

## APPENDIX C

### Traffic Impact Assessment



# Buttai Gravel Pty Ltd (Daracon)

Martins Creek Quarry  
Updated Project,  
Martins Creek NSW

Traffic Impact Assessment

May 2021

**SECA**solution >>>

# Martins Creek Quarry Revised Project

## Traffic and Access Assessment

Author: Sean Morgan

Client: Buttai Gravel Pty Ltd

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# 1 Introduction

## 1.1 Background

Seca Solution was commissioned by Umwelt (Australia) Pty Limited (Umwelt) on behalf of Buttai Gravel Pty Ltd to prepare an updated Traffic Impact Assessment for the proposed extension of the existing Martins Creek Quarry (the Revised Project) in Martins Creek, NSW. This report forms part of the updated environmental assessment being prepared for the Revised Project to support the Amended Development Application and Response to Submissions report (ADA & RTS) being prepared by Umwelt. This report is based upon:

- a review of the historic and recent operations of the quarry;
- a review of the transport operation for the quarry based upon historic data provided by the quarry operators;
- the collection of traffic data along the primary traffic route associated with the transport of quarry product;
- extensive consultation with the road authorities;
- site visits to the location, surrounding road network and analysis by Seca Solution.
- addressing various government agencies and community submissions on previous TIA; and
- undertaking an updated TIA.

This assessment has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) dated 4 August 2016, the Austroads Guidelines and the "RTA Guide to Traffic Generating Developments" published by the Roads and Maritime Services (RMS).

## 1.2 Scope of Report

The scope of this report is to review the external traffic impacts of the proposed extension of the Quarry and provide advice on the capacity, efficiency and safety associated with the road network. This includes a road safety review of the proposed haul route and a review of access into the Quarry. The submissions received during the exhibition of the Environmental Impact Statement (EIS) for the Original Project have been reviewed and addressed as part of this revised assessment as outlined in Section 1.6.

This report is an update of the previous traffic assessment completed for the Original Project submitted as part of the previous application (traffic assessment completed by Seca Solution dated 22<sup>nd</sup> April 2016 Martins Creek Quarry Traffic and Access Assessment").

## 1.3 Issues and Objectives of the study

The objectives of the study are to:

- Assess the potential impact on the local road network of the traffic flows associated with the transportation via road of a maximum of 500,000 tonnes of quarry product per annum, with a maximum of 140 laden trucks (280 movements) per day and a maximum of 20 laden trucks (40 movements) per hour;
- To review the access arrangements for the Revised Project; and
- Assess any capacity, efficiency and safety impacts associated with the Revised Project.

The objective of this report is to document the impacts of the Revised Project and provide advice on any mitigation and management measures to be implemented as part of the Revised Project.

## 1.4 Planning Context

In preparing this document, the following guides and publications were used:

- RMS Guide to Traffic Generating Developments, Version 2.2 Dated October 2002;

- Austroads Guide to Traffic Management – Part 12 Traffic Impacts of Developments

Note that the Roads and Maritime Services (RMS) have been renamed as Transport for NSW (TfNSW). All documents prepared by the RMS (or RTA prior to that) have remained current and some have been updated to identify TfNSW as the relevant agency.

## 1.5 Authority Requirements

The DPE provided a set of SEAR's (dated 4 August 2016) that provide advice on what was to be assessed for the Original Project and the information that is required to be provided. Relevant to traffic are the following sections:

Table 1-1 – Department of Planning and Environment SEARs

Requirement	Relevant Section of Seca Solution report
Accurate predictions of the road traffic generated by the construction and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products, the public roads in the Dungog Shire, Maitland City and Port Stephens LGAs likely to be so used and the times during which those roads would be so used.	Section 4.1
A detailed assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State road network (as identified above), having regard to the requirements of TfNSW, Dungog Shire, Maitland City and Port Stephens Councils (see Attachment 2);	Section 4.2, Section 4.3, Section 4.4
A detailed assessment of the existing railway siding facility at the site as an alternative transport option for delivering quarry products and avoiding potential impacts associated with road delivery.	Refer to Section 6.3 of the ADA & RTS
A detailed description of the measures or works (including concept plans) that would be used and/or implemented to upgrade, maintain and improve the capacity, efficiency and safety of the road network used by the development.	Design completed by Lindsay Dynan and considered in this report in Sections 3 and 5

The Roads and Maritime Services have provided separate details in Appendix 2 of the SEARs on their requirements for the Original Project as provided below:

Table 1-2 – Roads and Maritime Services requirements

Requirement	Relevant Section of Seca Solution report
Identify all relevant vehicular traffic routes and intersections for access to / from the subject site and any connections to the classified state road network.	Section 2.5 Section 4.2
The anticipated additional vehicular traffic likely to be generated as a result of the subject development.	Section 4.1
The distribution on the road network of the trips generated by the proposed development.	Section 4.2
Consideration of the traffic impacts on existing intersections and the capacity of the intersections to safely and efficiently cater for additional vehicular traffic generated by the proposed development. The traffic impact shall also include	Section 4.4

the cumulative traffic impact of other proposed developments in the area if any.	
Identify any necessary road network infrastructure upgrades that are required to maintain existing levels of service as a result of the development. In this regard, preliminary concept drawings shall be submitted with the EA for any identified road infrastructure upgrades. Any road upgrades will need to be to the satisfaction of TfNSW and Council.	Section 5
Traffic analysis of the affected intersections, using Sidra or similar modelling and include: <ul style="list-style-type: none"> <li>• Current traffic counts and 10 year traffic growth projections</li> <li>• With and without development scenarios</li> <li>• 95<sup>th</sup> percentile back of queue lengths</li> <li>• Delays and level of service on all legs for the relevant intersections</li> <li>• Electronic data for TfNSW review</li> </ul>	Section 4.4

## 1.6 Submissions relating to Traffic and Transport

Table 1.3 below summarises the key Agency submissions made by the Department of Planning Industry and Environment (DPIE), TfNSW, Dungog Shire Council, Maitland City Council and Port Stephens Council during the exhibition of the EIS relating to traffic and transport along with a section reference of where these have been addressed in this report. A more detailed checklist of all issues raised by relevant agencies, is provided in Appendix E.

Table 1-3 – Summary of Key Issues Raised in Agency submissions

Agency submission issue	Relevant section of SECA Solution report
Road capacity	Section 4.4
Intersection safety and capacity including safe intersection sight distance for all movements	Section 4.4
Road safety appraisal of proposed new access to Dungog Road	Section 3.2
Staging of works for the new haul route, including interim mitigation measures	Section 3.2
Acceptable road intersection upgrade at King Street / Duke Street	Section 5
Unquantified ancillary truck movements	Sections 4.1 and 4.4.
Gostwyck Bridge safety and capacity	Section 4.3
Road upgrades to consider existing property access points	Section 5 Refer design plans by Lindsay Dynan
Haul Route 2 and 3 analysis	Daracon have committed to using Haul Route 1 only. Haul Route 2 and 3 only used for local access requirements
Road Maintenance Contribution / VPA	Section 5.1
Alternative flood free access	Section 2.4.4
Morning peak time conflicts	Section 3.1
Lack of overtaking lanes provided along route	Section 4.4
No traffic data for Station Street or Grace Avenue	Section 2.5
Queuing of commuter traffic at the intersection of Pitnacree Road and Melbourne Street, East Maitland	Section 4.4
Traffic noise	Addressed by Umwelt in a separate detailed Noise Impact Assessment, provided in the ADA & RTS
Cumulative traffic impact	Section 2.10 and Section 4.4

In addition, public submissions made during the exhibition of the EIS raised a number of traffic related issues which are summarised below.

*Table – Summary of public submissions*

Public submission issue	Relevant section of Seca Solution report
Road safety including cyclists and pedestrians	Section 4.3
Intersection safety and capacity	Section 4.4
Safety concerns associated with school bus runs	Section 4.3
Road capacity	Section 4.4
Safety associated with new site access on Dungog Road	Section 3.2.1
Estimates for construction vehicles and ancillary vehicles during operation	Sections 4.1, 4.4.1 and 4.4.3
Background traffic data used in assessment	Section 2.5.1 Appendix A
Safety provisions for existing residential driveways opposite new site access	Section 3.2.1
Road safety with Gostwyck Bridge	Section 4.3
Cumulative traffic impact	Section 4.4
Road maintenance contribution / VPA	Section 5.1
Amenity impacts along the haul routes	Addressed in the Social Impact Assessment prepared by Umwelt
Noise impacts	Addressed in the noise impact assessment prepared by Umwelt
Economic impacts	Addressed in the economic impact assessment prepared by Ernst and Young
No reference is made to the lack of sight distance on the northern side of the Paterson level crossing nor the conflict that may occur due to queueing vehicles	Sight distance to the level crossing is in accordance with RMS / ARTC requirements and there are no recorded accidents in this location associated with lack of visibility. Road side maintenance of vegetation is the responsibility of the road authority.
Prince Street/Duke Street Intersection - The poor road alignment (horizontal and vertical) and narrow pavement widths have not been addressed	This intersection is constrained by 3 <sup>rd</sup> party land to all sides which restricts options for upgrading this intersection. The condition of the road surface has been separately identified and appropriate maintenance procedures have been developed.
Level crossings in Martins Creek and Paterson are referred to as only causing minor traffic delays as "there is a limited train service in this location". The rail crossings service 5 local commuter trains (10 movements), 6 XPT services (6 movements) and numerous coal and freight services.	Timetable for trains has been added (refer Section 3.2.4) and confirm daily numbers for trains on this line. These trains are controlled by ARTC. The proposed maximum of 20 trucks per hour shall not create any significant increase in traffic delays at these crossings.
The report identifies the use of 10-15kt per annum of flyash. On average, 12,500t of flyash is imported to the site per annum. Based on 32.5t per load, this would generate a further 385 laden and 385 unladen truck movements per annum. Therefore, based on Dungog Shire Council data from 2014, there would be significant increases in heavy vehicles on the various haul roads south of Martins Creek Quarry, as well as effects on traffic volumes.	The revised project limits the truck activity to 20 trucks per hour and 140 loads per day, which allows for inbound material.
No consideration has been provided to the safety issues generated by traffic entering King St from Church St. Vehicles entering King St from Church St	Visibility to the north for drivers exiting Church Street is appropriate for the posted speed limit (50 km/h). The road corridor in this location does not allow for any

are required to enter with a reduced sight line to the north. This turn is utilized by local residents but also by road users accessing and egressing from Paterson Primary School, Paterson Historical Rail Society, St Columbas Catholic Church, Paterson Court House and Paterson sports ground area. Conversely the South bound right hand turn from King St in to Church St has no sheltered turning lane. The safety issues relating to this intersection have not been addressed or considered in the current TIA.	widening to allow for a sheltered right turn lane on King Street. Discussion with the road authority has not raised any safety concerns for traffic at this intersection
Paterson Village according to Austroad Guidelines is an activity centre. No consideration has been given within the TIA or EIS body as to the impacts of this activity centre by the proposed development. No consideration has been made as to the impacts to pedestrians or parking in regard to the proposed magnitude of haulage. It is MCQAG view that the impacts to this activity centre both at the current scale of operation and future proposed expansion parameters is totally unacceptable and an alternate route that avoids this activity centre should be proposed by the proponent as part of a revised TIA.	There is no economically viable route for traffic associated with the quarry to bypass the village of Paterson. Consideration has been given to pedestrian and vehicle safety and upgrades are proposed in the centre of Paterson at King and Duke Street to improve road safety for all users.
Total homestead entrance, no consideration has been made for other road users safety at the proposed magnitude of haulage (80 truck movements per hour) having regard to the significant numbers of vehicles that enter and exit the Total homestead. There are no proposed sheltered turning bays.	The revised project shall limit trucks to 20 trucks per hour per direction. The provision of a sheltered right turn lane at Total Homestead entrance is not a matter for consideration for this project. The road authority has not raised any concerns over this existing access point.
The intersection of Tocal Road and Paterson Road (turn off to Largs), this lane is deficient at current flows for the safe merging of traffic. This intersection poses an unacceptable safety conditions based on the proposed magnitude of haulage. An upgraded intersection should be incorporated into a revised TIA. The Tillys Childcare centre directly accesses Tocal Rd. The access point is located on a sweeping bend. No assessment has been made in regard to the safe entry and egress of vehicles accessing this facility. This driveway access and the proposed magnitude of haulage poses unacceptable safety risks to road users based on the propose trucking rates.	<p>The traffic associated with the haulage from Martins Creek only travels along Paterson Road / Tocal Road and does not use this existing merge.</p> <p>The layout of this intersection is the responsibility of the road authority. No upgrades have been identified as being required for this intersection.</p> <p>The access to the Tillys Childcare Centre has been designed in accordance with Austroads requirements (in 2016) and satisfied the requirements of the road authority. This access allows for left in and left out movements only to ensure safe entry and exit movements are provided.</p>
The intersection of Paterson Rd and Bolwarra Rd. The TIA provides no assessment of the safety issues presented by the proposed scale of haulage in regard to this intersection. We note that this intersection is the primary access point for Bolwarra Heights Public School. There are significant numbers of vehicles utilizing this intersection, there are currently no sheltered turning bays provided at this intersection. This intersection and the proposed magnitude of haulage pose unacceptable safety risks to road users.	<p>The intersection of Paterson Road and Bolwarra Road allows for a BAR type intersection control with shoulder widening to allow for a vehicle to pass a vehicle propped waiting to turn right. The road authority has not identified any safety concerns at this location. The road authority monitors accident data for any specific issues and have not identified this intersection as a safety concern.</p> <p>The reduction in the proposed road haulage shall improve the situation at this location.</p>

## 1.7 Authority Consultation

A summary of the authority consultation undertaken since the public exhibition of the EIS is provided below in Table 1-5. Outcomes of previous consultation has also been considered in this report.

Table 1-4 – Authority Consultation

Authority		Date	Purpose of Consultation
Dungog Council	Shire	25 <sup>th</sup> February 2015	<p>Noted that when Gostwyck Bridge closed route is via low level crossing on Allyn River</p> <p>Any haulage route to north needs to be identified in report</p> <p>Road classification and traffic volumes discussed</p> <p>Details of Capital Works Program provided by Council for roads</p> <p>EIS needs to identify impacts on road pavements and costings for repair</p> <p>Identified road works are provided based on available funds and does not meet requirements of the road maintenance requirements i.e. lack of funding</p> <p>Paterson to Paterson Road resealed in 2014/2015</p> <p>Blackspot funding sought for works on Webbers Creek Bridge</p> <p>Works proposed for level crossing in Martins Creek and ARTC approached DSC for funding but none available</p> <p>Number of existing traffic issues noted by Council in the area of the quarry</p> <p>12 tonne load limits on Martins Creek Road</p> <p>Martins Creek Road to Corey Street – timber bridges</p>
Dungog Council	Shire	15 February 2019	Provide an update on the Project, including Traffic Impact Assessment (TIA)
Dungog Council	Shire	27 February 2019	Discuss proposed intersection design options and follow up on previous letter requesting pavement data.
Dungog Council	Shire	22 May 2019	Provide an update on the revised intersections designs and seek feedback.
Dungog Council	Shire	18 July 2019	Provide project update ahead of planned Traffic Collaborative Assessment Forum (CAF).
Dungog Council	Shire	11 August 2020	<p>Meeting via video conference to provide a presentation and update on the Project:</p> <ol style="list-style-type: none"> <li>1. Brief history</li> <li>2. Engagement to date</li> <li>3. What has been happening since September 2019?</li> <li>4. Key project changes – revised project</li> <li>5. Upcoming stakeholder engagement</li> <li>6. Environmental assessment study update</li> <li>7. Next steps</li> </ol>
Dungog Council	Shire	7 December 2020	<p>Meeting via video conference to provide a presentation and update on the Project to DSC Councillors and advise further refinements:</p> <ol style="list-style-type: none"> <li>1. Brief history</li> <li>2. Engagement to date</li> <li>3. What has been happening since September 2019?</li> <li>4. Key project changes – revised project</li> <li>5. Upcoming stakeholder engagement</li> <li>6. Environmental assessment study update</li> <li>7. Next steps</li> </ol>

<b>Port Stephens Council</b>	20 February 2019	Advise of revised haulage route for the Project and confirm that haul route 2 is no longer a primary haul route for the Project, but would only be used to service local jobs as required
<b>Roads and Maritime Services</b>	30 May 2019	Discuss updated Gostwyck Bridge engineering report
<b>TfNSW</b>	16 <sup>th</sup> June 2017	TfNSW to confirm speed zone requirement for the intersection upgrade design work Single haulage route via Paterson / East Maitland advised and TfNSW require report to be updated around this. Weighbridge on site limits hourly output to 40 trucks Gostwyck Bridge structural capacity to be investigated can continue to operate as one-way but increased use could impact on sub-structure of bridge Stress gauges could be installed to monitor bridge and provide guidance for on-going maintenance Need to review controls and upgrade controls on approaches New access to quarry on Dungog Road will need to be in accordance with Austroads Design requirements TfNSW suggested 40 km/h speed could be provided in Paterson at King and Duke St
<b>TfNSW</b>	4 <sup>th</sup> February 2015	TfNSW confirmed that distribution and impact of trucks on the New England Highway and Adelaide Street need to be assessed with Sidra TfNSW maintain Gostwyck and Vacy Bridges TfNSW maintain all traffic signals Need to confirm if B-doubles are to be used Gostwyck Bridge built in 1928, structurally sound and no current restrictions TfNSW require current and future truck numbers to assess impacts on Gostwyck and Vacy Bridges No road upgrades proposed by TfNSW B-double use permitted along some sections of haulage routes Note TfNSW submission to Department of Planning and Environment TfNSW to confirm status of speed review on Tocal Road at Bolwarra Heights Trucks numbers to be identified on current maximum permitted rate and on what the development is seeking
<b>TfNSW</b>	31 <sup>st</sup> May 2019	Gostwyck bridge traffic options King and Duke St options discussed. Further email update to TfNSW on 4 <sup>th</sup> June 2019 from Umwelt to Peter Marler

## 1.8 Collaborative Assessment Forum (CAF)

Since 2018 Umwelt and Daracon have undertaken consultation with residents and other members of the community on the Revised Project. As part of this consultation process, a series of collaborative assessment forums (CAFs) were held, with two CAFs on 23 and 24 July 2019 to discuss outcomes of technical studies specifically relating to traffic and transport. Further input was sought from the community on roads and traffic management options and design concepts. Since that time, further consultation has been undertaken in with individuals and as part of CAFs relating to noise and social impact assessment. These forums also raised matters relevant to traffic impact assessment and management. Daracon has considered this input and committed to additional management and mitigation measures as outlined in Section 5 and 6 of this report, to further reduce traffic and transport related impacts to the local community.

## 2 Existing Situation

### 2.1 Site Description and Proposed Activity

The Martins Creek Quarry (the Quarry) is licensed by Buttai Gravel Pty Ltd, which is part of the Daracon Group (hereafter referred to as Daracon). The Quarry is an existing hard rock quarry situated within the Dungog Local Government Area (LGA), approximately 7 kilometres (km) north of Paterson and 28 km north of Maitland, New South Wales (NSW).

In 2014, Daracon submitted a development application for the Martins Creek Quarry Extension Project. This application sought approval for the consolidation of the existing development approvals and the expansion of the Quarry into new areas to extract approximately 1.5 million tonnes of material per annum over a 30 year period (the Original Project).

The development application is being assessed as a State Significant Development (SSD) (application number SSD 6612), requiring approval under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The Secretary's Environmental Assessment Requirements (SEARs) were issued on 4 August 2016. An Environmental Impact Statement (EIS) was prepared during 2016 (Monteath & Powys, 2016) and exhibited in late 2016.

Key concerns from the local communities included traffic and transport (particularly the volume and frequency of truck movements and road safety), noise, blasting and vibration impacts and social amenity impacts. Furthermore, some of the government agencies requested further information and/or revised impact assessments to adequately address the assessment requirements for a number of technical studies.

Following detailed analysis of the EIS submissions, Daracon committed to key project design changes and additional mitigation and management measures to minimise the Project's environmental and social amenity impacts. This included reductions in proposed extraction limits, Quarry operating hours and truck movements (the Revised Project).

Following further community engagement and feedback during 2018 and 2019 and placement of the Quarry into limited operations in September 2019, Daracon has undertaken further assessment of potential amendments to the Revised Project. As a result, the Revised Project now includes a number of further amendments such as a reduction in the proposed Quarry footprint, further reduction to truck movements numbers and further reduction in operating hours.

