to 10.00pm will only be for special circumstances, where delivery of product on a particular job/project is required out of normal work hours.

While the hourly traffic generation of the product trucks will continue to vary as it does now, the hourly traffic generation of the product trucks due to the Project is calculated to be:

- 7 loads i.e. 14 truck trips (7 inbound trucks/7 outbound trucks) during an average hour; and
- 10 loads (20 truck trips) 10 inbound trucks/10 outbound trucks during a busy hour.

Holcim have determined the maximum hourly traffic generation of Jandra Quarry during the daytime (6.00am-6.00pm) and evening (6.00pm-10.00pm) periods would be;

- 12 loads (i.e. 12 in/12 out) during the 6.00am-6.00pm day period; and
- 12 loads (i.e. 12 in/12 out) during the 6.00pm-10.00pm evening period.

The maximum hourly traffic generation is based on the loading capacity of the trucks which is 12 truck and dog combinations per hour.

4.3 Assessment of Impacts of Project Associated with Increased Traffic Levels

4.3.1 Traffic Increases

Traffic impacts are typically assessed for the busiest hour or peak hours associated with the traffic generation of the proposal.

Table 4.2 shows the increase in product truck trips per hour from the Project.

Reference to Table 4.2 shows that increases for the average hour will be 2 loads (4 truck trips) per hour.

Similarly the increase in truck volumes during a busy hour is of the same order as the increase in the average hour (i.e. 2 truck loads or 4 truck trips per hour).

There will be no increase in the maximum hour, as the quarry has the capacity to load 12 truck and dog combination vehicles per hour and currently does load at this rate at times of very high demand.

TABLE 4.2

INCREASE IN HOURLY PRODUCT TRUCK LOADS AND TRIPS WITH PROJECT

	Existing Approval 250,000 tonnes per calendar year		Project 475,000 tonnes per calendar year		Difference	
	Loads	Two Way Trips	Loads	Two Way Trips	Loads	Two Way Trips
Average Hour	5	10	7	14	+2	+4
Busy Hour	8	16	10	20	+2	+4
Maximum Hour	12	24	12	24	Nil	Nil

4.3.2 Traffic Impacts

For an average weekday the Project would result in a total average increase in traffic using the Pacific Highway in the order of:

- 20 additional light vehicle trips per day (based on 10 in/10 out); and
- 52 additional heavy vehicle movements per day based on 26 in/26 out).

Based on 50:50 split north and south of the quarry, the additional traffic would increase the average weekday two way volumes by 36 vehicles per day in the Pacific Highway. From Tables 3.2 and 3.3, the proposed increase in total volumes from the Project as compared to the existing weekday volumes in the Pacific Highway north and south of the quarry, would be 0.3%. Heavy vehicles would represent 29.2% of total volumes using the Highway and the proportional increase in heavy vehicles using the Pacific Highway due to the Project would be approximately 0.1% for an average weekday.

As noted from Table 4.2 the Project would result in an increase of 2 loads per hour (ie. 4 truck movements per hour) using the Pacific Highway, during an average and busy hour.

Figure 8 shows the additional volumes from the Project during an average and busy hour.

The most significant impact would occur at the Pacific Highway/Jandra Quarry Access Road intersection during the maximum hour when 12 product trucks enter and exit the quarry access road (ie. 12 trucks in/12 trucks out).

Depending on sales on a particular day, this could result in the following hourly scenarios:

(i) 6 trucks travelling north, together with 6 return trips and 6 trucks travelling south together with the 6 return trips (i.e. normal 50:50 split north and south);

(ii) 12 trucks travelling north, together with the 12 return trips (i.e. 100% split to north); and

(iii) 12 trucks travelling south, together with the 12 return trips (i.e. 100% split to south).

Figure 9 shows the traffic split during the maximum hour for the above scenarios.

To examine the impacts of the Project's maximum hour on this intersection of the Pacific Highway/Jandra Quarry Access Road, traffic modelling has been undertaken using the SIDRA software package.