The key features of the Revised Project include:

- continuation of the quarrying operations within the existing West Pit and quarrying in the previously disturbed area in the East Pit.
- extraction of up to a maximum of 1.1 million tonnes per annum (Mtpa) of hard rock material over 25 years
- revised product transport and trucking rates to –
  - transporting up to 500,000 tonnes per annum (tpa) of quarry product via public roads (primary Haul Route 1 only), with up to 600,000 tpa transported via rail
  - maximum daily loaded truck movements of 140 loaded trucks (280 movements) per day for up to 50 days per annum, otherwise up to 100 loaded trucks (200 movements) Monday to Friday 7.00am to 6.00pm only; with no road transportation of quarry product on Saturday, Sunday or public holidays
  - maximum hourly loaded truck movements of 20 loaded trucks (40 movements) per hour, Monday to Friday 7.00am to 3.00pm only and 15 loaded (30 movements) per hour 3.00 to 6.00 PM; with no road transportation of quarry product on Saturday, Sunday or public holiday
- use of one primary haulage route i.e. Haul Route 1 with Haul Route 2 only to service local jobs as required
- construction and use of a new access road and bridge crossing from Dungog Road, over the North Coast rail line, to allow for all heavy vehicle movements via the new access

- ongoing use of the existing site access via Station Street until the new access road is constructed by the end of Year 4, thereafter Station St will only be used for emergency access
- intersection upgrades at the Dungog Road / Gresford Road intersection and the King Street / Duke Street intersection within the village of Paterson and an upgrade to the Gostwyck Bridge approach
- revised operational hours to between 7.00 am and 6.00 pm Monday to Friday, with no Saturday, Sundays or public holidays - apart from rail haulage which will occur 24/7
- use of blasting between 11.00 am and 3.00 pm on Monday to Friday, with no blasting on Saturday, Sunday or public holiday
- use of the existing fixed processing plant with further upgrades and replacements throughout the life of the Quarry
- additional noise mitigation works including a new noise barrier and acoustic treatment of processing infrastructure to reduce noise and air quality impacts (such as cladding)
- proposed extension of the rail spur to facilitate longer trains to transport more Quarry product
- progressive rehabilitation of the site.

## 2.2 Site Location

The site is located on the northern edge of the township of Martins Creek, some 7 kms north of Paterson and 28 kms north of Maitland as shown in Figure 2-1 and Figure 2-2. It is located within the Dungog Local Government Area. The site gains access via Station Street through Martins Creek and along Grace Avenue to connect with the external road network (Dungog Road).

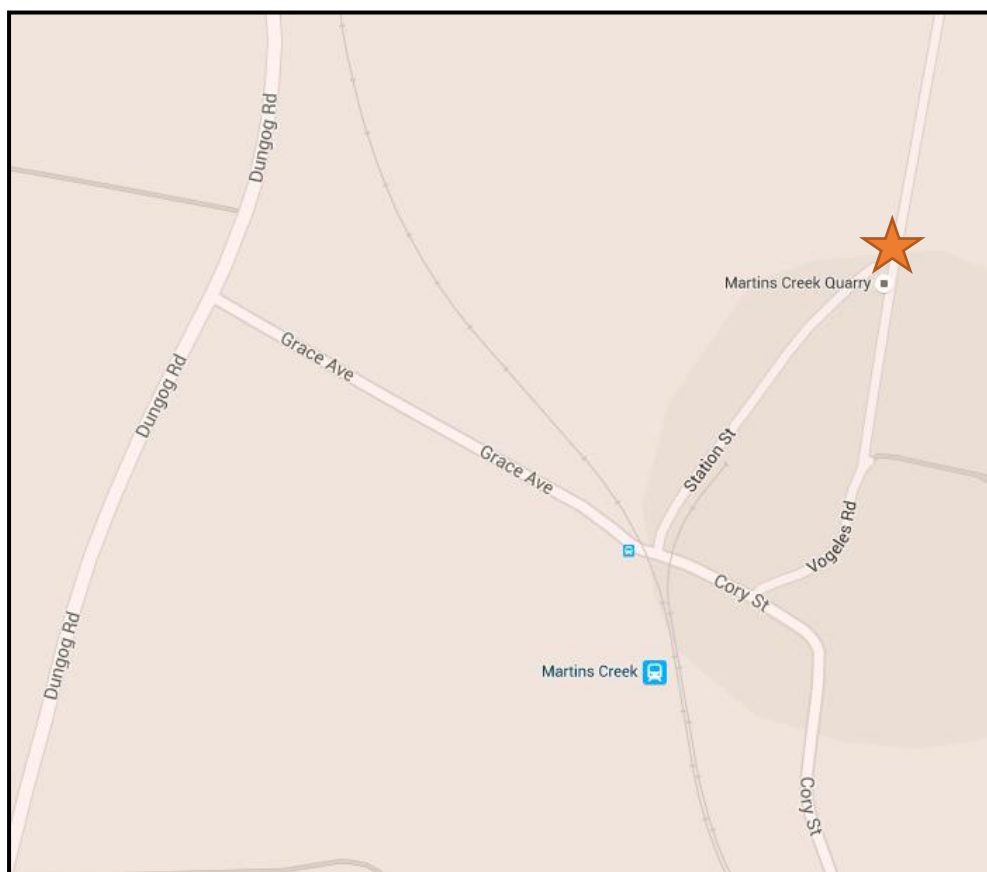


Figure 2-1 – Martins Creek Quarry site access in the local context (Source: Google maps)

The location of the site within the broader regional context is shown below in Figure 2-2.



Site access is available via a number of different access points that connect to the local road network. The primary site access is via Station Street that then connects with Grace Avenue and Dungog Road to provide a route through to Gresford Road, which is the primary road connection. The site access at this location caters for both trucks entering and exiting the site as well as light vehicles.

There is a railway line running along the western boundary of the site that stops vehicle access connecting directly with Dungog Road to the west of the site.

The major route through the locality is the regional road (MR 101) that connects from East Maitland (at the New England Highway) via Bolwarra, Paterson, Wallarobba, Wirragulla, Dungog, Dingadee and Walshpool Bridge to The Bucketts Way. With a branch from Paterson Road, Bolwarra via Flat Road and Pitnacree Road, Pitnacree to Melbourne Street, East Maitland.

The Quarry has previously used additional haul routes, such as via Lorn to connect with the New England Highway as well as to the east via Paterson Road / Butterwick Road / Clarencetown Road / Brandy Hill Drive / Seaham Road to connect with the Pacific Highway at Raymond Terrace. However, as part of the Revised Project, Daracon is seeking approval for one primary haul route (Haul Route 1) and any other routes will only be used as required for local delivery destinations.

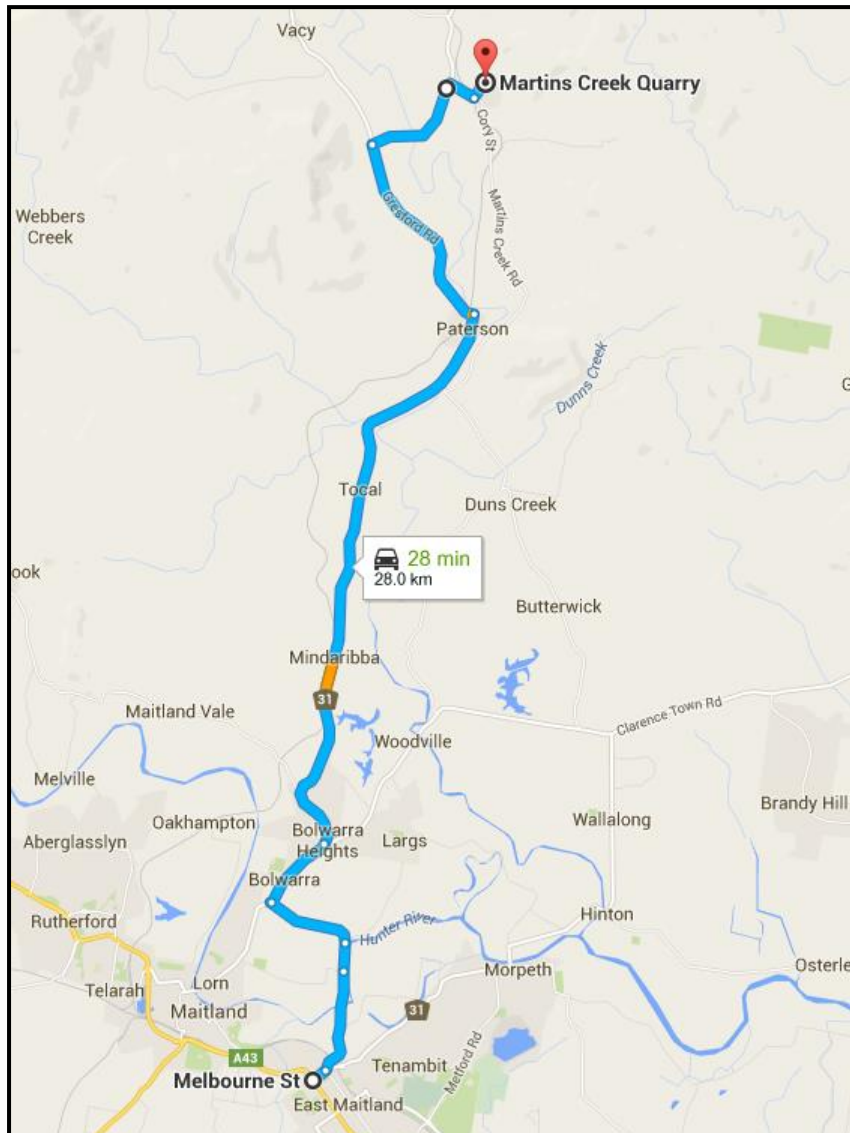


Figure 2-3 – Quarry Haulage Route

Table 2-1 – Characteristics of haulage route

Section	Length	Characteristics
Dungog Road between Grace Avenue and Gresford Road	2.4 kms	Single lane of travel in both directions, no shoulders and formed verges. Posted speed limit of 80 km/h, provides access to a number of rural holdings. Has a width restriction over the Paterson River which permits a single lane of travel only over Gostwyck Bridge. It provides a reasonably straight alignment with a noticeable curve with speed reduction sign (35 km/h advisory) on the northern approach to the bridge over the Paterson River. There are no overtaking lanes provided.

Gresford Road between Dungog Road and Paterson	4.3 kms	Single lane of travel in both directions; no shoulders nor formed verges. Posted speed limit of 100km/hr passing Dungog Road, reducing to 80 km/hr 1.3 kilometres to the south. It provides access to a number of rural holdings and rural residential lots. This section of the road provides a very good alignment with a single curve with an advisory speed limit of 65 km/h. The speed limit reduces to 50 km/h at the southern end of this section of the road when it passes through the village of Paterson. There are no overtaking lanes provided.
Gresford Road / Tocal Road (King and Duke Street locally in Paterson) through Paterson	1.2 kms	This section of road provides a single lane of travel in both directions with additional road pavement to both sides to permit on-street parking. It provides access to the local facilities within Paterson as well as residential lots fronting directly onto this road. It also allows for connection to a number of side roads for the residential area of Paterson. It operates under a posted speed limit of 50 km/h and there are limited pedestrian paths except in the centre of the village. The connection of Gresford Road and Tocal Road is a right angle requiring vehicles to slow down and large vehicles e.g. semi-trailer or truck and dog combination are required to use all of the provided road pavement width to complete the turn within their lane. It provides a minimum width of 7.0 metres with 12 metres provided in the centre of the village to accommodate the on-street parking.
Tocal Road between Paterson and Dungog / Maitland LGA boundary	3.3 kms	This section of the road provides a single lane of travel in both directions with a narrow shoulder over much of its length. Where it crosses Webbers Creek there is no shoulder and the width between the kerbs is 7 metres. There are no footpaths along this section of the road and the bridge over Webbers Creek creates a pinch point. This section of the road has a posted speed limit of 100 km/h with an advisory speed limit of 65 km/h for the bend on the northbound approach to Webbers Creek.
Tocal Road between Dungog / Maitland LGA boundary and Lang Drive	6.4 kms	This section of road provides a good alignment with sealed shoulders to both sides of the road, operating under a posted speed limit of 100 km/h reducing to 80 km/h at its southern end. There are no footpaths and the overall width is 9 metres.
Tocal Road between Lang Drive and Bolwarra Heights	1.0 km	Over this length of the road, the alignment has several tighter bends, which encourage drivers approaching the built up area to reduce their vehicle speeds in line with the posted speed limit of 60 km/h through Bolwarra Heights. There is no shoulder over the majority of the length of the road and no footpaths. At its southern end it connects with Maitland Vale Road and enters the urban area of Bolwarra Heights.
Tocal Road between Maitland Vale Road and Paterson Road	1.3 kms	Provides a single lane of travel in each direction and operates under the posted speed limit of 60 km/h. There is a partial pedestrian footpath along the eastern side of the road and there are individual residential lots with driveway access direct onto the road at this location. There are a number of streetlights reflective of the urban road environment in this locality. The road alignment is reflective of the urban built form and the posted speed limit, with a curved alignment.
Paterson Road between Tocal Road and Flat Road	1.7 kms	Provides a single lane of travel in both directions with a marked parking lane to both sides over the majority of its length. Allows for direct driveway access to residential lots and operates under the posted speed limit of 60 km/h. No footpaths are provided along the majority of its length and limited street lights. Provides an overall pavement width of 12.5 metres for the majority of its length. Generally a straight alignment.
Flat Road between Paterson Road and Melbourne Street	4.9 kms	This road forms part of the 3 <sup>rd</sup> Hunter River Project completed by the RMS. This section of the road has been built to current design standards, providing a single lane of travel in both directions with a wide sealed

		shoulder to both sides to cater for breakdowns and cyclists. It operates under the posted speed limit of 80 km/h and provides a good alignment. There are no pedestrian paths along this road.
Melbourne Street between Flat Road and the New England Highway	350 metres	This road forms part of the State Road network and provides two lanes of travel in both directions, with additional turn lanes at the key intersections. It connects with Flat Road and the New England Highway via 4-way traffic signals. There is kerb side parking permitted along the majority of its length together with footpaths to both sides. It operates under the posted speed limit of 60 km/h.
New England Highway (State Highway)		This road forms part of the state highway network and provides a minimum of 2 lanes of travel in both directions. Additional lanes are provided at the key intersections and there are parking lanes to both sides for the majority of its length in this location. In this location it operates under the posted speed limit of 60 km/h.

From the New England Highway, trucks can access both local and regional markets. These routes can utilise the New England Highway as well as the Hunter Expressway to access areas including the Upper Hunter Valley, Greater Newcastle and its surrounds, the M1 towards the Central Coast and Sydney as well as areas in the immediate locality.

The major intersections along the haulage route, where trucks associated with the haulage are required to give way are:

- Dungog Road and Gresford Road- give way control with Gresford Road being the priority road
- Paterson Road and Flat Road – three-way roundabout
- Pitnacree Road and Melbourne Street – four-way traffic signal control;
- Melbourne Street and New England Highway- four-way traffic signal control

Martins Creek Quarry provides material for local Councils in the Lower Hunter Valley as well as other projects requiring access at times via other routes. The volume of material transported along these other routes is much lower and sporadic in nature and include:

- The use of Dungog Road to access projects within Dungog and the Dungog LGA
- The use of Gresford Road north to East Gresford and beyond
- The use of Belmore Road through Lorn to access the local market in Lorn and Maitland
- Port Stephens Council local LGA works which could include Butterwick Road, Clarencetown Road, Brandy Hill Drive and other roads within the LGA.
- Dungog Shire Council local LGA works

#### 2.4.2 Roadworks

Discussion with the road authorities (Maitland City Council, Dungog Shire Council and TfNSW) indicates that there are no major road network changes proposed along the primary haulage route to be used by Martins Creek Quarry nor other roads works that will be impacted upon by the Revised Project. There are maintenance works identified on Dungog Road near the proposed new access for the quarry and maintenance works in Paterson that occurred in 2019.

The completion of the Hunter Expressway (2014) significantly altered the traffic patterns along the New England Highway. In particular, it reduced the through traffic movements along the length of the New England Highway which improved the capacity of the side roads, which at Melbourne Street provides reduced 2-way traffic flows on the New England Highway allowing for increased green signal time for the side road traffic which in turn potentially reduces the delays and queues. TfNSW has also upgraded the intersection of the New England Highway and

Cessnock Road (opened late 2016), which suffered from significant delays and congestion during the traditional morning (7.30-9.00 AM) and afternoon (4.00-5.30 PM) peak periods. This part of the road network was recently used by haulage trucks from Martins Creek that travelled via the New England Highway to Cessnock Road to link with the Hunter Expressway to the south of this location. TfNSW are continuing to monitor the operation of this intersection to assess if further works are required.

From the consultation meetings held with Dungog Shire Council (detailed above Table 1-4) it was noted that other than routine maintenance, there are no planned road upgrades within the general vicinity of the Quarry site or along Haul Route 1.

#### 2.4.3 Gostwyck Bridge

Previous discussions with TfNSW regarding the heritage listed Gostwyck Bridge on Dungog Road over the Paterson River had indicated that this bridge is subject to on-going maintenance and has been approved for on-going use by heavy vehicles which include the truck and dog combinations utilised at Martins Creek Quarry. In their submission on the EIS, TfNSW have also indicated that the on-going use of this bridge with increased trucks numbers will need to be reviewed and potential on-going maintenance work to be identified. A separate assessment of potential ongoing maintenance requirements for Gostwyck Bridge has been completed by Focus Bridge Engineering (FBE), with the key outcomes relevant to this traffic assessment summarised below.

The Gostwyck Bridge over the Paterson Rive has a single main steel span of about 100 m supported by concrete piers and flanked by six timber girders approach spans. The carriageway width is approximately 5.5 m between kerbs and carries a narrow two lanes for light vehicles or one lane for heavy vehicles. The internal truss height clearance from the deck to the overhead bracing is 5.5 m. In general, the bridge is in good condition (FBE, 2020).

The bridge is not on a B-Double route but is open to general access vehicles. When the environmental impact statement (EIS) for the Martins Creek Quarry Extension Project was submitted in 2016 it carried around 900,000 tonnes or 30,000 heavy vehicles (up to 50.5 tonne trucks) annually.

Gostwyck Bridge is listed on the NSW State Heritage Inventory, the Dungog Local Environment Plan 1990 and the TfNSW Section 170 heritage and conservation register. The bridge has been assessed as a high heritage significance at a local level.

Investigations by FBE, including load testing and structural assessment, have found the steel truss span operating as a one lane bridge is capable of supporting vehicle loads up to 68 tonne B-Doubles. The bridge has also been found to have a remaining fatigue life well in excess of 90 years under a usage of approximately 900,000 tonnes per year. Additionally, the assessment indicated that if BD68 vehicles are used in place of TD50.5 vehicles, the estimated remaining fatigue life of the structure is still greater than 100 years at the proposed transportation rate of 500,000 tonnes per annum. FBE therefore concluded that the Revised Project will not have any adverse impact on the structure of the Gostwyck Bridge due to an increase in truck movements over the bridge (FBE, 2020).

#### 2.4.4 Traffic Management Works

There are currently no traffic management works occurring in the vicinity of the subject site.

#### 2.4.5 Flood Prone Land

Various sections of the primary haul route have been identified in the Dungog Local Environmental Plan (LEP) 2014 and Maitland LEP 2011 as being in Flood Prone Land, due to the proximity of roads to the Paterson River and Hunter River.

Daily traffic movements will vary due to market demands as well as weather conditions. It is expected that during heavy rain events or flood events, road haulage will slow down or, depending on the severity of the event, cease.

#### 2.4.6 Pedestrian and Cycling Facilities

There are currently no pedestrian or cyclist's facilities provided along the majority of the length of the local roads associated with the current haulage routes for the quarry outside of the urban areas. This is typical of the rural

setting and is reflective of the on-site observed low demand for pedestrians or cyclists. Through Paterson there are footpaths provided in a non-continual manner. These paths are in the centre of the town where they cater for local pedestrian demands associated with trips to the commercial facilities in the centre of Paterson.

A footpath to the eastern side of Tocal Road is provided through Bolwarra Heights which ensures pedestrian safety is maintained through the narrow section of the road reserve. There are no footpaths provided on Paterson Road further south, including the recently upgraded section to the north of Flat Road. Footpaths are provided within East Maitland, reflective of the much higher pedestrian demands and the urban development. Maitland City Council have recently installed a path along Paterson Road between Victoria Road and Tocal Road and this appears to be continuing along Tocal Road.

For other minor routes utilised by the Martins Creek Quarry, the majority of the roads are in rural areas with no footpaths or cyclist facilities, reflective of the low demands by pedestrians or cyclists observed. Within the local town centres e.g. Dungog there are footpaths provided within the central business district only, reflective of the higher demands in these areas. In the rural settings for the roads, the distance between urban centres discourages casual cycling use and cyclists using these rural roads are generally more proficient and accepting of the rural environment for cycling. Roads around Martins Creek and Paterson appeal to weekend riders as part of a casual ride who are more confident of riding bikes in these environments. These riders typically ride at the weekend and less so during the week.

## 2.5 Traffic Flows

### 2.5.1 Peak Hour Flows

As part of this updated assessment, Seca Solution has collected additional traffic data along the haul route to be utilised by the quarry traffic. This included morning and afternoon traffic surveys conducted on Tuesday 8<sup>th</sup> and Thursday 10<sup>th</sup> May 2018 prior to the limitations on transport imposed by the L&E Court at the following intersections:

- Dungog Road / Gresford Road
- Paterson Road / Tocal Road
- Paterson Road / Flat Road
- Pitnacree Road / Melbourne Street / Lawes Street
- Melbourne Street / New England Highway

At the time of these traffic surveys, the Martins Creek Quarry was operational. The survey staff observed Daracon trucks (due their livery) as well as other truck and dog combinations consistent with quarry operations. This traffic data is considered valid for the purposes of this assessment due to lack of background traffic growth in this location.

A summary of the peak hour traffic data from the above intersections is provided in **Appendix A**.

Tube counters were also installed in week beginning 28<sup>th</sup> April 2018. These traffic surveys have involved using automatic tube counts, which collect data over a 24-hour period over the course of 3 weeks. These traffic counters also provide the split in traffic movements by direction as well as a breakdown of vehicle numbers by class as defined by Austroads. A summary of the peak hour traffic volumes by location is provided in Table 2-2.

Table 2-2 – Summary of hourly traffic flows by direction and two-way

Location	AM Peak			PM peak		
	Inbound Direction	Outbound Direction	2-way	Inbound Direction	Outbound Direction	2-way
Dungog Road, midway between Grace Ave and Gresford Road	53	92	145	80	56	136
Gresford Road north of Paterson	97	213	310	195	126	320
Total Road, midway between Paterson and Bolwarra Heights	159	227	386	217	180	397
Paterson Road, between Bolwarra Heights and Flat Road	355	865	1,220	755	454	1,209
Flat Road midway between Paterson Road and Melbourne Street	298	601	899	643	342	985

Note: Inbound direction equates to vehicle movements heading towards the Martins Creek quarry whilst outbound is vehicles heading away from the Martins Creek quarry.

Traffic flows on both Station Street and Grace Avenue are very low and well within capacity limits, and therefore no additional traffic data was collected for these streets. The existing traffic flows on these roads are less than 100 vehicles per hour and well within the acceptable urban road limits. Once the new access is provided direct to Dungog Road, there will be limited demands along these roads associated with Martins Creek quarry.

Added tube counters were installed for the week beginning Monday 17<sup>th</sup> February 2020, to the north of Church Street in Paterson. When these surveys were completed there were no product haulage activities occurring in the Martins Creek quarry.

Table 2-3 - Summary of hourly traffic flows by direction and two-way to immediate north of Paterson

Location	AM Peak			PM peak		
	Inbound Direction	Outbound Direction	2-way	Inbound Direction	Outbound Direction	2-way
Dungog Road, midway between Grace Ave and Gresford Road	92	194	286	181	119	300

Note: Inbound direction equates to vehicle movements heading towards the Martins Creek quarry whilst outbound is vehicles heading away from the Martins Creek quarry.

Table 2-3 above demonstrates that the traffic volumes on Gresford Road to the immediate north of Paterson are predominantly not related to the traffic operations associated with the Martins Creek quarry. In the AM peak between 8.00-9.00 the traffic flows reduce to 286 2-way with no quarry road haulage operations from Martins Creek from 310 when the quarry was operating. Similarly, in the PM peak between 3.00-4.00 PM the flows decreased from 320 2-way to 300 vehicles 2-way when the quarry was not hauling product by road.

### 2.5.2 Daily Traffic Flows

The traffic data for existing daily traffic flows via the tube counts also provides details on the Annual Average Daily Traffic flow (AADT). The AADT for the various sections of the major transport route is provided in Table 2-4 with daily flows provided for weekdays only, calculated as the average over the three weeks of tube counts.

Table 2-4 – Daily traffic volumes

Location	Daily traffic flows
Dungog Road, midway between Grace Ave and Gresford Road	1,621
Gresford Road north of Paterson (April 2018)	3,576
<b>Gresford Road north of Paterson (February 2020 with quarry non-operational)</b>	3,307
Total Road, midway between Paterson and Bolwarra Heights	4,548
Paterson Road, between Bolwarra Heights and Flat Road	13,538
Flat Road midway between Paterson Rd and Melbourne St	10,492

### 2.5.3 Daily Traffic Flow Distribution

The daily traffic volumes are reasonably balanced in both directions, with the above data indicating a slight bias in movements southbound (outbound) in the AM peak towards Maitland and the New England Highway. This would be reflective of commuter type trips to the major centres such as Maitland and Newcastle for work and education requirements. At this time there are also peak demands associated with quarry material being hauled from the quarry site for delivery to construction sites. During the PM peak periods, the traffic flows with a bias for northbound movements. These would be reflective of reverse commuter trips heading home after work, educational and retail activities, with these centres all being to the south of Martins Creek. At this time, the quarry would typically not be busy as the majority of material is delivered to sites in the morning.

### 2.5.4 Vehicle Speeds

The automatic tube counter data also included the collection of vehicle speeds. A summary of the vehicle speeds from the surveys is provided in Table 2-5, calculated as the average 85<sup>th</sup> percentile speed over the three weeks of tube counts.

Table 2-5 – Summary of 85<sup>th</sup> percentile speeds and posted speed limits 2018 surveys

Location	85 <sup>th</sup> percentile speed	Posted speed limit
Dungog Road, midway between Grace Avenue and Gresford Road	81 km/h	80 km/h
Gresford Road north of Paterson	89 km/h	80 km/h
Total Road, midway between Paterson and Bolwarra Heights	98 km/h	100 km/h
Paterson Road, between Bolwarra Heights and Flat Road	60 km/h	60 km/h
Flat Road midway between Paterson Road and Melbourne Street	79 km/h	80 km/h

The 85<sup>th</sup> percentile speed is the speed at or below which 85% of all vehicles travelled.

The above data shows that in the more rural areas of the haulage route the 85<sup>th</sup> percentile vehicles speeds exceed the posted speed limit, but within the more residential areas the vehicle speeds are nearer to the posted speed limit.

Additional data from tube counters installed in October 2014 and July 2015 was extrapolated to determine the vehicle speeds by vehicle class (as defined by Austroads Standards). A summary of the results of the data is provided below. Note that this data was not collected as part of the 2018 traffic surveys as the survey equipment used did not allow for the collection of this data.

Table 2-6 – Summary of speeds by vehicle class (cars and quarry haulage vehicles) for typical working day

Location (2015)	Light vehicle speeds	Quarry haulage vehicle speeds	Posted speed limit
Gresford Road, north of railway crossing at Paterson	46.3 km/h	37.2km/hr	50 km/h
Paterson Road, between Bolwarra Heights and Flat Road	66.8 km/h	63.0 km/h	60 km/h
Flat Road midway between Paterson Road and Melbourne Street	87.9 km/h	87.0 km/h	80 km/h

The above results demonstrate that the trucks associated with the quarry haulage travel slower than the light vehicles. Trucks typically travel within the posted speed limit except on Paterson Road (Bolwarra to the immediate south of Tocal Road) and along Flat Road. It can be seen that Flat Road provides a high standard of road design and construction which leads to all drivers regularly driving over the posted speed limit of 80 km/h. As part of the on-going management of the trucks associated with the Martins Creek Quarry all drivers will be instructed to adhere to the requirements of the Drivers Code of Conduct which includes drivers to adhere to the posted speed limits. A process will be documented with the road authority to monitor truck speeds along the haul route with appropriate action taken with drivers who exceed the posted speed limit.

#### 2.5.5 Existing and Historic Site Flows

Since October 2018, the quarry operated in accordance with a series of Interim Environmental Management Plans (IEMP) which placed limits on extraction and processing volumes, truck numbers and operating hours.

The IEMP was revised to incorporate additional controls. During the period 11 February 2019 to 24 September 2019, the quarry operated in accordance with the most recent IEMP as agreed to with Dungog Shire Council. This comprised the following parameters associated with traffic and transport:

- No more than 75,000 tonnes of product dispatched from the quarry by road in any two month period (450,000 tonnes per annum).
- No transporting of material permitted on Saturdays, Sundays and Public Holidays.
- No more than 90 laden trucks dispatched from the quarry in one calendar day.
- No more than 20 laden trucks dispatched from the quarry in any 1 hour period.
- No Quarry trucks to pass through Paterson before 6.45am.
- All trucks entering and leaving the quarry to observe a reduced speed limit of 40 km/hour through the town of Paterson.
- No truck loading prior to 7.00 am.

On 24 September 2019, the quarry was placed into limited operations, in line with the parameters of the existing consent for the quarry, as approved by the Court of Appeal judgment delivered on 20 June 2019. These parameters comprise the following with respect to traffic and transport:

- Total production of no more than 449,000 tonnes per annum
- Not greatly more than 30% of the products of the Quarry transported by public road on an annual basis without the specific approval of Dungog Shire Council.

Further, the effect of the order is the Environment Protection Licence (EPL) restricts the extraction of more than 500,000 tpa of quarry product.

All vehicle access is via the main access point on Station Street. This access connects with Grace Avenue to then connect to the greater road network.

Weighbridge data 2<sup>nd</sup> July 2018 and 29<sup>th</sup> March 2019 has been provided for the quarry and this data provides advise on tonnage hauled from the site. The data is summarised below and the hourly breakdown of truck movements for outbound material shown in Table 2.7:

- Maximum road haulage tonnage is approximately 32 tonnes, requiring truck and dog combination
- Smaller trucks carrying 12 tonnes widely used and do not have a trailer

Table 2-7 – Hourly spread of laden trucks outbound from Martins Creek (2018/19)

	FY2018/2019			
Time	Average Movements	Max Movements	Min Movements	MEDIAN
5-6				
6-7	7.79	19	1	7
7-8	8.23	30	1	7
8-9	5.73	19	1	4
9-10	6.32	35	1	5
10-11	7.16	32	1	6
11-12	6.17	29	1	5
12-13	6.01	34	1	5
13-14	5.37	21	1	4
14-15	4.69	20	1	4
15-16	3.56	19	1	3
16-17	2.01	6	1	2
17-18	1.33	2	1	1
18-19	2	2	2	2
19-20				

The historic tonnage removed from Martins Creek and associated truck movements, based on 32.5 tonnes per truck load, associated with Martins Creek quarry are shown in Table 2-8.

Table 2-8 – Historic haulage values (Tonnes) and associated truck movements for Martins Creek Quarry (Source: Daracon)

YEAR	Total Tonnes	TRAINS		TRUCK AND DOG		RIGID		LIGHT VEHICLE	
		TONNES	MOVEMENTS	TONNES	MOVEMENTS	TONNES	MOVEMENTS	TONNES	MOVEMENTS
2012/2013	347,951.20	8478							
FY2013/2014	1,150,433.96	33,130.60	-	1,082,962.10	33,940.00	28,221.81	2,588.00	269.33	148.00
FY2014/2015	906,536.86	35,046.00	36.00	822,837.80	25,587.00	48,239.88	4,232.00	413.18	248.00
FY2015/2016	848,211.31	45,036.00	51.00	752,043.39	23,047.00	50,779.21	4,751.00	352.71	194.00
FY2016/2017	758,008.72	29,523.28	27.00	662,332.37	20,985.00	65,542.32	5,823.00	610.75	300.00
FY2017/2018	663,071.00	28,282.56	25.00	590,449.76	18,439.00	43,852.59	4,068.00	486.09	285.00
FY2018/2019	521,773.75	45,036.00	-	498,304.60	15,884.00	23,436.18	2,325.00	44.79	117.00

Note that the above values are for average outbound truck movements only based on tonnes. For every outbound laden truck there is a corresponding inbound un-laden truck movement.

Note that data for 2012/13 is not for the complete year, as Daracon did not operate the quarry for the full financial year. For 2013/14 the data excludes train movements.

The above values represent the average truck movements per day, but operations on site vary considerably by day and also by hour through the normal working day. The operational characteristics of the quarry has historically allowed a maximum throughput of up to 40 trucks per hour outbound, with this being the maximum capacity of the weighbridge on site.

A further historical assessment of the average and peak truck movements for the quarry is provided below.

Table 2-9 – Average, median and peak daily truck flows by year (Source: Daracon)

<b>YEAR</b>	<b>Average Daily Loads</b>	<b>Median Daily Loads</b>	<b>Peak Daily Loads</b>	<b>Average daily Tonnes</b>	<b>Median Daily Tonnes</b>	<b>Operating Days</b>
<b>FY2013/2014</b>	123.07	118.50	311.00	3,729.71	3,493.51	298.00
<b>FY2014/2015</b>	101.02	102.00	316.00	3,042.07	3,166.54	298.00
<b>FY2015/2016</b>	93.60	89.00	240.00	2,459.27	2,459.27	297.00
<b>FY2016/2017</b>	91.18	87.00	247.00	2,475.76	2,316.11	294.00
<b>FY2017/2018</b>	75.27	77.00	183.00	2,121.41	2,192.61	299.00
<b>FY2018/2019</b>	66.64	64.00	157.00	1,897.40	1,810.44	275.00

Table 2-10 – Historical data, 2014/15

<b>FY2014/2015</b>		
<b>Average Daily Loads</b>		
10/07/2014	98	2847.11
4/08/2014	100	3276.34
2/09/2014	98	3605.7
17/11/2014	102	3010.46
<b>18/12/2014</b>	<b>101</b>	<b>2826.1</b>
5/02/2015	98	2864.19
16/02/2015	100	3074.6
1/04/2015	99	3710.76
2/04/2015	100	3191.98
19/05/2015	102	3151.64
<b>Median Daily Loads</b>		
17/11/2014	102	3010.46
18/12/2014	101	2826.1
<b>19/05/2015</b>	<b>102</b>	<b>3151.64</b>
<b>Peak Daily Loads</b>		
<b>29/04/2015</b>	<b>316</b>	<b>5643.47</b>

Note – 2<sup>nd</sup> column above is number of trucks and 3<sup>rd</sup> column weight in tonnes per day

Table 2-11 – Historical data, 2015/16

<b>FY2015/2016</b>		
<b>Average Daily Loads</b>		
17/07/2015	93	2561.98
11/09/2015	92	2664.42
15/09/2015	95	3040.3
16/12/2015	95	3055.06
12/01/2016	93	2611.79
13/02/2016	92	2599.14
11/03/2016	94	2160.15
5/05/2016	95	2657.74
21/06/2016	95	2864.74
30/06/2016	92	2337.22
<b>Median Daily Loads</b>		
9/09/2015	90	2623.7
17/11/2015	89	2829.64
14/01/2016	90	2808
9/03/2016	89	2456.79
6/04/2016	89	2299.35
18/04/2016	89	2334.53
20/04/2016	89	2459.27
26/04/2016	89	2033.18
27/04/2016	89	1953.95
<b>Peak Daily Loads</b>		
21/10/2015	240	7380.75

Table 2-12 Historical data 2016/17

<b>FY2016/2017</b>		
<b>Average Daily Loads</b>		
8/07/2016	92	1944.55
19/07/2016	89	1843.88
26/07/2016	91	2745.86
10/08/2016	93	1993.97
18/08/2016	89	2547.33
8/11/2016	90	2326.78
25/01/2017	91	2773.95
27/02/2017	89	2383.14
21/04/2017	93	2622.93
21/06/2017	92	2666.71
<b>Median Daily Loads</b>		
19/07/2016	89	1843.88
18/08/2016	89	2547.33
4/10/2016	85	2399.16
6/02/2017	85	2452.74
27/02/2017	89	2383.14
2/03/2017	85	2123.76
7/04/2017	86	2069.54
27/06/2017	88	2140.44
<b>Peak Daily Loads</b>		
10/05/2017	247	6164.5

Table 2-13 Historical data 2017/18

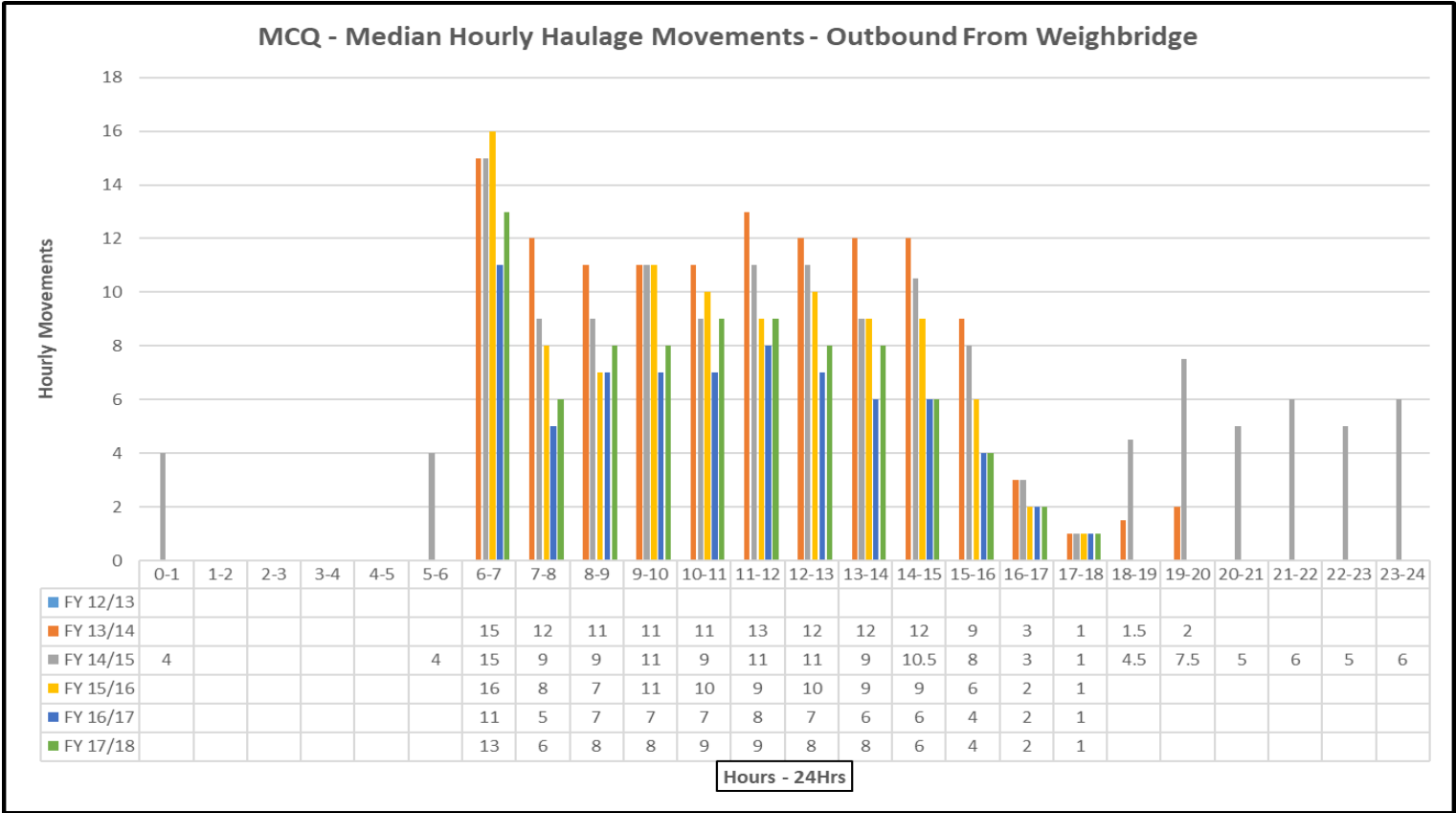
FY2017/2018		
Average Daily Loads		
20/07/2017	76	2139.7
26/07/2017	76	1959.09
31/07/2017	75	1828.73
3/08/2017	75	2185.76
4/08/2017	76	1651.66
5/09/2017	77	2206.14
21/09/2017	76	1954.04
29/09/2017	74	1647.48
3/10/2017	75	2337.55
18/10/2017	77	2442.69
30/10/2017	73	2084.74
7/12/2017	75	2242.82
8/12/2017	73	2171.67
20/12/2017	74	2379.77
21/12/2017	74	2280.6
24/01/2018	74	2241.26
30/01/2018	73	2269.46
2/02/2018	77	2167.9
15/02/2018	74	2230.62
27/02/2018	76	2312.46
7/03/2018	75	2234.1
11/04/2018	76	2187.96
22/05/2018	77	2269.3
6/06/2018	73	2133.2
7/06/2018	77	2050.49
8/06/2018	76	2149.79
12/06/2018	73	2001.42
14/06/2018	74	1996.54
Median Daily Loads		
7/07/2017	78	1901.13
20/07/2017	76	2139.7
26/07/2017	76	1959.09
31/07/2017	75	1828.73
3/08/2017	75	2185.76
4/08/2017	76	1651.66
5/09/2017	77	2206.14
21/09/2017	76	1954.04
3/10/2017	75	2337.55
10/10/2017	78	2257.59
11/10/2017	78	2272.22
18/10/2017	77	2442.69
15/11/2017	79	1885.74
17/11/2017	78	2220.86
7/12/2017	75	2242.82
2/02/2018	77	2167.9
27/02/2018	76	2312.46
7/03/2018	75	2234.1
11/04/2018	76	2187.96
20/04/2018	78	2308.06
22/05/2018	77	2269.3
7/06/2018	77	2050.49
8/06/2018	76	2149.79
Peak Daily Loads		
4/10/2017	183	4639.71

Note that the above values are for outbound truck movements only. For every outbound laden truck there is a corresponding inbound un-laden truck movement.