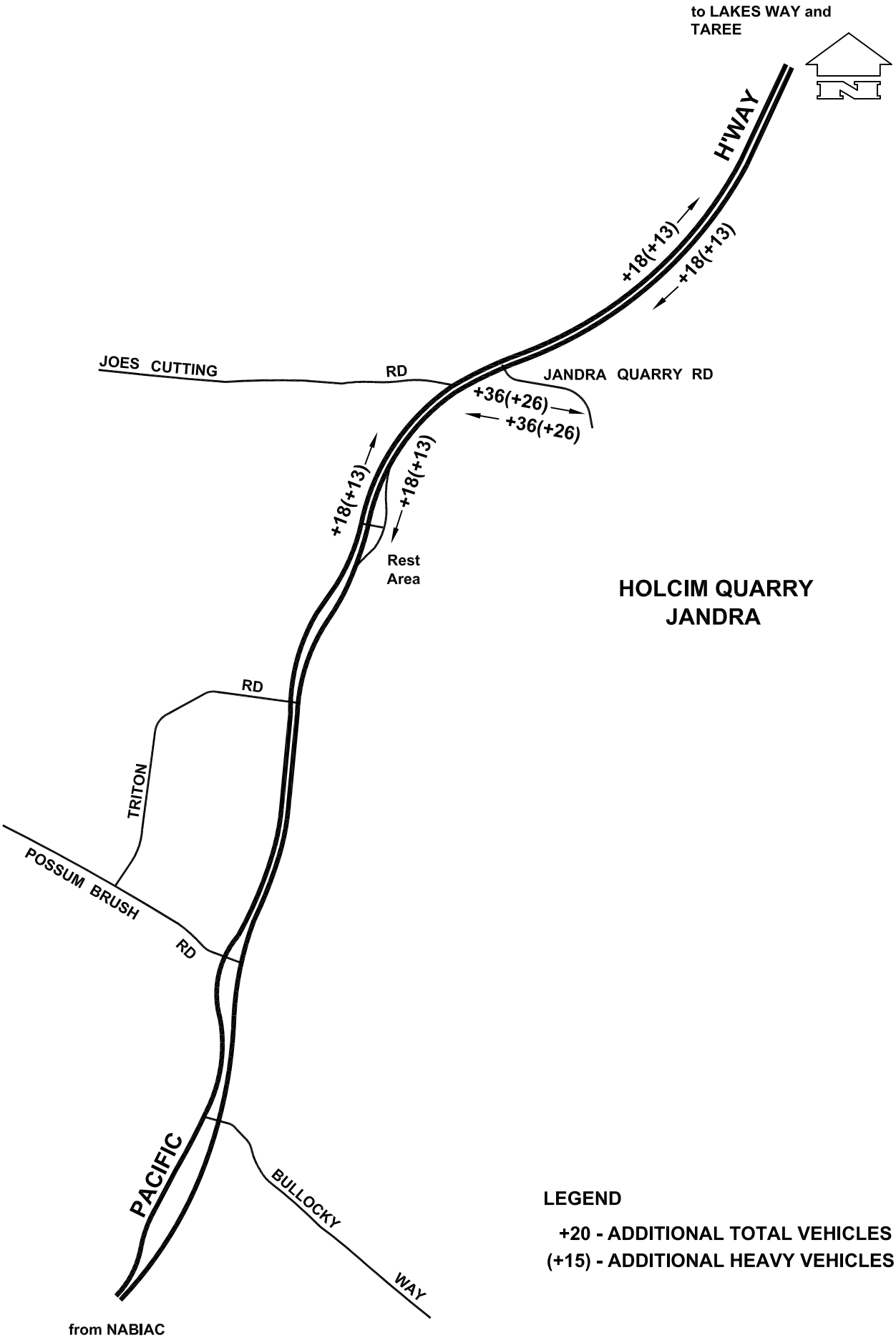
SIDRA assesses the operational performance of intersections under traffic signal, roundabout or sign control. The best criteria for assessing intersections controlled by sign control are Level of Service (LS), Degree of Saturation (DS) and Average Vehicle Delay (AVD). Table 4.3 shows the Level of Service 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 D 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.

As the Pacific Highway/Jandra Quarry Access Road is a seagull intersection with an acceleration lane for the right turn out of the Quarry, the average delay for the right turn out of the quarry is based on the time for the right turn vehicle to cross the southbound carriageway and enter the northbound acceleration lane.