Table 2-10 relates to the current and historic operation of the quarry during the peak year (2013/2014), it is noted that there can be significant variation in demands, based upon the end market demands and weather conditions i.e. reduced or no operations within the quarry during periods of prolonged heavy rain. March 2014 was the peak month for the quarry operations which coincided with peak demands at a number of major projects in the Lower Hunter i.e. Aurizon project at Hexham, ARTC train passing loops at Hexham and Maitland River revetment project. There was an average daily outbound flow of 6,720 tonnes corresponding to 207 outbound truck movements per day. The absolute peak daily demand occurred on Monday 17<sup>th</sup> of March 2014 with 9,449 tonnes which equates to 291 outbound truck movements, giving 582 two-way truck movements on that day. During the week commencing Monday 17<sup>th</sup> March, on average 8212 tonnes of material was supplied per day over the full working week, some 22% higher than the average per week for that month and 87% higher than the overall average weekly flow for 2014.

The historical data available from the weighbridge has been reviewed and the figure below shows the hourly variation in outbound movements from Martins Creek.

Figure 2-4 Hourly truck movements outbound from weighbridge at Martins Creek



### 2.5.6 Heavy Vehicle Flows

The traffic data collected by Seca Solution in May 2018 included a break down in vehicle classification as per the Austroads Guidelines. The traffic data shows that north of the town of Paterson the truck numbers as a percentage of the total flows is higher, but then as the analysis moves south along the haul route, the truck numbers remain near constant but the overall volume of traffic increases and hence the number of trucks as a percentage of the overall flow decreases. A summary of the heavy vehicle flows is given in Table 2-14.

Table 2-14 – Summary of the weekday heavy vehicle flows along the transport routes from tube counters

Location	Total daily flow	Total Heavy vehicle daily flows	Quarry classification truck movements
Dungog Road, midway between Grace Avenue and Gresford Road	1,621	294 (18%)	162 (10%)
Gresford Road north of Paterson	3,576	418 (17%)	179 (5%)
<b>Gresford Road north of Paterson Feb 2020 (NO Martins Creek quarry trucks)</b>	3,307	627 (18%)	34 (1%)
Tocal Road, midway between Paterson and Bolwarra Heights	4,548	459 (10%)	182 (4%)
Paterson Road, between Bolwarra Heights and Flat Road	13,538	699 (5%)	135 (1%)
Flat Road midway between Paterson Road and Melbourne Street	10,492	385 (3.6%)	105 (1%)

Heavy vehicles shown above are vehicles from medium rigid upwards, classes 3 to 12 inclusive as per Austroads Vehicle Classifications allowing for all heavy vehicle movements, not just those associated with the quarry. Heavy vehicles associated with the quarries are class C9 (6 axle articulated) and C10 (Heavy truck and trailer combination).

A closer examination of the survey results show that the percentage of heavy vehicles is greater in the morning and gradually decreases through the working day and from 5.00 PM the percentage of heavy vehicles drop off significantly.

### 2.5.7 Current Road Network Operation

Observations on site by Seca Solution staff along the haul route during the morning peak (7.30 to 9.30 AM) and afternoon peak (4.00 to 5.30 PM) periods show that the road network associated with the major haul route for the Martins Creek Quarry operations operates well with minimal delays and congestion, with the exception of the length of Melbourne Street on the approach to the New England Highway. Sidra intersection modelling in accordance with TfNSW requirements under the SEARs has been completed along the network at the key intersections to confirm the current intersection operation. This Sidra modelling shows that the delays at the various intersections, based on assessment criteria provided by TfNSW are low and within acceptable limits, except at the New England Highway intersection. The TfNSW guidelines provide a measure of intersection performance ranging from highest level of A through to F. All intersections other than the traffic signals at the New England Highway and Melbourne Street are operating at a level of service of A or B.

These surveys were completed during the intersection count surveys in February 2015 and in May 2018. Observations show that in the morning peak in particular, the queue back from the traffic lights at the New England Highway and Melbourne Street intersection extends beyond the traffic signals at Pitnacree Road / Lawes Street which creates significant delays and congestion for traffic on Melbourne Street. This is created by the high volume of traffic using the New England Highway in this location. Whilst the Hunter Expressway has provided some relief along this road corridor, the local demands along the New England Highway in this location remain high, hence the delays and queues created at this signal-controlled intersection. The Sidra modelling demonstrates that these traffic signals are currently operating at a level of service of F which based upon TfNSW Guidelines indicates the intersection control is failing and creates unacceptable delays and congestion.

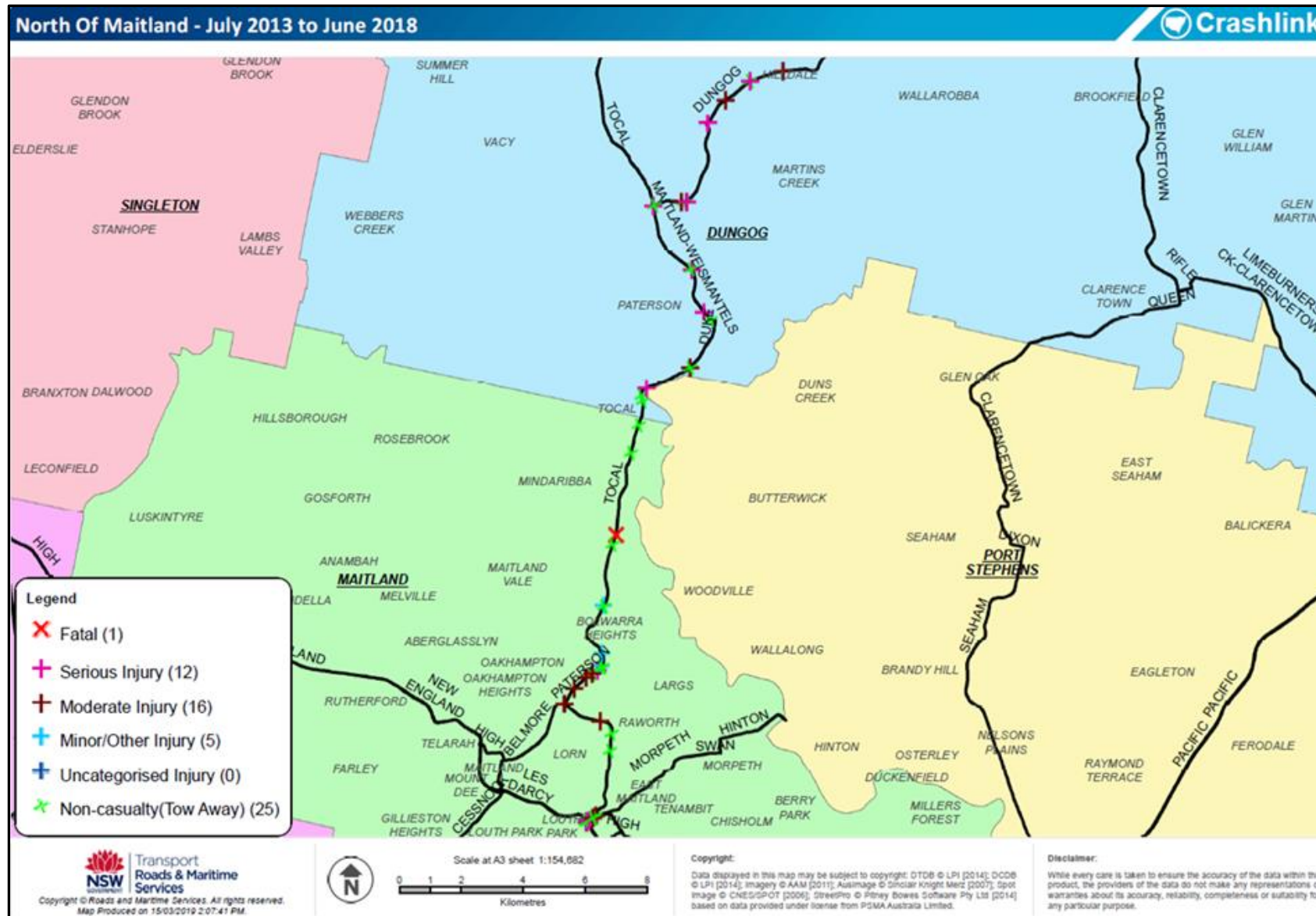
Historically the quarry used a haulage route via Belmore Road, Lorn which experienced delays caused by the traffic signals within Maitland at High Street as well as the more intense residential development in this area. This route shall no longer be used except to service the local markets in Maitland and its environs as required.

### 2.6 Traffic Safety and Accident History

The length of the major haulage route for the quarry operations has been reviewed as part of the quarry under the guidelines for the preparation of Road Safety Audits published by Austroads (Updated guidelines in 2019 Parts 6 and 6A). TfNSW has also provided accident data along the full length of the haul route over the 6 year period between July 2013 and June 2019, which provides details on the accident types as well as the type of vehicles involved.

Accident data provided by the RMS (now TfNSW) showed that the overall number of accidents are low with no reportable accidents identified to be associated with the operations of the quarry. In addition, Daracon have confirmed that since operating the quarry there have been two recorded minor incidents associated with the Daracon operations, involving a parking incidence in a driveway and a car mirror being damaged. Neither of these resulted in an injury.

The NSW Transport Centre for Road Safety's accident data along the haulage route, which is provided in Figure 2-5 and Figure 2-6.



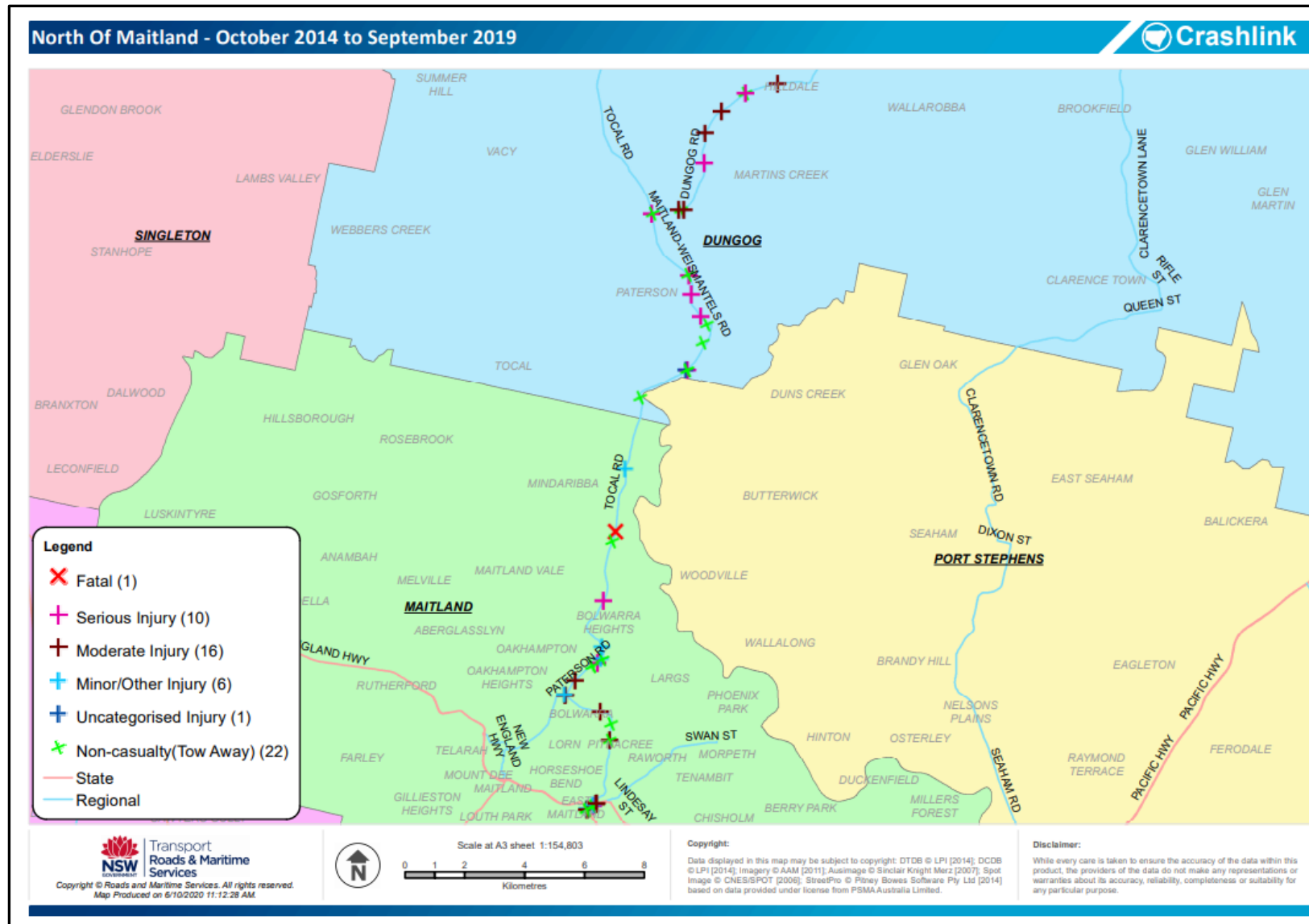


Figure 2-5 – Crash maps along haulage route (Provided by NSW Transport Centre for Road)

# Summary Crash Report

# Crash Type	Contributing Factors	Crash Movement	CRASHES 56	CASUALTIES 43
Car Crash 43 76.8%	Speeding 8 14.3%	Intersection, adjacent approaches 6 10.7%	Fatal 1 1.8%	Killed 1 2.3%
Light Truck Crash 15 26.8%	Fatigue 7 12.5%	Head-on (not overtaking) 2 3.6%	Serious inj. 10 17.9%	Seriously inj. 12 27.9%
Rigid Truck Crash 1 1.8%		Opposing vehicles; turning 4 7.1%	Moderate inj. 16 28.6%	Moderately inj. 21 48.8%
Articulated Truck Crash 2 3.6%		U-turn 0 0.0%	Minor/Other inj. 6 10.7%	Minor/Other inj. 7 16.3%
Heavy Truck Crash (3) (5.4%)		Rear-end 11 19.6%	Uncategorised inj. 1 1.8%	Uncategorised inj. 2 4.7%
Bus Crash 0 0.0%	Weather	Lane change 0 0.0%	Non-casualty 22 39.3%	Unrestrained 0 0.0%
Heavy Vehicle Crash (3) (5.4%)	Fine 46 82.1%	Parallel lanes; turning 1 1.8%		
Emergency Vehicle Crash 0 0.0%	Rain 6 10.7%	Vehicle leaving driveway 2 3.6%		
Motorcycle Crash 6 10.7%	Overcast 4 7.1%	Overtaking; same direction 0 0.0%		
Pedal Cycle Crash 0 0.0%	Fog or mist 0 0.0%	Hit parked vehicle 0 0.0%		
Pedestrian Crash 0 0.0%	Other 0 0.0%	Hit railway train 0 0.0%		
	Road Surface Condition	Hit pedestrian 0 0.0%		
	Wet 8 14.3%	Permanent obstruction on road 1 1.8%		
	Dry 48 85.7%	Hit animal 2 3.6%		
	Snow or ice 0 0.0%	Off road, on straight 0 0.0%		
	Natural Lighting	Off road on straight, hit object 11 19.6%		
	Dawn 4 7.1%	Out of control on straight 1 1.8%		
	Daylight 34 60.7%	Off road, on curve 0 0.0%		
	Dusk 2 3.6%	Off road on curve, hit object 7 12.5%		
	Darkness 16 28.6%	Out of control on curve 1 1.8%		
		Other crash type 7 12.5%		
		Speed Limit		
		40 km/h or less 1 1.8%		
		50 km/h zone 3 5.4%		
		60 km/h zone 28 50.0%		
		70 km/h zone 0 0.0%		
		80 km/h zone 10 17.9%		
		90 km/h zone 0 0.0%		
		100 km/h zone 14 25.0%		
		110 km/h zone 0 0.0%		
		~ 07:30-09:30 or 14:30-17:00 on school days ~ 40km/h or less 0 0.0%		
		~ School Travel Time Involvement 9 16.1%		
		Day of the Week		
		Monday 6 10.7%		
		Tuesday 10 17.9%		
		Wednesday 3 5.4%		
		Thursday 16 28.6%		
		Friday 6 10.7%		
		Saturday 6 10.7%		
		Sunday 9 16.1%		
		WEEKEND 15 26.8%		
		WEEKDAY 41 73.2%		
		#Holiday Periods		
		New Year 0 0.0%		
		Easter 0 0.0%		
		Queen's BD 0 0.0%		
		Christmas 1 1.8%		
		Easter SH 1 1.8%		
		Sept./Oct. SH 1 1.8%		
		Aust. Day 1 1.8%		
		Anzac Day 0 0.0%		
		Labour Day 1 1.8%		
		January SH 3 5.4%		
		June/July SH 3 5.4%		
		December SH 3 5.4%		

Crashid dataset North Of Maitland - October 2014 to September 2019

Note: Data for the 9 month period prior to the generated date of this report are incomplete and are subject to change.

Crash self reporting, including self reported injuries began Oct 2014. Trends from 2014 are expected to vary from previous yrs. More unknowns are expected in self reported data. Reporting yrs 1996-2004 & 2019 Q4 onwards contain uncategorised inj crashes.

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

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Figure 2-6 – Summary crash data along haulage route (Provided by NSW Transport Centre for Road Safety, accessed on 06 October 2020))

From the accident data above, the following points are made:

- The vast majority of the accidents involved light vehicles and light trucks only, which excludes the size / type of vehicle associated with haulage of quarry material;
- Speed and fatigue were determined as contributing factors in over 30% of the accidents along the route;
- The majority of accidents in urban areas along the haulage route involved rear end accidents, turning traffic and at the approach to intersections. These are typically created at driveways and intersections where there are no sheltered right turn lanes, to protect traffic waiting to turn right off the road.
- The most frequent crash type involved vehicles going off road, with this being the most common accident type in rural locations.
- One fatal accident was recorded along the route involving a driver going off road on a bend. Speeding and fatigue were identified as contributing factors for this accident.

The road safety review undertaken along the length of the major haulage route identified a number of safety concerns with the existing layout of intersections and roads. It is noted that these concerns do not have a nexus to the haulage vehicles associated with quarry use at Martins Creek. These are existing safety issues on the existing road network where there is non-compliance with current Austroads Guidelines design standards. A summary of the safety concerns is provided in Table 2-15.

Table 2-15 – Summary of findings of Road Safety review along the haulage routes

Issue	Potential safety concern	Suggested upgrade	Comment
Lack of space between intersection of Station Street and railway crossing and road alignment across railway crossing	Could lead to driver confusion over traffic controls leading to blockage of railway crossing	1 - Remove railway crossing with grade separation 2 - Upgrade level crossing and alignment	ARTC has previously proposed an upgrade but no timeframe for works. Further review by Council has identified other works to be completed as part of this upgrade but funding is not available. As the project has committed to constructing a new access of Dungog Road by Year 4 no upgrade by the quarry is suggested for this location. Any upgrade at this location is a ARTC requirement.
One-way bridge operation on Dungog Road	Could lead to head on collisions due to drivers not giving way	1 – Widen bridge 2 – Provide new wider bridge	TfNSW has stated that the current bridge can continue to operate as one-way however requires monitoring of the structure and further assessment based on increase tonnage use over this bridge. Subsequent to this, in consultation with TfNSW, Daracon commissioned and funded a study by Focus Bridge Engineering which identified duplication was not necessary and the impact can be managed via a regime of inspections and major and minor maintenance activities. Adopted reduction in proposed road haulage volumes to maximum of 20 trucks per hour and daily limit of 140 loaded trucks further supports this position
Lack of sheltered right turn lane on Gresford Road for drivers turning right into Dungog Road	Could lead to rear end type crashes	Upgrade intersection to provide a dedicated sheltered right turn	Existing traffic demands warrant this road upgrade and Daracon have committed to upgrading this intersection as part of the project.

Issue	Potential safety concern	Suggested upgrade	Comment
		lane and storage for trucks turning right into Dungog Road	
Tight road alignment on 90-degree bend at King Street / Duke Street in Paterson	Could lead to drivers cutting the corner and resulting in head on collisions	Provide physical guidance for vehicles to reinforce traffic manoeuvre around the bend and traffic island on King Street.	Daracon have committed to upgrading this intersection as part of this project. Concept design prepared and will be designed / constructed in accordance with road authority requirements. In addition Daracon will include in driver Code of Conduct a max speed limit of 20-25km/h for quarry related trucks through the intersections
Lack of pavement width on Tocal Road at Bolwarra Heights	Could lead to safety concerns for cyclists and potential issue for vehicles stopping	1 - Widen road pavement or 2 – Provide an off-road footway / cycleway Provide No Stopping signage along length of the road	Council has completed works in this section (early 2016 and 2019) to improve delineation and includes an off-road footway / cycleway on the eastern side of the road.

Overall, it is considered that the road network is generally satisfactory for road safety issues, with the only issues being those identified above. The existing road network is typical of a rural road standard and currently carries a wide mixture of vehicles including quarry trucks other than Martins Creek. The current road layout does not conform with the Austroads requirements in a number of locations with regard to the alignment and road corridor width / clear zones. However, the accident data provided by TfNSW shows that the overall number of accidents along the haul route are low with no accidents identified to be associated with the operations at the Martins Creek quarry. Daracon have confirmed that since they have taken over the operations at the quarry in 2012 there have been no reportable or significant accidents associated with the truck movements in and out of the quarry site along the haul route.

## 2.7 Parking Supply and Demand

### 2.7.1 On-street Parking Provision

Currently, vehicles can be parked on both sides of the local roads in the vicinity of the site e.g. along Grace Avenue. However, on-site observations indicate that current on street demands are negligible with the majority of local residents having off street parking available.

On-street parking is provided in Paterson, with high demand for the parking in the middle of town around the local facilities fronting King and Duke Street. Parking for these local demands is also provided along King Street east of Duke Street

### 2.7.2 Off-Street Parking Provision

There is adequate off-street parking in the general locality of the subject site along both Station Street and Grace Avenue to satisfy the local demand. Limited off-street parking is also provided in the centre of Paterson for people visiting the local attractions.

### 2.7.3 Parking Demand and Utilisation

There was no on-street parking noted on Station Street during the site work for the project. All parking was accommodated within the private properties. The on-street parking in the centre of Paterson is well used with a regular turn over, providing parking for use by locals as well as visitors to Paterson for access to the local facilities.

### 2.7.4 Short term Set down or pick up areas

There are no set down or pick up area on Station Street. A drop off area is available for the Martins Creek train station. Other informal bus stops are located at various locations along the haul route to serve the school bus runs.

## 2.8 Public Transport

### 2.8.1 Rail Station Locations

Martins Creek railway station is less than 500m from the quarry. It is located on the Hunter railway line providing a link to Newcastle and beyond through to Sydney to the south and to Dungog to the north. Maitland station, located on the Hunter line 27 kms to the south of the site provides access to services to the west towards Singleton and beyond.

### 2.8.2 Bus Routes and Associated Facilities

Local bus services are limited. Linq Buslines provides a Vacy-Dungog school service that passes through Martins Creek, and also services students travelling to Dungog High School. Shelton Services of Dungog operate local school bus runs and connect with Busways and Hunter Valley Buses.

There are no bus stops within the general locality of the subject site on Station Street. There are a number of informal bus stops along the haul route that cater for school students.

There are three main school bus service operators whose routes correlate and interact with the Revised Project's primary haul route (Haul Route 1). These are Hunter Valley Buses, Linq Bus Lines and Grace Coaches.

The biggest operator is Hunter Valley Bus lines, who run four school bus services in the Paterson/Bolwarra/Maitland area – the 2322 from Bolwarra Heights, the 2291 from Phoenix Park, the 2241 from Hunterglen, and the 2322 from Thornton. These services cross paths with the trucking route at several key points along Tocal Road, Paterson Road and Melbourne Street (Maitland). These cross overs include several locations where buses are required to turn on or off the main road, in both 60km and 80km per hour zones. This includes turning from Lang Road onto Tocal Road, where with multiple services operating between this point and Bolwarra Road, where children are delivered to Bolwarra Public School. The 2322 also merges with Melbourne Road where the Quarry trucks merge onto the Highway, however this section of road has good infrastructure to accommodate the trucks and buses.

Consultation with Hunter Valley Buslines (operated by CDC buses) found that:

- Buses pick up school children along the route around 7:30AM until approximately 9AM; Buses start their drop off trips at 2:45PM, and most will be back off the road by 5PM.
- Due to variability in students use of services, the conductors at HV buses could not make an exact estimate of student numbers along the route. However, they identified that:
  - There are 6 stops between Bolwarra PS and Lang Road where buses typically pick up 6-12 students
  - 2-3 variable stops were identified along Tocal Road, where 1 or 2 students are sometimes picked up

- Two stops in Paterson (either side of the road) where 4-6 students are picked up
- This leads to a liberal estimate of 70 students who are collected and/or dropped off along the haulage route. It should be noted that these students are collected and dropped off at various times throughout the above-mentioned timeframes by the four services who operate along the route.
- When asked about safety concerns, conductors could not recall any concerns voiced by bus drivers, nor were there any incident reports to suggest any near misses. In general, they noted the following:
  - The point where buses turn onto Tocal Road from Wesley Road is narrow, and buses require a lot of road space to make the turn
  - The first part of Tocal Road is narrow, and there isn't a lot of room for buses to pull off the side
  - Sometimes, due to limited space for parents and bus drivers to pull over, children need to cross Tocal Road from where their parents stop to get to the bus
- When asked about how the Quarry could mitigate these risks, the conductors indicated that the only measure they could see was to remind drivers to keep an eye out for the flashing 40km signal on the buses and be mindful that there may be children crossing. They felt that as long as truck drivers adhere to the signal, there shouldn't be any issues.
- HV buslines routes that travel along the MC truck route drop students off at various schools, including the following:
  - Bolwarra PS, Hunter Valley Grammar, St Peters & St Mary's (Maitland), Maitland Grosmann HS, Maitland HS, Dungog HS, & Largs Public

The second operator, Linq bus lines, operates several services that traverse the truck route along Tocal Road (from Paterson Road), Gresford Road and Dungog Road, up to Grace Avenue where trucks exit and enter the Quarry. On being consulted, the operator confirmed that children were picked up at one location on Tocal Road, several locations on Gresford Road, and one section of Dungog Road at the corner of Gresford Road. Asked about the issues relating to the trucks for the company, the operator said they generally had no issues, and reported that there had been no near misses or incidents that he could think of. The only issue noted was buses meeting trucks at the Gostwyck Bridge and having to give way, but he stressed that he felt this was a Council road concern, not an issue with Daracon per se – he also noted a difference between Daracon drivers and contractors, indicating that Daracon drivers drive to a higher level of safety and care.

- Schools:
  - 513 & 593: Dungog HS, St Joseph's PS, Dungog PS
  - 479 & 280: Martins Creek PS, Paterson PS, Vacy PS
- Start times (on route):
  - Mornings 7:20 – 9AM
  - Afternoons 2:55 – 4:45PM

The third operator, Grace Coaches, is a small independent bus company, who took over several school-transportation routes from the previous Operator, Sextons. Grace Coaches operates a single school service that traverses the MC Quarry truck route. The service runs from Paterson to Butterwick, to Dunns Creek and Martins Creek Road, delivering school students to the Paterson Public School.

Consultation with bus companies highlighted the fact that the recent operations did not result in any road safety concerns. Truck drivers associated with the quarry are required to drive in strict adherence to the road rules and continual observance of the Martins Creek Quarry Drivers Code of Conduct, including a reduction of speed to 40 km/h when passing a stationary bus.

### 2.8.3 Rail and Bus Service Frequencies

There are five northbound rail services and five southbound rail services daily, Monday to Friday, with less frequent services of a weekend. There are also XPT services and freight services across this train crossing 7 days a week (details below in Section 3.2.4).

The local school bus services only operate on school days.

### 2.9 Pedestrian Network

There are no pedestrian facilities on Station Street or Grace Avenue within Martins Creek, reflective of the rural setting and the combination of low traffic flows and very low pedestrian demands. Refer to Section 2.4.6 above for further information.

### 2.10 Other Proposed Developments

The other major development proposed within the general locality of the subject site is the recently approved expansion of the Brandy Hill Quarry. The expansion of the Brandy Hill Quarry will see production increase from 700,000 tonnes of hard rock per year to 1.5 million tonnes for 30 years.

A review of the documentation submitted for the quarry, available on the NSW Department of Planning and Environment's website (Traffic Impact Assessment for Quarry expansion project, 979 Clarencetown Road Seaham prepared by Intersect Traffic dated June 2016) indicates that traffic impacts have been assessed allowing for all traffic to utilise a route through Raymond Terrace. This was completed as a worst-case scenario with it being noted in the Response to Submissions for the quarry that up to 25% of their quarry traffic could use a secondary route along Clarence Town Road towards Maitland. This route would coincide with part of the haul route identified for Martins Creek, being Paterson Road between Tocal Road and Flat Road. This is consistent with the existing situation with quarry truck movements associated with Brandy Hill included in the traffic data.

The approved truck movements at the site (i.e. either arrival or dispatch) must not exceed:

- (i) 24 movements between 6:00 am and 7:00 am;
- (ii) 60 movements per hour between 7:00 am and 6:00 pm;
- (iii) 10 movements per hour between 6:00 pm and 10:00 pm, on up to 20 evenings per calendar year; and
- (iv) 600 movements per calendar day

The impact of this Brandy Hill quarry traffic has been considered in the traffic assessment to follow in Section 4.4.

### 3 Proposed Development

#### 3.1 The Development

The key features of the Revised Project include:

- Expanding the existing Quarry to extract and process up to 1.1 million tonnes per annum (Mtpa) of hard rock material over 25 years.
- Proposed hours of operations between 7.00 am to 6.00 pm Monday to Saturday, with the exception of:
  - road haulage of Quarry product which will only occur Monday to Friday.
  - rail haulage 24 hours a day, 7 days a week
  - maintenance which will occur 24 hours a day, 7 days a week.
  - blasting of Quarry material between 11.00 am and 3.00 pm on Monday to Friday, with no blasting on Saturday, Sunday or public holidays.
  - Provision for up to 10 unladen Daracon trucks (not contractors) to return to the quarry between 6.00 pm and 7.00 pm Monday to Friday to park in the quarry overnight and be loaded during this time in readiness for departure from 7.00 am the following morning. (Note: in the case of trucks loaded on Friday evening, departure will be no earlier than 7.00 am Monday morning.)
- Transporting up to 500,000 tonnes per annum (tpa) of quarry project via public roads, with up to 600,000 tpa product transported via rail.
- Maximum of 20 loaded trucks (40 movements) per hour, between 7.00 am and 3.00 pm and 15 loaded trucks per hour (30 movements) between 3.00 and 6.00 PM Monday to Friday. This includes heavy vehicle movements inbound with supplies to the site.
- Maximum of 140 loaded trucks (280 movements) per day for up to 50 days per annum and otherwise up to 100 loaded trucks (200 movements) per day, between 7.00 am and 6.00 pm Monday to Friday.
- use of one primary haulage route i.e. Haul Route 1 (via Station Street, Grace Avenue, Dungog Road, Gresford Road, Tocal Road, Paterson Road, Flat Road, Pitnacree Road, Melbourne Street, New England Highway), with Haul Route 2 (via Station Street, Grace Avenue, Dungog Road, Gresford Road, Butterwick Road, Clarence Town Road, Brandy Hill Drive, Seaham Road) only to service local jobs as required
- proposed extension of the rail spur to facilitate longer trains to transport more Quarry product.
- construction and use of a new access road and bridge crossing from Dungog Road, over the North Coast rail line, to allow for all heavy vehicle movements via the new access.
- ongoing use of the existing site access via Station Street until the new access road is constructed, thereafter Station St will only be used for emergency access.
- road improvements at the Dungog Road / Gresford Road intersection and the King Street / Duke Street intersection within the village of Paterson, and an upgrade to the Gostwyck Bridge approach as further described in Table 3.1 below.
- additional noise mitigation works including a new noise barrier and acoustic treatment of processing infrastructure to reduce noise and air quality impacts (such as cladding)
- progressive rehabilitation of the site.

The proposed road works associated with the Revised Project are summarised in Table 3.1 below.

Table 3.1 Proposed Intersection and Bridge Approach Upgrades

Proposed Intersection and Bridge Approach Upgrades	Proposed works
New Site Access Road and Dungog Road intersection	<p>Daracon propose to:</p> <ul style="list-style-type: none"> <li>Construct a diverge taper and left turn lane from Dungog Road into Main Site Access road (AUL intersection);</li> <li>construct road widening on both sides of Dungog Road to accommodate a channelized right turn intersection (CHR) from Dungog Road into Main Site Access road and associated line marking and delineation;</li> <li>for vehicles exiting Main Site Access road, provide storage for 1 design vehicle turning right onto Dungog Road (northbound) and new acceleration lane on Dungog Road (southbound);</li> <li>remove the existing redundant line marking on Dungog Road; and</li> <li>modify existing property accesses on western side of Dungog Road</li> <li>Provide new safety barriers and drainage infrastructure.</li> </ul>
Dungog Road and Gresford Road	<p>Daracon propose to:</p> <ul style="list-style-type: none"> <li>realign Gresford Road north of the intersection with Dungog Road to locate road pavement more central to road reserve;</li> <li>refresh the line marking on the existing diverge taper and left turn lane from Gresford Road onto Dungog Road (AUL intersection);</li> <li>remove the existing redundant line marking on Gresford Road;</li> <li>construct a channelised right turn intersection (CHR) incorporating storage length for 3 design vehicles turning right onto Dungog Road (eastbound) and associated line marking;</li> <li>realign Dungog Road on approach to intersection incorporating storage length for 1 design vehicle turning right onto Gresford Road (northbound) and diverge taper into acceleration lane on Gresford Road (southbound);</li> <li>median, painted markings, give way sign and refreshed line marking on Dungog Road;</li> <li>remove the existing redundant line marking on Dungog Road;</li> <li>realign Gresford Road south of the intersection to locate road pavement more central to road reserve; and</li> <li>extend existing acceleration lane and merge taper along revised Gresford Road alignment.</li> </ul>
King Street and Duke Street (within the village of Paterson)	<p>Daracon propose to:</p> <ul style="list-style-type: none"> <li>Relocate the existing driveway on the north side of the intersection slightly west to improve the space allocation for parking on either side of the driveway and improve carparking capacity along this northern kerb line;</li> <li>relocate existing direction and hazard signage on northern side of intersection;</li> <li>refresh the dividing line marking through the intersection;</li> <li>modify the footpath, kerb ramp and kerb &amp; gutter on the south-western corner of the intersection to accommodate the design vehicle turn path;</li> <li>relocate existing 'No Stopping' sign in front of Telstra phone box to power pole adjacent to Post Office driveway, remove existing single carparking space to accommodate design vehicle turn path.</li> </ul>

Proposed Intersection and Bridge Approach Upgrades	Proposed works
Gostwyck Bridge approach	<p>Daracon propose to:</p> <ul style="list-style-type: none"> <li>• realign Dungog Road, incorporating a series of curves to raise driver awareness and associated new line marking;</li> <li>• install Vehicle Activated Signage alerting drivers approaching the bridge to reduce speed;</li> <li>• relocate existing hazard signage;</li> <li>• remove redundant signage; and</li> <li>• modify existing property accesses as required on either side of Dungog Road.</li> </ul>

### 3.1.1 Projected number of employees

Construction activities will occur at different times throughout the first five years following commencement of the Revised Project. Construction works will occur over different durations and may not all occur simultaneously. However, the total duration of construction activities is expected to be approximately 12 months. During these periods, the construction workforce numbers will vary and are expected to total in the order of approximately 120 personnel across the project and during the peak of the works 20-30 staff.

### 3.1.2 Hours and days of operations

A summary of the proposed operational hours for the Revised Project is provided below:

- for truck loading and dispatch 7.00am –6.00pm (Monday to Friday);
- train loading and dispatch 24 hours a day and 7 days a week;
- maintenance works at 24 hours per day, 7 days a week as required.

### 3.1.3 Phasing and Timing

The Quarry has operational capacity to cater for the proposed annual output of 1.1 mtpa, with historical operation to meet market demands having accommodated a higher output. The Revised Project will seek to operate at the proposed capacity over 25 years upon approval.

### 3.1.4 Selection of appropriate design vehicles for access and circulation requirements

The Revised Project will need to accommodate both light vehicles and heavy vehicles with the largest vehicle being a truck and dog combination. Light vehicles will include staff vehicles as well as small trucks associated with general maintenance for the plant. The majority of the current material hauled by road from the site utilise a truck and dog combination. Other product is moved using semi-trailers and rigid trucks.

Daracon also has need for the occasional larger vehicle, including low loader floats for moving heavy machinery on and off site as required. Over size and / or over mass vehicles may be required infrequently and would be subject to separate specific permits from TfNSW and Council.

## 3.2 Access

### 3.2.1 Driveway Location

During the early phase of the Revised Project all vehicle access to the Quarry will be via the existing access on Station Street. Station Street connects with Grace Avenue to allow for connection to the greater road network. Whilst the current layout of the intersection of Station Street and Grace Avenue does not comply with current Austroads Guidelines, the existing access has operated as the single vehicle access to the quarry for the majority of the life of the quarry and allows for safe and appropriate two-way traffic movements. There have been no recorded accidents at this location and Daracon have confirmed that they have not had any reportable or significant accidents at this access since they have been operating on site, which includes Daracon drivers and contract

drivers. Whilst the posted speed limit is 50 km/h, the alignment of the road discourages drivers from driving at this speed. This section of the road network is typically used by local drivers only as it does not provide for a direct and convenient route for through traffic, with these local drivers who are familiar with the length of the road and as such drive to the conditions. Station Street does not carry any through traffic movements and with 11 residential lots along its length, traffic flows other than those associated with the quarry would be less than 100 vehicles per day based upon TfNSW standard generation rates for residential development. The road layout is shown in Figure 3-1 to follow.

As part of the on-going development of the quarry, a new access option has been identified that will allow for direct vehicle access between the quarry and Dungog Road, to the north of Grace Avenue which requires a bridge crossing over the railway line. Once constructed, all heavy vehicle movements will be via this new access. This new road access will be designed and constructed in consultation with Council, in accordance with Austroads Guidelines standards and will allow for a sheltered right turn lane on Dungog Road to enable the new access to operate in a safe and appropriate manner. The design will require alignment work to be completed on Dungog Road to ensure that visibility requirements are met in accordance with Austroads Guidelines. The design will take into account the access to private property in this location. The bridge works will be designed and constructed in accordance with ARTC standards. As this intersection will be designed and constructed in accordance with Austroads Guidelines with review / concurrence from the road authority, safe access to the site will be provided whilst catering for safe through traffic movements.