The modelling has been undertaken for peak hour periods in the AM, Business hours and PM periods, adopting the existing traffic volumes using the intersections, together with the additional trucks for the maximum hour generated by the Project.

Table 4.4 shows the SIDRA results for the existing conditions and with the Project during the maximum hour for the normal 50:50 split of product trucks to the north and south, for the above periods.



LEGEND

+20 - ADDITIONAL TOTAL VEHICLES
(+15) - ADDITIONAL HEAVY VEHICLES

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FIGURE 7

HOLCIM JANDRA QUARRY
JANDRA QUARRY RD, POSSUM BRUSH

ADDITIONAL WEEKDAY TRAFFIC FROM PROJECT ON AVERAGE DAY

JOB NO.13109

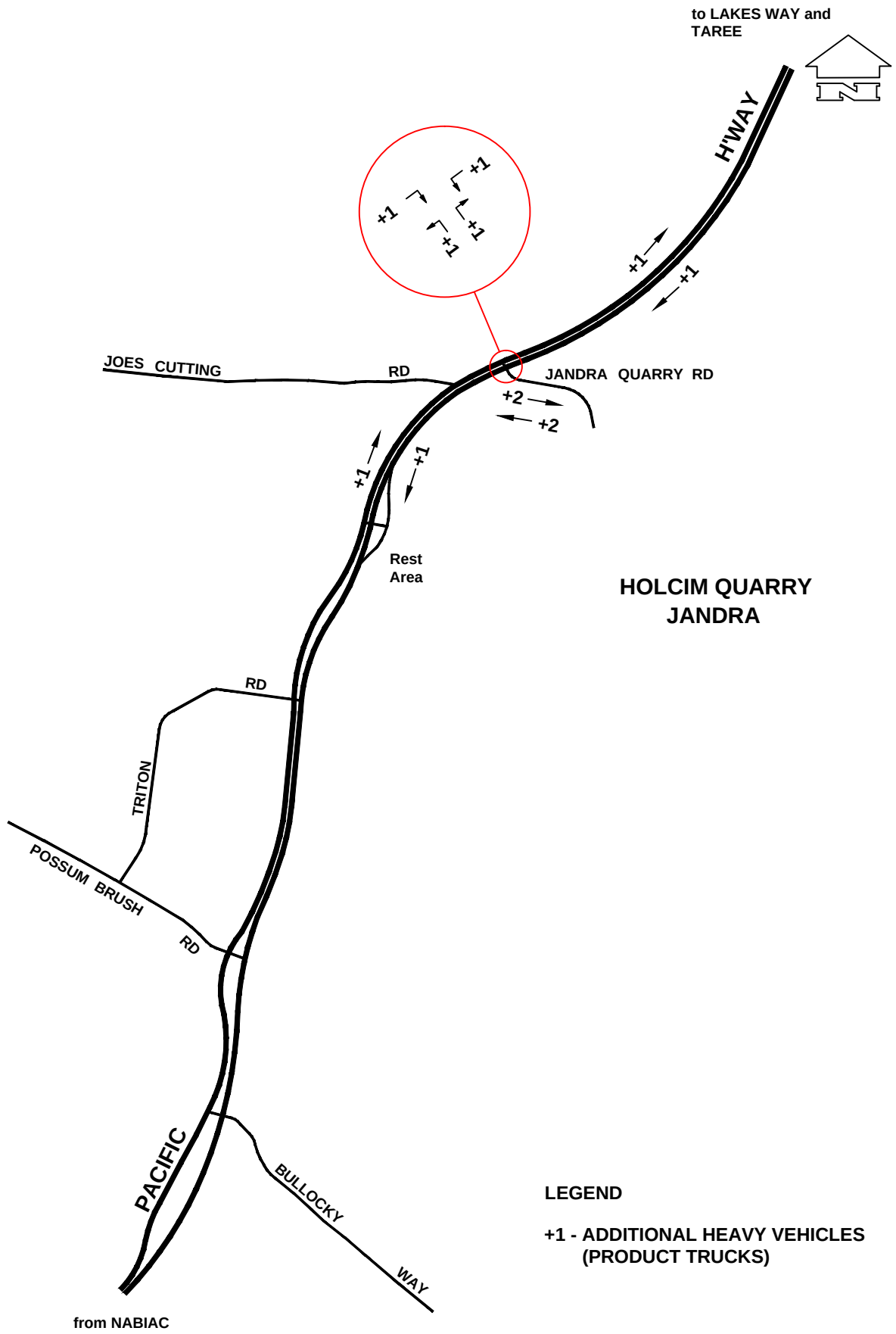

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FIGURE 8

HOLCIM JANDRA QUARRY

JANDRA QUARRY RD, POSSUM BRUSH

ADDITIONAL TRAFFIC VOLUMES FROM PROJECT IN AVERAGE & BUSY HOUR

JOB NO.13109

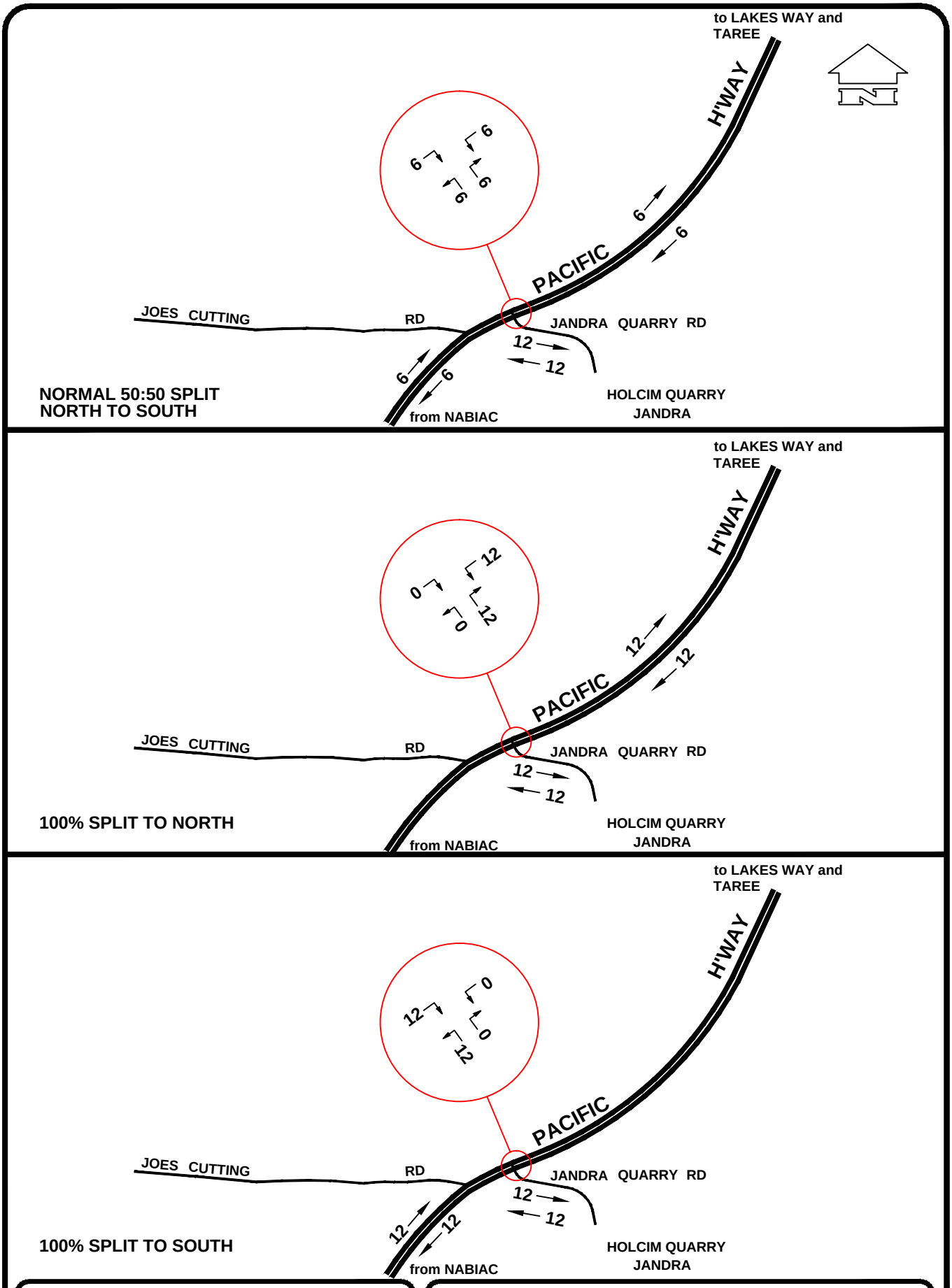

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FIGURE 9

HOLCIM JANDRA QUARRY

JANDRA QUARRY RD, POSSUM BRUSH

TRAFFIC VOLUMES FROM PROJECT IN MAXIMUM HOUR

JOB NO.13109

TABLE 4.3

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
F	>70	Intersection is oversaturated	Oversaturated, requires other control mode