In the interim, the existing access shall continue to operate.

Once this new access is constructed, the existing access on Station Street will remain as per the current layout, allowing only for temporary / emergency access for light vehicle movements in and out of the quarry. Access for over size over mass vehicles, should these be required for operation reasons or storage on site, will use the new quarry access with these vehicles operating under a separate approval process as required with Council and TfNSW.

### 3.2.2 Sight Distances

The connection of the current site access to the road network is via the intersection of Grace Avenue and Station Street. This intersection is a simple T-intersection with Stop sign control with the roads connecting at 90 degrees. As discussed below, visibility is good in both directions, especially when taking into account the raised seating position for drivers of trucks. Visibility to the right for drivers exiting Station Street is impacted upon by the vertical alignment of the road over the level crossing, but there remains adequate distance for drivers of trucks (due to the raised seating position) to determine a suitable gap for exiting Station Street.

For the posted speed limit of 50 km/h the sight distance requirement measured in accordance with Austroads Guides for a driver exiting Station Street is 80 metres. This distance has been assessed on site and exceeds 100 metres in both directions. It is noted that whilst the posted speed limit is 50 km/h in this location, the actual vehicle speeds are lower due to the interaction with the at-grade train level crossing to the immediate west of the intersection as shown in Photo 1 to follow.

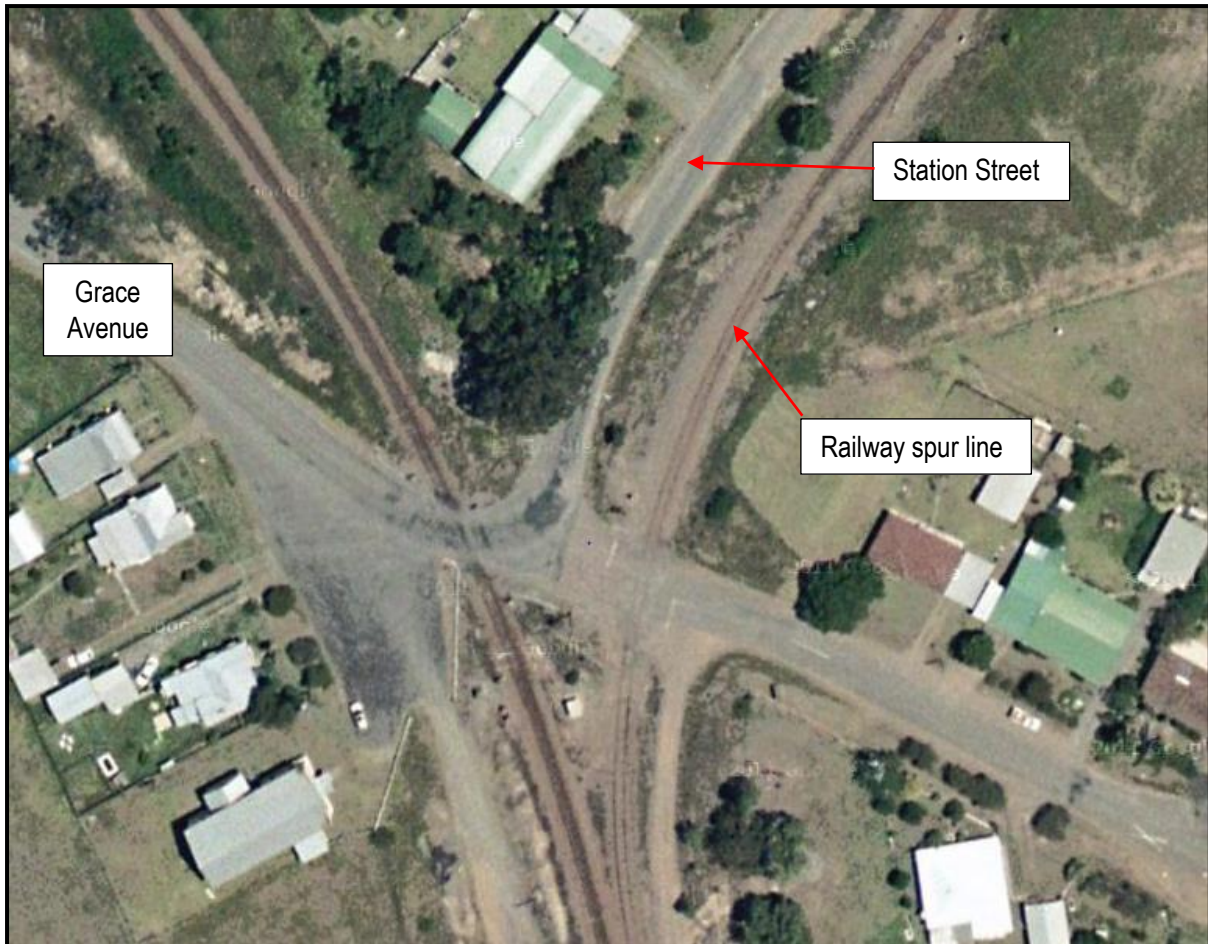


Figure 3-1 – Aerial photo showing intersection of Station Street and Grace Avenue



Photo 1 – View west along Cory Street on approach to level crossing. Note Station Street is to right of photo

### 3.2.3 Service Vehicle Access

Typical service vehicles include light to medium trucks and these vehicles can all be accommodated on site as appropriate. Currently, all of these vehicles gain access via Station Street but in the future will be able to gain access via the new connection direct onto Dungog Road. The current site access allows for access for all vehicles including the truck and dog combinations and thus can cater for service vehicles.

### 3.2.4 Queuing at entrances

Given the existing traffic flows on Grace Avenue are less than 100 vehicles per hour 2-way in the morning peak period (7.30-9.00 AM) based on site observations completed as part of this project, it is considered that there will be minimal queuing associated with the traffic movements in and out of the quarry. Observations of the operation in 2014, 2015 and 2016 show that there are very limited delays for trucks accessing the site, with the major delays occurring when trains are travelling through the location causing hold ups across the at-grade level crossing. However, there are just 5 trains per day per direction in this location and accordingly the delays are minimal.

A summary of the trains passing Martins Creek in September 2020 is provided below.

Table 16 – summary of rail network use at Martins Creek

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of XPT service	6	6	6	6	6	6	6
Number of passenger service	10	10	10	10	10	6	6
Number of freight service	11	15	14	16	14	16	13
<b>Total</b>	<b>27</b>	<b>31</b>	<b>30</b>	<b>32</b>	<b>30</b>	<b>28</b>	<b>25</b>

The construction of the new access direct onto Dungog Road will remove the majority of heavy vehicles along Grace Avenue and will not use the access via Station Street. This existing access will remain open to allow for the use as detailed above. The new access on Dungog Road will allow for a safe and appropriate connection and will provide a sheltered right turn lane for traffic entering the quarry. It will be designed in consultation with Council and TfNSW in accordance with Austroads Guidelines. The delays for the through traffic movements on Dungog Road will be minimal and any delay for exiting traffic will result in a queue located within the quarry.

### 3.2.5 Current access compared with proposed access

Light vehicle access to the quarry will be the same as the existing access to the site, via Station Street.

Improvements to the site access will be provided by the construction of new access road with connection to Dungog Road. Once constructed, light vehicles and heavy vehicles associated with the quarry haulage will be able to access the site via the new access and not via Station Street. The Station Street access will remain as per the current layout and will allow for vehicle access if required.

### 3.2.6 Access to Public Transport

There is no significant demand for public transport anticipated in association with the Quarry.

### 3.3 Circulation

#### 3.3.1 Pattern of circulation

The size of the Quarry and the layout of the internal roads allows for vehicles to enter and exit the quarry in a forward direction.

#### 3.3.2 Internal Roads

The informal road ways within the Quarry allow for two way traffic movements as appropriate. All internal traffic movements are governed by Daracon's Drivers code of conduct as well as the on-site traffic management plan to manage internal traffic movements. There is no public access within the Quarry.

#### 3.3.3 Internal Bus Movements

It is considered that there will be neither internal bus movements nor a requirement for a bus to travel within the Quarry.

#### 3.3.4 Service Area Layout

Servicing is completed across the quarry as required adjacent to the various equipment and plant. Vehicles associated with maintenance and servicing park within the site adjacent to the plant as required. A separate maintenance shed is provided that allows for vehicle maintenance.

### 3.4 Parking

#### 3.4.1 Proposed Supply

All parking for the Revised Project will be contained within the Quarry.

As the project is a State Significant Development the Council DCP does not apply, which includes car park requirements. The RTA Guide to Traffic Generating Developments does not provide guidance on parking requirements for a quarry.

The existing parking provision will be retained, with this being adequate to cater for future staffing needs. The existing parking provision allows for staff parking near the offices and the staff amenities and additional area will be provided to accommodate the parking requirements associated with 11 to 18 staff based on site.

#### 3.4.2 Parking Layout

The site layout will allow for the safe parking of vehicles within the quarry. This will include a stand over area for the trucks parked overnight. These parking areas are typically informal and located within the quarry footprint as appropriate and will alter as the quarry expands.

#### 3.4.3 Projected peak demand

Peak parking demand will be reliant upon staffing levels. Staff arrive and depart in their own vehicles, and will continue to utilise the existing carparking area provided near the Station Street entrance. The new access road to be constructed by the end of Year 4 will include 12 carparks adjacent the weighbridge for staff and visitors.

Approval is being sought for up to ten unladen Daracon trucks to return to the quarry between 6.00 pm and 7.00 pm Monday to Friday for product loading. These trucks will park overnight in the quarry to allow departure from 7.00 am on Monday to Friday. Overnight parking will be facilitated within the Southern Stockpile Area near the maintenance and servicing area.

#### 3.4.4 Service Vehicle Parking

The site area allows for all service vehicle parking to be provided on site as required.

#### 3.4.5 Pedestrian and Bicycle Facilities

There are no specific pedestrian and bicycle facilities proposed.

## 4 Transportation Analysis

### 4.1 Traffic Generation

The Revised Project is to allow for a maximum annual allowance of 1,100,000 tonnes for the quarry. The Revised Project seeks to transport up to 500,000 tonnes per annum via road with up to 600,000 tpa product transported via rail. Quarry products will be transported via rail in response to market demands.

Based upon the typical truck and dog combination used at the quarry carrying 32.5 tonnes per load, the future expansion to 500,000 tonnes by road could generate:

- 15,385 laden truck movements per year.
- Corresponding 15,385 empty truck movements accessing the site.

Allowing 50 weeks per year and 5 days per week operation, this will generate 308 truckloads per week on average and 62 truckloads per day Monday to Friday. This gives a typical daily two-way rate of 124 trucks per day Monday to Friday with no movements for quarry product haulage, on Saturday, Sunday or public holidays.

On 24 September 2019, the quarry was placed into limited operations within the parameters deemed as approved by the Court of Appeal, with total production of no more than 449,000 tonnes per annum and not greatly more than 30% of that total production transported by road.

The Revised Project will be limited to a maximum of 20 laden trucks per hour and 140 laden trucks per day. This is less than the historical operation for the Quarry which is outlined below (and section 2.5.5 above) to provide context for typical daily site operations.

Market demands have historically required that the product be delivered early within the working day and as such have left the quarry by 8.00am, after this time hourly truck movements have reduced, dropping off significantly after 11.00am and further again at 3.00pm. This is illustrated on the timeline for quarry product deliveries shown in Figure 4-1. The peak traffic demands associated with outbound loads in the morning will occur later in the day compared with historic use, as no trucks can enter the site prior to 7.00 AM.

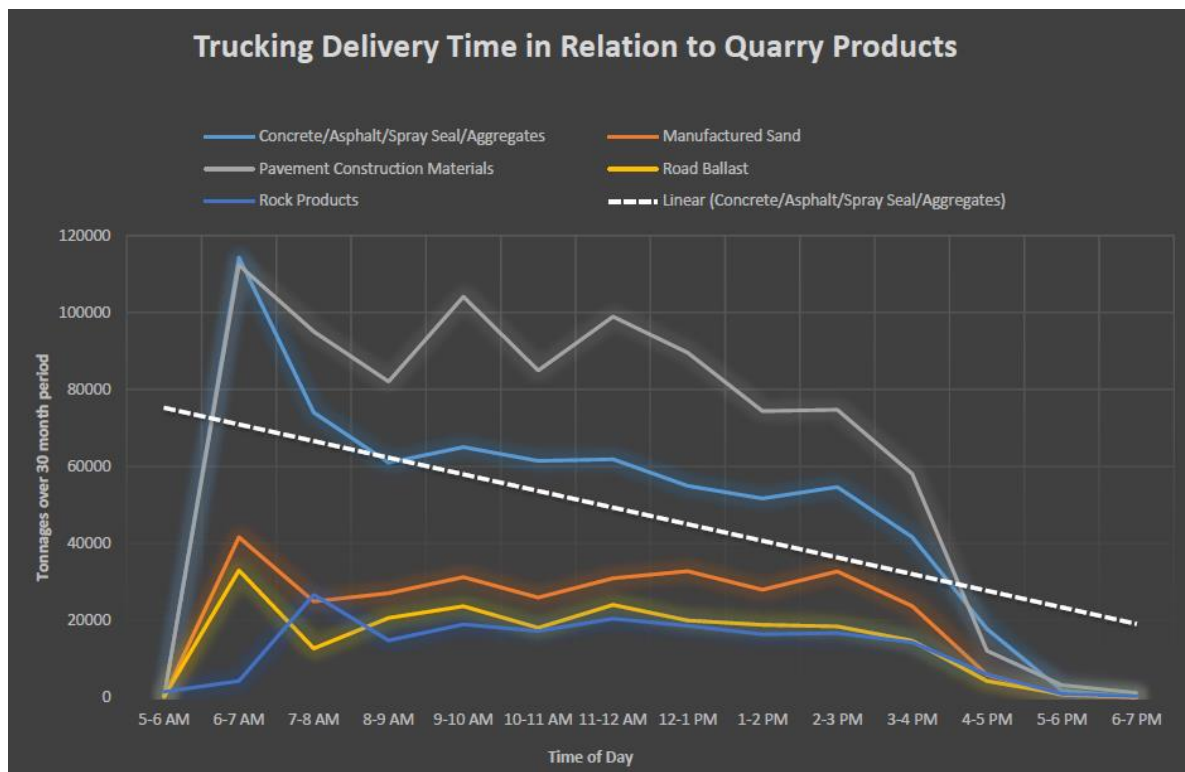


Figure 4-1 – Truck movements associated with outbound quarry products (Source: Daracon)

The above allowed for operation at the peak hourly capacity of 40 laden trucks, resulting in the peak daily flow 320 laden trucks per day.

It is important to note that this type of demand was dependent upon Daracon working concurrently on a number of major projects requiring quarry product at the same time. A review of the weighbridge data shows that the absolute peak demand for 2013/2014 was 291 trucks on the 17<sup>th</sup> March 2014, which generated 582 two-way truck movements. For the following Monday (24<sup>th</sup> March) the weighbridge records show 179 truckloads were removed from the site whilst the average for the entire year for 2014 was 136 truckloads per day.

Further assessment of the weighbridge data has been prepared for the operational years 2014 through to 2018. A summary of this information is provided below.

Table 4-1 – Summary of annual splits Train / Truck + dog / Truck / Light vehicle

YEAR	Total Tons	TRAINS		TRUCK AND DOG		RIGID		LIGHT VEHICLE	
		TONS	Number trains	TONs	Veh numbers	TONS	Veh movements	TONS	Veh movements
FY2014/2015	906,537	35,046	36	822,838	25,587	48,240	4,232	413	248
FY2015/2016	848,211	45,036	51	752,043	23,047	50,779	4,751	353	194
FY2016/2017	758,009	29,523	27	662,332	20,985	65,542	5,823	611	300
FY2017/2018	663,071	28,283	25	590,450	18,439	43,853	4,068	486	285

The weighbridge data from the quarry has been further assessed to provide the split of daily flows associated with the quarry between 2014 through to 2019. The table below provides details on the daily average loads, median daily and peak daily flows. These daily values represent outbound truck movements – there is a corresponding inbound unladen truck movement.

Table 4-2 – Average / Median / Peak daily loads

<b><u>YEAR</u></b>	<b><u>Average Daily Loads</u></b>	<b><u>Median Daily Loads</u></b>	<b><u>Peak Daily Loads</u></b>	<b><u>Average daily Tonnes</u></b>	<b><u>Median Daily Tonnes</u></b>	<b><u>Operating Days</u></b>
<b>FY2013/2014</b>	123	119	311	3730	3494	298
<b>FY2014/2015</b>	101	102	316	3042	3167	298
<b>FY2015/2016</b>	94	89	240	2459	2459	297
<b>FY2016/2017</b>	91	87	247	2476	2316	294
<b>FY2017/2018</b>	75	77	183	2121	2193	299
<b>FY2018/2019</b>	67	64	157	1897	1810	275

The above table shows that there has been a significant decrease in material hauled from the quarry in recent years. The number of operating days has remained reasonably consistent throughout this timeframe at just under 300 operating days per annum.

The Revised Project will see truck movements reduce over the peak historical operations with laden trucks limited to a maximum of 140 per day, for up to 50 days per year. This gives 140 inbound truck movements per day, generating 280 truck movements in total per day 2-way along the haul route during peak demands.

In addition to truck movements, there will be traffic movements associated with staff and maintenance vehicles, which will be similar to the existing operations. There is also inbound material required for specific products produced at the quarry. These heavy vehicles associated with specific products (inbound and outbound) would be included in the limit of 140 trucks per day.

#### 4.1.1 Daily and Seasonal Factors

Due the market driven nature of quarry operations, variations in daily traffic flows are necessarily created by market demands. Daily flows will vary due to market demands as well as weather conditions. The primary influencing factor on the traffic flows generated by the Revised Project is created by the demands of the end market.

Daracon's external customer base included, but was not limited to, government and major industry clients including TfNSW, ARTC, Local Government, Sydney Trains, Lend Lease, Thiess, Leightons, Boral, Hanson, Holcim, Fulton Hogan, EDI Downer, CPB Contractors, Seymour White, John Holland, Ditchfields, Robsons and Metromix. Supply to these customers occurs mainly due to the quality and availability of aggregates and road pavement materials produced at Martins Creek that readily meet the rigorous requirements of State Government and associated geotechnical specifications.

NSW State Government has committed \$107.1 billion to rebuilding state infrastructure in the 2019-21 budget. The budget has allocated the below funding to invest in a record infrastructure pipeline over the next four years and ensure delivery of projects across the state.

This forecasted growth within the Hunter, and government commitment to upgrading road infrastructure, will increase market need for hard rock quarry products in the region including from Martins Creek, to service the demand for building and construction materials.

Dungog Council has an ongoing requirement from quarries in the Hunter Valley which may include Martins Creek quarry for road maintenance and upgrades.

All of these future projects, as well as other projects yet to be commissioned or determined, will impact upon the end market demands for quarry products from Martins Creek quarry.

#### 4.1.2 Pedestrian Movements

Pedestrian access to the site will be available using the local road network, but with the site locality pedestrian movements will be very low.

### 4.2 Traffic Distribution and Assignment

#### 4.2.1 Hourly Distribution of Trips

The information provided above shows that for the proposed maximum annual sales of 1.1 million tonnes per annum with road transport of up to 500,000 tonnes. The application for the quarry will allow for a maximum peak of 140 laden trucks per day for 50 days per annum and 100 per day for the balance and a peak of 20 laden trucks per hour.

In addition, the end user demands for material from the quarry are guided by standards for material and their application on site. This has a direct bearing upon the flow of trucks outbound from the site, with the majority of the demand for road base material for example occurring at the beginning of the working day at the quarry i.e. 7.00 AM onwards, so that it can be laid and spread within the normal working day on the construction site. This leads to a higher demand for outbound trucks from the site per hour within the first three or more hours of operation within the quarry and a significant drop off in the supply of material in the afternoon period. The historical hourly distribution of trips, reflecting the demands across the day is discussed and shown in Figure 4-1 previously.

#### 4.2.2 Origin / destinations assignment

The Revised Project seeks to predominately utilise the following haulage route for quarry trucks:

- Martins Creek Quarry – Station Street - Grace Avenue – Dungog Road – Gresford Road – Tocal Road – Paterson Road – Flat Road – Melbourne Street

Daracon have committed that as part of the Revised Project, trucks will predominately utilise this route unless they have a destination within local areas or for emergency related projects.

With regard to the distribution of product from the Quarry, a review has been completed by the study team of the product deliveries over the twelve months from November 2013 to October 2014. This is considered reflective of high product demands (as 2013/2014 was the busiest year for the Quarry) and can be used to predict the future worst case distribution pattern for the Quarry. The approximate volume for the period totalled 1.1 million tonnes (by road) which is greater than the Revised Project volumes of 500,000 tonnes (by road).

A distribution of percentages to each LGA are included in Table 4-3 and illustrated on Figure 4-2. Consideration should be given to the major projects that Daracon supplied over this period, which generated short term increased volumes. Major projects during this period included;

1. Hexham Rail upgrades – Newcastle
2. Nelson Bay Road Upgrade – Port Stephens
3. Inner City Bypass – Newcastle

Table 4-3 – Distribution of material from Martins Creek quarry by LGA areas based on historic demand (Source: Daracon)

Market By Local Government Area	% of total volume
<b>Newcastle</b>	40.2%
<b>Port Stephens</b>	18.2%
<b>Lake Macquarie</b>	15.4%
<b>Maitland</b>	12.6%
<b>Cessnock</b>	3.6%
<b>Singleton</b>	1.7%
<b>Gosford / Wyong</b>	1.6%
<b>Dungog</b>	0.7%
<b>Muswellbrook</b>	0.6%
<b>Upper Hunter</b>	0.1%
<b>Gloucester</b>	0.1%
<b>Sydney (Botany)</b>	0.1%
<b>Other</b>	
<b>Ex Bin / COD's with no Address</b>	2.6%
<b>Ballast Trains</b>	2.5%

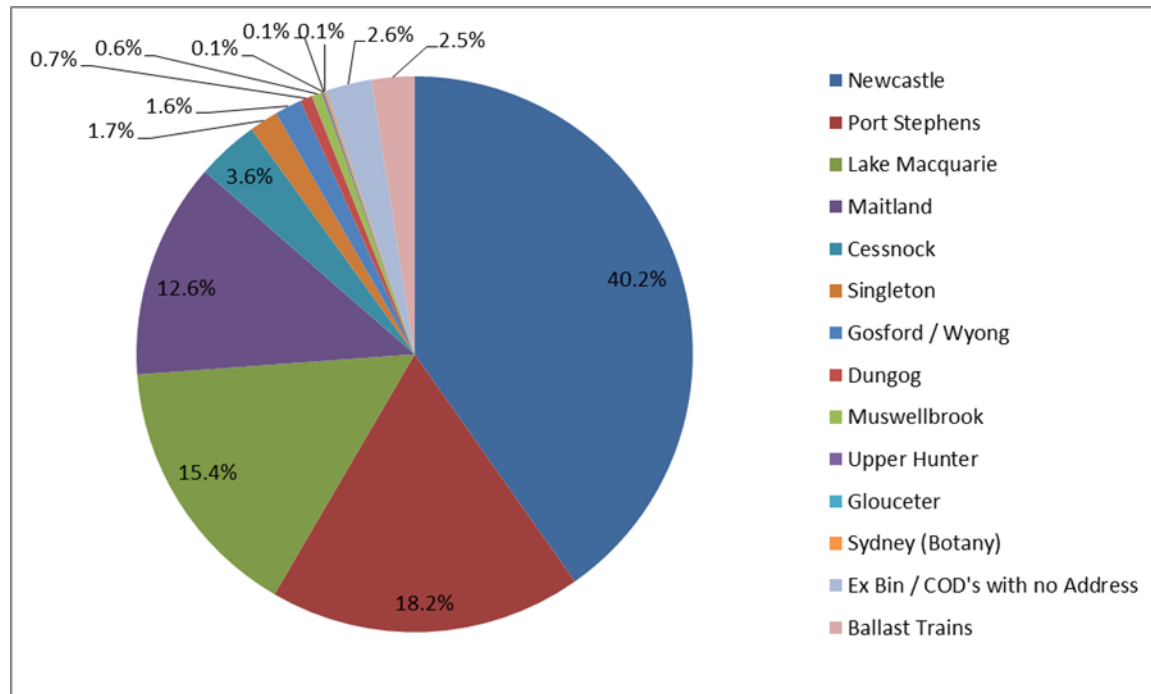


Figure 4-2 – Distribution of material from Martins Creek quarry by LGA areas

The Revised Project allows for all quarry trucks to utilise the identified route (Haul Route 1) to access the New England Highway, with movements then distributed to service demands in the surrounding areas with a distribution

similar to the above. The maximum number of laden trucks along this route will be 20 per hour and 140 per day for 50 days per annum (100 trucks per day for the remaining days).

Note the above values represent the outbound truck movements – there is a corresponding inbound truck movement per loaded truck.

#### 4.3 Impact on Road Safety

The review of the existing road network has highlighted a number of locations where there is an existing road safety concern relating to the layout of the road network which are not directly related to the existing activities of Martins Creek Quarry. These safety issues are due to the existing road system being built to historic rather than current Austroads design standards. These can be summarised as:

- Lack of space between intersection of Station Street and railway crossing and road alignment across railway crossing
- One-way bridge operation at Gostwyck Bridge on Dungog Road
- Lack of sheltered right turn lane on Gresford Road for drivers turning right into Dungog Road
- Tight road alignment on 90 degree bend at King Street / Duke Street in Paterson
- Lack of pavement width on Tocal Road at Bolwarra Heights

Whilst these issues above have been noted in relation to conformance with current Austroads Guidelines, the operation of the quarry has not resulted in road accidents associated with the quarry trucks. Accident data provided by TfNSW does not show any accidents relating to quarry trucks and Daracon have confirmed that there has been no recordable or significant accident with the trucks associated with the quarry activities.

Through the consultation process, additional issues raised have included safety for pedestrians, cyclists, public and school buses. With regard to pedestrian safety, the rural nature of the locality means that the vast majority of pedestrian movements occur within the urban locations only. In Paterson, the pedestrian movements are concentrated in the centre of town and there are footpaths provided to both sides of the road that allow for connection between the various commercial elements located in this location.

Within Martins Creek, there are no footpaths provided but it is considered that there is little if any demand for pedestrian movements within Martins Creek, due the lack of a shop, etc. With the provision of the new access direct to the quarry off Dungog Road in the future, the trucks will not need to travel along Grace Avenue. Vehicles will also use this access in an emergency.

Through Bolwarra Heights, a footpath is provided on the eastern side of the road that allows for local connections and access to the school buses that run on this section of the road. South of Paterson Road there is a footpath constructed on the western side of the road which will extend through to Victoria Road providing a connection to the sports fields and Bolwarra Public School as part of on-going upgrade works by Council. This work has commenced by Council.

Through East Maitland, there are footpaths provided to both sides of Melbourne Street and pedestrian crossings are incorporated at the traffic signals on this road.

In the sections between these main urban centres, there is little demand for pedestrian movements, due to the distance between these centres discouraging pedestrian movements.

As the road authority the various Councils within the study area as well as Transport for NSW continually monitor road safety based via the collected accident data and any specific road safety concerns raised by the community or Council offices. Any road safety upgrades are determined by the road authority and installed as required.

It is considered that the Revised Project will continue to have an acceptable impact upon pedestrian safety, with no recorded incidents involving pedestrians or Daracon operated vehicles, including contract drivers. The hourly and daily truck numbers associated with the quarry will be reduced from historical values thereby reducing the safety risks accordingly.

For cyclists, the rural location together with distances from Maitland and other major centres discourages casual cycling. The area does appeal to cycling enthusiasts, who typically ride as weekend groups or tourists in this area on a weekend, when the quarry will not be hauling product from the quarry by road. As such, it is considered that the road haulage of material from the quarry Monday to Friday is unlikely to impact upon cycling within the locality.

For buses, discussions with the bus companies by the study team shows that the existing operations do not create any specific road safety concerns. The truck drivers associated with the operations at Martins Creek quarry drive in a safe manner and with continual adherence with road rules and reduction of speed to 40 km/h when passing a stationary bus, the ongoing operations will have an acceptable impact on safety with regard to buses.

As part of the Revised Project, it is proposed to provide a new access that will provide direct access onto Dungog Road. This will remove the issues currently occurring at the railway crossing adjacent to Station Street. However, this new access to Dungog Road, requiring a new bridge to be constructed over the railway line, will require extensive planning and design in accordance with Austroads Guidelines prior to construction and the existing access to the quarry via Station Street will remain in operation to service the site while the construction of the new accessway is done.

A review of the accident data provided by TfNSW shows that the intersection of Station Street and Grace Avenue has no recorded accidents and Daracon have confirmed that to their knowledge no trucks associated with the Quarry have been involved in an accident at this location. Whilst the intersection does not conform with current Austroads Guidelines, it can be seen that it operates in an acceptable manner, mainly due to the high level of familiarity with drivers using this section of the road together with the low traffic flows observed by Seca Solution on Grace Avenue. Visibility at this location also allows drivers in trucks exiting the quarry to safely determine suitable gaps in the through traffic movements along Grace Avenue to exit Station Street. Whilst the posted speed limit is 50 km/h in this location, the road alignment in this location encourages drivers to travel below this limit.

ARTC have previously identified this existing level crossing at Grace Avenue to be upgraded but there is no planned date for this upgrade work to commence. It is considered that as the Quarry will see no increase in the hourly and daily traffic flows over this level crossing, when compared to historic operations, it is expected that there would be no impact upon the existing road safety levels at this location as a result of the Revised Project. Further, once the new access road is constructed there will be minimal traffic associated with the Revised Project utilising this intersection. The existing controls for the level crossing will continue to advise vehicle drivers of approaching trains which enhances road safety.

Daracon have proposed a new access for the Quarry direct off Dungog Road to the north of Grace Avenue, to be in place within 4 years of approval for the quarry extension. When this new connection is provided quarry trucks delivering material from the quarry to the market will not use this access off Station Street. This access will remain for emergency use and staff vehicle access. The use of Vogeles Rd during rail loading will also no longer be required.

Daracon have discussed with TfNSW the potential options for the ongoing maintenance and management of the Gostwyck Bridge, including options for managing safety and monitoring of the substructure with TfNSW. Given the lack of accidents at this location it is considered that the ongoing use of this route by trucks associated with the expansion of the quarry will not have an increased impact upon the safety at this location. In order to raise driver awareness and improve road safety along the Gostwyck bridge approach, it is proposed that the bridge approach be upgraded as part of the Revised Project through a series of curves being incorporated in the realignment of Dungog Road, including new line marking and Vehicle Activated Signage alerting drivers approaching the bridge to reduce speed.

As part of the Revised Project, it has been recognised that the intersection of Gresford Road for drivers turning right into Dungog Road will be upgraded to provide a sheltered right turn lane on Gresford Road. The design and construction of this upgrade will be agreed with Council with the design prepared in accordance with Austroads Guidelines. This will ensure that there are minimal impacts upon road safety in this location.

As part of the Revised Project, it has been identified that the 90 degree bend at King Street / Duke Street in Paterson can be upgraded with a refresh of the dividing line marking through the intersection to delineate and separate opposing traffic. The upgrade will allow for the relocation of the driveway on the north side of the intersection to improve space allocation for on street parking. In addition, Daracon commit to the following traffic controls in relation to trucks traveling through Paterson:

- No quarry trucks through Paterson prior to 6.45 am Monday to Friday.
- 40 km/hr through Paterson with a further reduction to 20-25 km/hr at the intersection of King and Duke St Paterson.
- To plan quarry activities, and revise haulage as required, around days when there is extra traffic in Paterson due to a funeral.

Roadworks recently completed by Maitland Council on Tocal Road through Bolwarra Heights has improved the road surface and line markings along this section of the road, however this has not increased the running width of the road. Given the apparent existing width constraint of the road reserve in this location, further road widening beyond the current alignment is not proposed. The accident data at this location does not highlight any specific concerns and there have been no recorded incidents involving heavy vehicles in this location or any accidents resulting in injuries. The Revised Project will generate 40 truck movements per hour (20 per direction) which is considerably less than that which has historically operated. TfNSW have completed a speed review for this section of the road network and determined that there was no justification for altering the posted speed limit in this location.

In summary, traffic accident data provide by TfNSW indicates there have not been any accidents involving trucks associated with material haulage from Martins Creek Quarry. Daracon have confirmed that there have been no reportable or significant incidents associated with the trucks movements in and out of Martins Creek since they have been operating this quarry. Accordingly, it is considered that the operation of trucks in and out of Martins Creek has an acceptable impact upon road safety. It is further noted that as part of the Revised project, there is an hourly cap of 20 laden trucks per hour, which is lower than the historic demands associated with Martins Creek quarry. This will ensure that road safety could be improved over the existing situation.

The new access to be provided on Dungog Road will be designed in accordance with Austroads Guidelines and road authority requirements. This new intersection will allow for safe entry and exit movements for light and heavy vehicles in and out of the project site as well as access to other properties in this location.

It is therefore concluded that considering the above and with the implementation of the proposed traffic management and mitigation measures (Section 6.3), it is considered that the truck movements associated with the Revised Project will have a minimal impact upon the road safety of the primary haulage route.

#### 4.4 Impact of Generated Traffic

The impact of the Revised Project has been assessed against the capacity limits provided within the RTA Guide to Traffic Generating Developments that provides guidelines for the capacity of both rural and urban roads. This guide does not provide advice on daily limits for roads, however when a road has adequate capacity during the peak hour of activities coinciding with the background traffic demands it can be seen that the daily traffic flows are also acceptable upon capacity.

The impact on the hourly flows has been checked against the traffic volume data collected by Seca Solution and has covered the critical morning (7.30 to 9.00 AM) and afternoon (4.00 to 5.30 PM) peak hours. It can be seen that outside of these peak hours, the background traffic flows are much lower. Outside of the peak hours there is significant spare capacity in the road network which can cater for additional traffic demands without creating any capacity issues at intersections or on the road links.

The quarry has been modelled for the following three scenarios:

- No quarry truck movements.
- IEMP - 20 laden trucks per hour / 90 laden per day (180 movements).
- Proposed - 20 laden trucks per hour / 140 laden trucks per day (280 movements)

#### 4.4.1 Impact on daily Traffic Flows

The Revised Project will be limited to 140 laden truck movements per day, giving a maximum of 280 two-way movements per day on peak days for a maximum of 50 days per annum and 100 laden trucks per day for the remaining days. It is noted that these movements are well below the historic peak operation of the site, as discussed in Section 4.1.

The RTA Guide to Traffic Generating Developments does not provide advice on the capacity of roads based on daily traffic volumes, however it does determine Level of Service (LoS) and mid-block capacity based on peak hour traffic volumes (Table 4.4 and Table 4.5 of RTA Guide).

The quarry was operational during the traffic surveys completed in May 2018. In order to assess the operation of the road network without quarry traffic the recorded movements at the intersection closest to the site access (Dungog Road and Gresford Road) were analysed (by vehicle class). This determined 10 trucks inbound and 10 trucks outbound in the AM peak (7.30 to 8.30 AM) were associated with the quarry. As such, to determine flows without quarry traffic 10 heavy vehicle movements per hour were removed inbound and outbound from each intersection along the route.

Based on advice from the study team, the weighbridge data and the distribution of truck movements across a typical day outlined previously, truck movements in the PM peak period (4.30 to 5.30 PM) are significantly lower with recorded flows approximately a third of the AM movements. As such, 3 heavy vehicles inbound and outbound were removed from each intersection along the route in the PM peak.

A summary of the mid-block traffic volumes along the haulage route during the morning and afternoon peak hours for each of the identified scenarios are outlined in Table 4-4, Table 4-5 and Table 4-5, with the subsequent LoS under the RTA Guide identified in

*Table 4-4 – Mid-block traffic volumes along the haulage route, without quarry trucks*

Location	No quarry traffic					
	AM Peak			PM Peak		
	Inbound to quarry	Outbound from quarry	2-way	Inbound to quarry	Outbound from quarry	2-way
Dungog Rd east of Gostwyck Bridge	43	82	125	77	53	130
Gresford Road, 2 kms south of Dungog Rd	87	203	290	192	122	314
Total Road near Lemon Grove Rd	149	217	366	214	177	391
Paterson Road near Victoria Rd	345	855	1,200	752	451	1,203
Flat Road to north of McKimms Road	288	591	879	640	339	979

Table 4-5 – Mid-block traffic volumes along the haulage route, IEMP truck movements and the Revised Project

Location	With quarry under IEMP / Revised Project (20 inbound / 20 outbound)					
	AM Peak			PM Peak		
	Inbound to quarry	Outbound from quarry	2-way	Inbound to quarry	Outbound from quarry	2-way
Dungog Road	63	102	165	97	73	170
Gresford Road	107	223	330	212	142	354
Tocal Road	169	237	406	234	197	431
Paterson Road	365	875	1,240	772	471	1,243
Flat Road	308	611	919	660	359	1,019

Table 4-6 – Road capacity (Level of Service) based on RMS Guide to Traffic Generating Developments using mid-block flows

Location	Speed Limit	Road Type	% Heavy	Terrain	LoS (No quarry)	LoS (IEMP / Revised Project)
Dungog Road	80	Rural	18%	Rolling	B	B
Gresford Road	80	Rural	12%	Rolling	C	C
Paterson Township*	50	Urban	-	-	B	B
Tocal Road	100	Rural	10%	Rolling	C	C
Paterson Road	60	Urban	-	-	D	D
Flat Road	80	Rural	5%	Rolling	D	D

\* Flows through Paterson Township taken as higher of flows recorded on Gresford Road and Tocal Road (=Tocal).

Note, the highest LoS for rural roads under the RTA Guide is B. There is no change in the existing mid-block capacity at any of the above roads as a result of the Revised Project's flows.

#### 4.4.2 Peak Hour Impacts on Intersections

As part of the assessment for the Revised Project, the intersection capacity analysis program Sidra has been used. Sidra is a standard traffic engineering computer simulation program used by TfNSW, Councils and consultants to assess the capacity of intersections. The results of the Sidra analysis can be compared with acceptable parameters set out within the RTA Guide to Traffic Generating Developments. The Sidra analysis has reviewed the impact of the generated traffic at the key intersections nominated and confirmed by TfNSW along the haulage route, being:

- Dungog Road / Gresford Road
- Paterson Road / Tocal Road
- Paterson Road / Flat Road
- Pitnacree Road / Melbourne Street / Lawes Street
- Melbourne Street / New England Highway

Both intersections on Melbourne Street are controlled by traffic signals and form part of the regional road network with the traffic signals under the control of TfNSW.

As part of the updated assessment, the current traffic flows at the above intersections were surveyed during the typical morning and afternoon peak periods. The surveys were completed on Tuesday 8<sup>th</sup> May and Thursday 10<sup>th</sup> May 2018. This data is considered valid, as it is less than 3 years old and the extent of background growth in traffic will be low over 2 years. A summary of the results of these surveys is provide in Appendix B to this report.

The surveys show that the AM peak was generally 8.15 to 9.15 AM when the Martins Creek quarry is busy, as is the surrounding road network, and 4.30 to 5.30 PM. At this time traffic movements associated with Martins Creek are minimal, due to a drop off in material being delivery beyond 4.00 PM. The Sidra assessment has allowed for 30 trucks in the PM assessment, as a worst case scenario.

The performance of these five intersections has been modelled with the Sidra Network modelling program as per the SEARs request from TfNSW. The modelling allows for an assessment of the operation of the intersections and provides details on the performance of the intersection against standard criteria applied by TfNSW and Council.

The intersections have been modelled for the following scenarios:

- 2018 Operation with no quarry trucks (AM/PM).
- 2018 Operation with IEMP movements.
- 2020 Revised Project's operation with revised quarry movements.

A summary of the results of the Sidra analysis, for the operation with no quarry trucks is provided in Table 4-7 with trucks observed during the surveys when the quarry was operational removed from the count data, as discussed in Section 4.3.1 above.