Source: Table 4.1 RTA Guide to Traffic Generating Developments 2002

Reference to Table 4.4 shows that the intersection would operate at similar levels to the existing conditions with the additional traffic from the Project in the AM, Business hours and PM period, with a Level of Service A operation (very good operation) and relatively low vehicle delays to vehicles turning left and right into and out of Jandra Quarry Access Road.

To examine the alternative scenarios where 100% of the product trucks are despatched either to the north and or to the south in a maximum hour, additional SIDRA traffic modelling has been undertaken for the business peak hour volumes, which generally are representative of highest overall traffic volumes using the Pacific Highway in any one hour. The results of the SIDRA traffic modelling for the alternative scenarios described above are shown in Table 4.5.

Reference to Table 4.5 shows that both the alternative scenarios for the product trucks would have similar operation to the normal split. The intersection would retain a Level of Service A (i.e. very good operation) with low vehicle delays for the turning movements.

The modelling confirms that there would be considerable spare capacity at the intersection with the Project in place with relatively low vehicle delays and the intersection will continue to operate in a safe manner.

TABLE 4.4

SIDRA RESULTS FOR PACIFIC HIGHWAY/JANDRA QUARRY ACCESS ROAD FOR EXISTING CONDITIONS AND WITH PROJECT* DURING THE MAXIMUM HOUR IN AM, BUSINESS AND PM PEAK HOURS.

AM PEAK HOUR

Movement	Existing				With Project*			
	DS	AVD (secs)	LS	95% Queue Length (m)	DS	AVD (secs)	LS	95% Queue Length (m)
South: Pacific Highway								
Through	0.085	0.0	A	-	0.085	0.0	A	-
Right	0.003	12.4	A	0.1	0.019	14.1	A	0.7
East: Jandra Access Road								
Left	0.024	10.2	A	0.1	0.036	10.7	A	1.5
Right	0.024	10.4	A	0.1	0.036	10.5	A	1.5
North: Pacific Highway								
Left	0.005	8.2	A	-	0.006	8.2	A	-
Through	0.081	0.0	A	-	0.104	0.0	A	-
All Vehicles	**0.085**	**0.3**	**A**	**0.1**	**0.104**	**0.5**	**A**	**1.5**

BUSINESS PEAK HOUR

Movement	Existing				With Project*			
	DS	AVD (secs)	LS	95% Queue Length (m)	DS	AVD (secs)	LS	95% Queue Length (m)
South: Pacific Highway								
Through	0.112	0.0	A	-	0.112	0.0	A	-
Right	0.001	9.1	A	0.0	0.018	13.8	A	0.7
East: Jandra Access Road								
Left	0.009	11.0	A	0.3	0.038	10.4	A	1.5
Right	0.009	11.4	A	0.3	0.038	10.3	A	1.5
North: Pacific Highway								
Left	0.004	7.9	A	-	0.008	8.0	A	-
Through	0.093	0.0	A	-	0.093	0.0	A	-
All Vehicles	**0.112**	**0.1**	**A**	**0.3**	**0.112**	**0.5**	**A**	**1.5**

PM PEAK HOUR

Movement	Existing				With Project*			
	DS	AVD (secs)	LS	95% Queue Length (m)	DS	AVD (secs)	LS	95% Queue Length (m)
South: Pacific Highway								
Through	0.102	0.0	A	-	0.102	0.0	A	-
Right	0.003	13.6	A	0.1	0.018	13.9	A	0.7
East: Jandra Access Road								
Left	0.010	5.9	A	0.2	0.043	8.9	A	1.5
Right	0.010	5.9	A	0.2	0.043	9.1	A	1.5
North: Pacific Highway								
Left	0.004	7.9	A	-	0.007	8.2	A	-
Through	0.094	0.0	A	-	0.094	0.0	A	-
All Vehicles	**0.102**	**0.2**	**A**	**0.2**	**0.102**	**0.5**	**A**	**1.5**

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*
**Based on normal split 50:50 north and south*

TABLE 4.5

SIDRA RESULTS FOR PACIFIC HIGHWAY/JANDRA QUARRY ACCESS ROAD WITH PROJECT* DURING THE MAXIMUM HOUR WITH ALTERNATIVE SCENARIOS

BUSINESS PEAK HOUR WITH PROJECT

Movement	100% Product Trucks to North				100% Product Trucks to South			
	DS	AVD (secs)	LS	95% Queue Length (m)	DS	AVD (secs)	LS	95% Queue Length (m)
South: Pacific Highway								
Through	0.112	0.0	A	-	0.112	0	A	-
Right	0.002	9.2	A	0.0	0.035	14.2	A	1.4
East: Jandra Access Road								
Left	0.053	13.0	A	2.0	0.027	8.1	A	1.1
Right	0.053	13.7	A	2.0	0.027	7.6	A	1.1
North: Pacific Highway								
Left	0.011	7.9	A	-	0.004	7.9	A	-
Through	0.093	0.0	A	-	0.093	0.0	A	-
All Vehicles	**0.112**	**0.4**	**A**	**2.0**	**0.112**	**0.5**	**A**	**1.4**

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*

4.4 Assessment of Geometric Consideration at Pacific Highway and Jandra Quarry Access Intersection

The existing geometry of this intersection is shown in **Figure 4** and described in Section 3.2.2.

The existing geometry is assessed as being satisfactory in terms of intersection capacity and road safety requirements for the increased traffic associated with the Project.

The left and right turn movements out of Jandra Quarry Access Road are subject to Give Way (Priority) control.

The left turn requires a safe gap in the southbound traffic movement in the Pacific Highway. The southbound volumes which are spread over 2 lanes, typically range between 202vph to 415vph between 6am and 6pm on weekdays and provide regular safe gaps for product trucks to turn left into the Pacific Highway.

The traffic modelling for the Project confirms (Tables 4.4 and 4.5) that the delays to left turning vehicles in the order of 8-13 seconds per vehicle in the weekday peak hours, are relatively low and that the existing traffic management at the intersection for the left turn is satisfactory.

The need for a left turn acceleration lane in the Pacific Highway for the left turn out of Jandra Quarry Access Road has been examined as part of this assessment. However, the provision of a left turn acceleration lane is not favoured, due to the close distance between the Jandra Quarry Access Road and the southbound access road to the rest area, south of the site. The distance between these roads at 650 metres is considered too close to accommodate a left turn acceleration lane from Jandra Quarry given the potential conflicts between merging trucks and diverging vehicles decelerating to enter the rest area.

A right turn acceleration lane 250 metres long including taper is provided in the northern carriageway of the Pacific Highway for the right turn out of the quarry. This allows vehicles turning right out of Jandra Quarry Access Road to safely join the northbound carriageway in the Pacific Highway.

The acceleration lane is constructed on a reasonably flat grade, but at the end of the acceleration lane, the grade of the Pacific Highway changes with the commencement of a significant up grade which continues for an approximate distance of 1,500 metres to a crest, north of Blackbutt Road.

The acceleration lane length allows right turning cars exiting the quarry to accelerate to a speed where these cars can merge safely with northbound through vehicles. Right turning trucks normally enter the acceleration lane and then when suitable gaps appear in the north bound traffic flow, they change lanes into the adjacent through lane and then into the kerbside or left through lane.

The trucks change lanes as quickly as possible to the left/kerbside lane in the Pacific Highway, as when fully laden their acceleration and vehicle speed is restricted by the up grade which continues for the next 1.5 kilometres. The car and truck behaviour when using the acceleration lane described above, has been observed on site and works well.

Table 4.6 shows the average weekday northbound hourly traffic volumes using the Pacific Highway in each lane at the Jandra Quarry Access Road.

Reference to Table 4.6 shows that the hourly volumes in the right/median lane are relatively low with the highest volumes being 66vph. This is equivalent to 1 vehicle every 55 seconds.

The traffic volumes using the left/kerbside lanes during the busiest hourly periods number between 300 – 356vph. This is the equivalent of 1 vehicle every 10-12 seconds.

With the Project, during the maximum one hour up to 12 product trucks per hour may turn right out of the quarry, although this figure for the right turn is likely to be lower than this at most times and would typically number 6 trucks in the maximum hour.

These volumes are the equivalent of 1 truck every 5 minutes (12 trucks) or 1 truck every 10 minutes (6 trucks).

Austroad Guidelines state that the minimum gap in the adjacent lane for a vehicle to merge or change lanes is 3 seconds, with a follow up headway of 2 seconds for each additional vehicle also changing lanes.

Trucks may require slightly larger gaps of 4 seconds in the adjoining traffic lane to merge or change lanes safely.

As demonstrated from the hourly volumes shown in Table 4.6 and described above, there are large regular gaps in the right/median lane of around an average of 55 seconds (between vehicles) and regular gaps of an average of 10-12 seconds (between vehicles) in the kerbside/left lane of the Pacific Highway, which currently allows and will continue to allow product trucks to safely merge/change lanes when travelling northbound.

After the truck changes lanes into the kerbside/left lane, any following northbound vehicles in the kerbside lane travelling at a higher speed than the truck, simply change lanes to the right/median lane to pass the truck.

The possibility of extending the length of the right turn acceleration lane northbound has been examined as part of this assessment. However, extending the acceleration lane has no benefit, as truck speeds are and would continue to be affected by the existing up grade of the Pacific Highway, which continues for a distance of 1.5 kilometres, north of the end of the existing acceleration lane.

Field trials undertaken with fully laden trucks show that the speed of the truck is the same at the top of the crest, as it is at the end of the existing acceleration lane. Truck speeds only increase after they pass the crest of the hill and proceed on the downhill section of the Pacific Highway north of Blackbutt Road.

As noted above the current arrangements where product trucks turn right into the acceleration lane and then change lanes into the right/median lane and then the left/kerbside lane is safe and appropriate for the maximum traffic generation of the Project. As noted above there are regular gaps in the northbound traffic flow in the Pacific Highway, that allows product trucks to safely merge/change lanes, after turning right out of the quarry.

Based on the low number of trucks that will turn right out of the quarry at 6-12 trucks in the maximum hour, no changes are considered required to the length of the acceleration lane.

TABLE 4.6

HOURLY NORTHBOUND AVERAGE WEEKDAY TRAFFIC VOLUMES USING PACIFIC HIGHWAY AT JANDRA QUARRY ACCESS ROAD

Time	Traffic Volumes	
	Left or Kerbside Lane	Right or Median Lane
Midnight – 1am	70	16
1am – 2am	53	11
2am – 3am	51	9
3am – 4am	34	7
4am – 5am	43	8
5am – 6am	80	11
6am – 7am	133	18
7am – 8am	228	32
8am – 9am	306	51
9am – 10am	299	47
10am – 11am	342	53
11am – 12 noon	328	57
12 noon – 1pm	336	51
1pm – 2pm	340	60
2pm – 3pm	353	56
3pm – 4pm	356	66
4pm – 5pm	334	61
5pm – 6pm	290	55
6pm – 7pm	224	36
7pm – 8pm	184	26
8pm – 9pm	152	22
9pm – 10pm	134	20
10pm – 11pm	123	15
11pm - Midnight	105	17
TOTAL	**4896**	**808**

Source: Traffic Counts 14-20 May 2011

4.5 Future Traffic Conditions

Historical traffic growth on roads can be used as a guide to estimate likely future traffic growth.

RMS no longer publish regular AADT volumes, with the last publication for Hunter and Northern regions dated 2004, although historical AADT traffic volume information is available (i.e. pre 2004).

Traffic volumes in the Pacific Highway, in recent times (last 10 years or so) between Bulahdelah and Taree have been affected by roadworks associated with the upgrading of the Pacific Highway to a dual carriageway road.

As part of this assessment published AADT volumes for the period between 1990 and 2001 at two traffic counting stations in the Pacific Highway at Nabiac (Station No. 09.008) and at Purfleet (Station No. 09.1009) has been examined to check historical growth. At Nabiac the traffic growth over the 11 year period was a lineal average of 4.1% per year and at Purfleet, the traffic growth for the 11 year period was a lineal average of 3.3%.

Adopting these figures as a guide, the traffic growth over the next 15 years or so could be expected to be in the order of 3%-4% as a lineal average per year in the Pacific Highway.

The maximum traffic generation of Jandra Quarry will not change in the future if the Project is approved and would remain at 12 trucks arriving and 12 trucks departing the quarry site in the maximum hour.

Table 3.4 shows the existing traffic volumes using the Pacific Highway by hour for an average weekday and per day.

The highest hourly volume in either direction (i.e. north or south) is less than 450vph, which represents about 12.5% of the Highway's theoretical capacity in each direction, based on an assumed capacity of 1,800vph for each lane, or 3,600vph for each carriageway.

Clearly the Pacific Highway has plenty of capacity to absorb future traffic growth, associated with regional growth.

Similarly the Pacific Highway / Jandra Quarry Road Access intersection has adequate capacity to easily cater for future background traffic growth in the Pacific Highway for the foreseeable future.

4.6 Road Safety

The Project is not expected to have any negative impacts on road safety. The increase in product trucks due to the Project will be two trucks per hour for an average and busy hour arriving and departing the quarry, with a maximum of 12 trucks per hour entering and exiting the quarry during the maximum one hour.

The operation of the Pacific Highway / Jandra Quarry Access Road in terms of capacity and vehicle delay is very good with adequate spare capacity for the foreseeable future.

The Pacific Highway north and south of the quarry is dual lane divided carriageway road constructed to a high standard, and the additional trucks using the Pacific Highway, north and south of the quarry can easily be accommodated.

4.7 Impact on Other Road Users

The Project is not expected to result in any negative impacts to other road users, including buses and school buses. School buses currently use the Pacific Highway in the morning and afternoon periods on school days. They co-exist with other vehicles using the Pacific Highway including heavy vehicles. Product trucks generated by Jandra Quarry make up a relatively small proportion of the heavy vehicles using the Pacific Highway. The actual increase in product trucks from the Project is small in real terms (ie. 2 return truck trips per hour).

School buses are highly visible and operate at times that would be known to Holcim's truck drivers and other local truck drivers who deliver material sourced from the quarry.

The Project is not expected to have a negative impact on any cyclists using the Pacific Highway.

5.0 CONCLUSIONS

This report documents the assessment of the traffic impacts of a proposal to increase production and transportation of finished products at Jandra Quarry from 250,000 tonnes per calendar year to 475,000 tonnes per calendar year. The proposed increased production is required to meet increasing demand for quarry products associated with current and future road upgrade works and infrastructure projects in the region.

On an average weekday, the existing quarry operation generates:

- Some 60 two way vehicle trips per day for light vehicles based on 30 inbound trips and 30 outbound trips;

- 58 two way heavy vehicle truck trips per day (on an average day for 250,000 tonnes per calendar year) based on 29 inbound truck trips and 29 outbound truck trips.

The additional traffic generation from the Project based on 475,000 tonnes per calendar year is estimate to be:

- 20 two way light vehicle trips per day based on 10 inbound trips and 10 outbound trips; and

- 52 two way heavy vehicle trips per day based on 26 inbound trips and 26 outbound trips.

The increase in product truck trips in an hour would be an additional 2 return truck trips (i.e. 2 inbound trips and 2 outbound trips).

The assessment has found that the impacts of the Project on the road network and principal intersection of Pacific Highway and Jandra Quarry Access Road would be satisfactory.

REFERENCES

1. Austroads Guide to Road Design

2. Austroads Guide to Road Safety – Version 1 Dec 2010

3. Austroads Guide to Traffic Management

4. RTA (now RMS) Austroads Guide Supplements – Austroads Guide to Traffic Management – January 2011

5. RTA (now RMS) Supplement to Austroads Guide to Road Design Parts 1-5, 6 and 8

6. RMS Supplements to Austroads Guide to Road Safety

7. RMS Northern Region – Crash Statistics for 1 July 2010 to 11 December 2013

8. RTA – Traffic Volume Data for Hunter and Northern Regions 2004