Table 4-7 – Sidra results along haulage route for surveyed 2018 traffic volumes (quarry haulage traffic removed)

Approach	Level of Service	Ave. Delay (s)	95% Queue (m)
<b>Dungog Road / Gresford Road</b>			
Gresford Road (from Bolwarra Heights)	A / A	4.6 / 3.0	1.9 / 3.6
Dungog Road	A / A	7.5 / 7.5	1.5 / 1.4
Gresford Road (from Vacy)	A / A	0.3 / 0.3	0 / 0
<b>Overall</b>	<b>A / A</b>	<b>3.5 / 3.4</b>	<b>1.9 / 3.6</b>
<b>Paterson Road / Tocal Road</b>			
Paterson Road (from Bolwarra)	A / A	3.7 / 4.0	4.7 / 10.5
Paterson Road (from Largs)	A / A	5.8 / 6.2	0.5 / 0.7
Tocal Road (from Paterson)	A / A	0.2 / 0.6	0 / 0
<b>Overall</b>	<b>A / A</b>	<b>3.4 / 3.7</b>	<b>4.7 / 10.5</b>
<b>Paterson Road / Flat Road</b>			
Flat Road (from East Maitland)	A / A	11.5 / 9.7	9.7 / 11.3
Paterson Road (from Bolwarra)	A / A	7.1 / 6.8	42.4 / 19.7
Paterson Road (from Maitland)	A / A	5.4 / 5.8	11.5 / 28.7
<b>Overall</b>	<b>A / A</b>	<b>7.3 / 7.0</b>	<b>42.4 / 28.7</b>
<b>Melbourne Street / Pitnacree Road / Lawes Street</b>			
Lawes Street	E / F	63.4 / 81.7	93 / 139
Melbourne Street (from New England Hwy)	C / C	35.9 / 36.5	213 / 162
Pitnacree Road	E / F	70.0 / 87.2	149 / 131
Melbourne Street (from Morpeth)	B / B	26.3 / 28.1	104 / 276
<b>Overall</b>	<b>D / D</b>	<b>45.1 / 45.0</b>	<b>213 / 276</b>
<b>Melbourne Street / New England Highway</b>			
New England Highway (from Newcastle)	F / D	73.8 / 47.0	450 / 253
Melbourne Street (from Morpeth)	F / E	73.6 / 59.9	205 / 136
New England Highway (from Maitland)	C / D	30.6 / 53.5	224 / 415
Melbourne Street (South)	D / D	54.5 / 54.7	87 / 99
<b>Overall</b>	<b>E / D</b>	<b>56.5 / 52.5</b>	<b>450 / 415</b>

It can be seen that the intersections of Dungog Road / Gresford Road, Paterson Road / Tocal Road and Paterson Road / Flat Road each provide a very high standard of operation with the results yielding an overall Level of Service A on each approach with minimal delays and congestion.

The signal-controlled intersections at Pitnacree Road / Melbourne Street / Lawes Street and Melbourne Street / New England Highway are both currently operating close to capacity, with considerable delays and congestion on some approaches.

From the results, the intersection of the New England Highway and Melbourne Street suffers from delays and congestion during both the morning and afternoon peak periods.

Outside of the morning and afternoon peak periods, based upon site observations this intersection works with short delays and congestion for the majority of the movements. TfNSW do not require this intersection to be assessed outside of the peak hours, as it is acceptable that the overall traffic flows outside of the peak morning and afternoon periods are lower and hence the intersection will experience lower delays and queues. Whilst the opening of the Hunter Expressway has removed a large volume of through traffic movements from this section of the New England Highway, there is still a high local demand for traffic along this road which creates some delays and congestion during the traditional peak periods. In particular, the traffic flows from Maitland / Rutherford towards Newcastle in the afternoon are very high, leading to a lengthy queue on the approach to the traffic signals on the New England Highway.

A review of the intersection layout shows that the capacity of the intersection of the New England Highway and Melbourne Street is constrained, due to established development on each corner together with requirements for turning lanes, footpaths and cycling facilities. There is limited scope for any upgrades at this intersection to increase capacity, other than changes to timings of the traffic signal operation. These traffic signals are vehicle actuated i.e. detect queues and delays and will actively respond to vehicle demands / queues and as such provide the maximum capacity available at this location. The operation of these traffic signals is monitored by TfNSW operational staff and refined as appropriate. These traffic signals also incorporate detection loops on all approaches to allow for vehicle actuation of the traffic signals. Whilst these provide relief outside of the peak hours of operation, the high traffic demands at peak periods requires the traffic signals to operate at pre-determined phasing and timing which can be altered automatically by the SCATS system under the control of TfNSW.



Figure 4-3– Aerial photograph of New England Highway and Melbourne Street showing buildings to edge of all corners. The physical capacity of this intersection cannot be increased.

The intersections were then modelled allowing for the IEMP approved quarry movements per hour along the haulage route with the results provided in

Table 4-8

Table 4-8 – Sidra results along haulage route for surveyed 2018 traffic volumes with IEMP truck movements (20 inbound/20 outbound)

Approach	Level of Service	Ave. Delay (s)	95% Queue (m)
<b>Dungog Road / Gresford Road</b>			
Gresford Road (from Bolwarra Heights)	A / A	6.0 / 3.8	3.5 / 5.5
Dungog Road	A / A	7.9 / 7.9	2.6 / 2.4
Gresford Road (from Vacy)	A / A	0.3 / 0.3	0 / 0
<b>Overall</b>	A / A	4.4 / 4.2	3.5 / 5.5
<b>Paterson Road / Tocal Road</b>			
Paterson Road (from Bolwarra)	A / A	3.5 / 4.0	4.8 / 10.7
Paterson Road (from Largs)	A / A	5.9 / 6.2	0.5 / 0.8
Tocal Road (from Paterson)	A / A	0.2 / 0.5	0 / 0
<b>Overall</b>	A / A	3.3 / 3.7	4.8 / 10.7
<b>Paterson Road / Flat Road</b>			
Flat Road (from East Maitland)	A / A	12.2 / 10.1	12.7 / 13.7
Paterson Road (from Bolwarra)	A / A	7.1 / 6.8	47.1 / 22.3
Paterson Road (from Maitland)	A / A	5.6 / 6.1	12.1 / 30.0
<b>Overall</b>	A / A	7.5 / 7.2	47.1 / 30.0
<b>Melbourne Street / Pitnacree Road / Lawes Street</b>			
Lawes Street	E / F	66.5 / 81.7	93 / 139
Melbourne Street (from New England Hwy)	C / C	42.1 / 36.5	231 / 162
Pitnacree Road	F / F	74.4 / 92.9	171 / 146
Melbourne Street (from Morpeth)	B / B	21.9 / 28.1	83 / 276
<b>Overall</b>	D / D	47.3 / 46.1	231 / 276
<b>Melbourne Street / New England Highway</b>			
New England Highway (from Newcastle)	F / D	75.3 / 50.1	457 / 255
Melbourne Street (from Morpeth)	F / E	83.9 / 62.8	230 / 146
New England Highway (from Maitland)	C / D	30.5 / 53.3	224 / 415
Melbourne Street (South)	D / D	54.5 / 54.7	87 / 99
<b>Overall</b>	E / D	59.2 / 53.9	457 / 415

Allowing for the IEMP traffic the intersections of Dungog Road / Gresford Road, Paterson Road / Tocal Road and Paterson Road / Flat Road continue to provide a very high standard of operation with the results yielding an overall Level of Service A on each approach with minimal delays and congestion.

The signal-controlled intersections at Pitnacree Road / Melbourne Street / Lawes Street and Melbourne Street / New England Highway are both currently operating close to capacity, with considerable delays and congestion on some approaches. Delays and queuing at these intersections increase slightly as the number of heavy vehicles passing through these intersections increases, with the delays increasing by 10 seconds in the AM peak on the Melbourne Street approach and 3 seconds on this approach in the PM peak hour. The corresponding queues also increase by 25 metres in the AM peak and 10 metres in the PM peak. However, there is no significant change to their overall operation associated with the IEMP traffic with the levels of service remaining the same across all approaches for both the AM and PM assessment peak hour.

The Revised Project's maximum quarry movements per hour are 20 laden trucks (40 movements per hour) and will therefore operate the same as the results in Table 4-8 above under the limitations of the IEMP.

Delays and queuing at the signalised intersections of Pitnacree Road / Melbourne Street / Lawes Street and Melbourne Street / New England Highway increase slightly, however as per the IEMP assessment above, there is no significant change to their overall operation associated with the Revised Project traffic. Compared with the existing traffic conditions, the overall level of service remains at E in the AM peak with the average delay increasing from 56.5 seconds to 61.1. In the PM peak, the level of service changes from D to E with the delays increasing from 52.5 to 59.2 seconds. Compared with the current IEMP, there is no change to any of the levels of service and minor increases in delays (less than 6 seconds overall) with queue increases of 30 metres overall.

#### 4.4.3 Impact of Construction Traffic

Construction activities are planned to occur at different times over the first five years of the Revised Project, following project approval.

Works associated with the proposed ongoing operations of the quarry (such as noise bunds, rail siding extension and the new main access road) will be located within the quarry boundary and utilise existing equipment and plant available on site, where possible. Some materials and specific vehicles and plant (cranes etc) will be required to be transported to the site.

The Revised Project will further include three intersection upgrades (the new main site access on Dungog Road, upgrade of Dungog Road / Gresford Road and upgrade of King Street / Duke Street) and an upgrade to the Gostwyck Bridge approach, subject to approval from the relevant road authorities. Truck movements associated with the delivery of road base products during the proposed road upgrade works will be apportioned within the operational daily limit of 140 outbound truck loads per day, as road base products would be supplied from the quarry itself.

These road upgrades will create minor short-term traffic interruptions and delays. Once complete however, the upgraded intersections and bridge approach will result in an overall improvement to the local road network.

During the construction of the new access to connect to Dungog Road, there will be demands for light vehicle access for construction staff as well as heavy vehicles up to semi-trailers for delivery of building materials. The details of the construction staff and construction delivery traffic demands will be assessed as part of the design process for this work. Initial advice from Daracon, based on their experience of road construction across many projects, was that there could be up to 80 personnel required throughout the course of the construction work. It is not expected that all works will run concurrently, and the final program is dependent on approval for various aspects of each activity. It is more likely around 15-20 construction personnel which would generate 15-20 light vehicles at

the start of the working day and 15-20 outbound at the end of the working day. The construction of the new site access road is expected to be completed by the end of Year 4 after the Revised Project has commenced following approval. Heavy vehicle numbers would vary across the various stages of the construction phase and at peak times e.g. concrete pours there could be 10 trucks supplying product to the site. It is noted that any road base product would be supplied from Martins Creek quarry and would be allocated within the daily limit of 140 outbound truck loads per day. The road authority will require a site-specific Construction Traffic Management Plan (CTMP) for this work prior to any construction work commencing on site. This will be prepared in accordance with RMS Traffic Control at Work Sites manual and will include Traffic Control Plans (TCP) to control traffic though and in / out of the construction site. During this construction work, traffic control measures will be in place on at the construction zones to manage road safety and the safety of the construction staff. The requirements of the traffic control will be determined as part of the construction work and this could include speed reduction through the construction zone and associated delays to through traffic movements.

Overall, it is expected that construction related traffic will have a minor impact on the local road network.

#### 4.4.4 Background traffic and other developments

Advice from Maitland City Council during the consultation meeting with them (20/02/2015) indicates that there is limited growth expected within the general study area north of Bolwarra. Some development is occurring in Morpeth which may impact upon the traffic signals along Melbourne Street. However, it is noted that a significant portion of this is aged care and retirement village development which generates very low traffic flows during the traditional peak periods.

As per the normal requirement of TfNSW (and in accordance with the SEARs request) the operation of the key intersections have been assessed for the current year as well as the future design year of 2030, allowing for background traffic growth to occur over this 10 year timeframe. Background traffic growth in the locality of the Lower Hunter Valley has been applied at 2% per annum giving some 20% over 10 years. This growth factor has also been allowed for along the New England Highway, reflective of growth expected to occur along this corridor. As per the advice above from Maitland City Council, limited growth is expected to be generated by development in the Bolwarra area. A conservative growth value of 2% per annum has also been applied over a 10 year timeframe at each leg on all intersections.

As discussed previously in Section 2.10 the Brandy Hill quarry has been approved and the documentation for this proposal indicates the majority of quarry truck movements will be along a route towards Raymond Terrace, thereby not impacting upon the proposed Martins Creek quarry route. It is noted however that approximately 25% of Brandy Hill truck movements utilise a route through Maitland, coinciding with Martins Creek movements on Paterson Road between Tocal Road and Flat Road. This is consistent with the existing operation for both of these quarries.

The traffic surveys completed along the haulage route included the existing truck movements associated with the Brandy Hill quarry. It is understood the proposed expansion of Brandy Hill seeks to have daily movements increase significantly, however peak hourly movements shall remain at a maximum of 60 trucks per hour (two-way) being limited by the capacity of the weighbridge. This gives a maximum of 15 truck movements per hour along the Maitland route between Tocal Road and Flat Road, with some, if not all of this demand allowed for during the traffic surveys. The above allowance for background growth applied to each intersection is considered appropriate to provide for the minor volume of additional traffic along the Martins Creek quarry haulage route, associated with the Brandy Hill Quarry expansion.

The above growth rates have been applied to the no quarry trucks scenario, as well as the full development with quarry trucks scenario with summaries of the results of the Sidra analysis, provided in Table 4-7 and Table 4-8 respectively.

Table 4-9 – Sidra results along haulage route 2030 with no quarry trucks at 2% growth per annum

Approach	Level of Service	Ave. Delay (s)	95% Queue (m)
<b>Dungog Road / Gresford Road</b>			
Gresford Road (from Bolwarra Heights)	A / A	4.7 / 3.1	2.4 / 4.5
Dungog Road	A / A	7.6 / 7.6	1.9 / 1.7
Gresford Road (from Vacy)	A / A	0.3 / 0.3	0.0 / 0.0
<b>Overall</b>	A / A	3.5 / 3.5	2.4 / 4.5
<b>Paterson Road / Tocal Road</b>			
Paterson Road (from Bolwarra)	A / A	3.9 / 4.2	6.1 / 13.7
Paterson Road (from Largs)	A / A	5.9 / 6.4	0.7 / 1.1
Tocal Road (from Paterson)	A / A	0.3 / 0.6	0.0 / 0.0
<b>Overall</b>	A / A	3.5 / 3.9	6.1 / 13.7
<b>Paterson Road / Flat Road</b>			
Flat Road (from East Maitland)	A / A	13.0 / 10.3	15.1 / 15.6
Paterson Road (from Bolwarra)	A / A	7.4 / 6.9	66.9 / 27.3
Paterson Road (from Maitland)	A / A	5.6 / 6.9	15.3 / 44.7
<b>Overall</b>	A / A	7.8 / 7.6	66.9 / 44.7
<b>Melbourne Street / Pitnacree Road / Lawes Street</b>			
Lawes Street	F / F	90.8 / 117.3	118.6 / 219.8
Melbourne Street (from New England Hwy)	F / E	127.1 / 59.6	573.7 / 267.5
Pitnacree Road	F / F	104.9 / 104.6	207.4 / 164.0
Melbourne Street (from Morpeth)	C / F	36.4 / 101.6	171.9 / 768.1
<b>Overall</b>	F / F	91.5 / 92.8	573.7 / 768.1
<b>Melbourne Street / New England Highway</b>			
New England Highway (from Newcastle)	F / F	203.6 / 104.7	901.7 / 471.7
Melbourne Street (from Morpeth)	F / F	175.4 / 110.8	414.2 / 242.6
New England Highway (from Maitland)	D / F	53.9 / 142.4	370.4 / 836.9
Melbourne Street (South)	F / F	107.7 / 106.7	166.9 / 187.5
<b>Overall</b>	F / F	135.7 / 122.9	901.7 / 836.9

The results in Table 4-9 above demonstrate that the signalised intersections will start to suffer from increased delays and congestion as a result of background growth, during both the AM and the PM peaks when the predicted levels of service for each approach are LoS F, except for the AM peak on the New England Highway approach from Maitland.

Table 4-10 – Sidra results along haulage route 2030 with proposed quarry truck flows (20 inbound and 20 outbound per hour) plus 2% growth per annum

Approach	Level of Service	Ave. Delay (s)	95% Queue (m)
<b>Dungog Road / Gresford Road</b>			
Gresford Road (from Bolwarra Heights)	A / A	6.0 / 3.8	3.5 / 5.5
Dungog Road	A / A	7.9 / 7.9	2.6 / 2.4
Gresford Road (from Vacy)	A / A	0.3 / 0.3	0 / 0
<b>Overall</b>	A / A	4.4 / 4.2	3.5 / 5.5
<b>Paterson Road / Tocal Road</b>			
Paterson Road (from Bolwarra)	A / A	3.5 / 4.0	4.8 / 10.7
Paterson Road (from Largs)	A / A	5.9 / 6.2	0.5 / 0.8
Tocal Road (from Paterson)	A / A	0.2 / 0.5	0 / 0
<b>Overall</b>	A / A	3.3 / 3.7	4.8 / 10.7
<b>Paterson Road / Flat Road</b>			
Flat Road (from East Maitland)	A / A	12.2 / 10.1	12.7 / 13.7
Paterson Road (from Bolwarra)	A / A	7.1 / 6.8	47.1 / 22.3
Paterson Road (from Maitland)	A / A	5.6 / 6.1	12.1 / 30.0
<b>Overall</b>	A / A	7.5 / 7.2	47.1 / 30.0
<b>Melbourne Street / Pitnacree Road / Lawes Street</b>			
Lawes Street	E / F	63.4 / 81.7	93 / 139
Melbourne Street (from New England Hwy)	C / C	35.9 / 36.5	213 / 162
Pitnacree Road	F / F	75.9 / 89.9	157 / 131
Melbourne Street (from Morpeth)	B / B	26.0 / 28.1	104 / 276
<b>Overall</b>	D / D	46.4 / 45.6	213 / 276
<b>Melbourne Street / New England Highway</b>			
New England Highway (from Newcastle)	F / D	75.3 / 50.1	457 / 255
Melbourne Street (from Morpeth)	F / E	83.9 / 62.8	230 / 146
New England Highway (from Maitland)	C / D	30.5 / 53.3	224 / 415
Melbourne Street (South)	D / D	54.5 / 54.7	87 / 99
<b>Overall</b>	E / D	59.2 / 53.9	457 / 415

Based upon the assessment above it is considered that the traffic movements associated with the Revised Project will have an acceptable impact upon the overall operation of the traffic signal controlled intersections (Pitnacree

Road / Melbourne Street / Lawes Street and Melbourne Street / New England Highway ). Whilst these intersections are predicted to suffer from increasing delays, this would be due to the continual traffic growth along the New England Highway in this location rather than a direct impact of the Revised Project.

The traffic flows associated with the Revised Project, being a maximum of 40 vehicles per hour through the intersection of the New England Highway and Melbourne Street, represent a small increase over the existing flows. In the AM peak between 8.15 and 9.15 the total flows through this intersection were 4,451 and the quarry traffic represents an increase of 0.89% over these flows. In the PM peak between 4.30 and 5.30 the total intersection flows were 4,585 vehicles, the Revised Project's traffic generated through the intersection represents a 1.09% increase.

TfNSW will continue to monitor the operation of the key intersections and the New England Highway road corridor and implement upgrades as required. The upgrade of the intersection of the New England Highway and Cessnock Road / Church Street to the west of this intersection demonstrates TfNSW commitment to upgrades on this road as required to accommodate continual traffic growth along this corridor.

#### 4.5 Public Transport

##### 4.5.1 Options for improving services

Minimal, if any demand for public transport will be generated by the Revised Project.

##### 4.5.2 Pedestrian Access to Bus Stops

The Quarry is not serviced by public buses and it is considered that no staff will use a bus to access the quarry, therefore no specific pedestrian access to any bus stops need be provided.

#### 4.6 Pedestrian and Cyclists

The Revised Project is not considered to be a major attractor for pedestrians or cyclists. Local access is available via the existing road network as appropriate. No changes are proposed.

The locality is a popular destination for weekend bicycle riding and the removal of the truck operations on a Saturday will provide a benefit to these weekend cyclists.

## 5 Improvement Analysis

### 5.1 Improvements to Accommodate Existing Traffic

The following issues with regard to the current road design have been identified as being required to bring the road network up to current Austroads design standards to accommodate the existing traffic flows along the key route for the quarry:

- The distance between the intersection of Station Street and railway crossing together with the road alignment across railway crossing
- The Gostwyck Bridge has been identified by TfNSW as a potential issue and requires on-going monitoring of the structure and sub-base
- The layout of the intersection of Gresford Road and Dungog Road does not comply with Austroads Guidelines due to the lack of sheltered right turn lane on Gresford Road for drivers turning right into Dungog Road
- The 90 degree bend at King Street / Duke Street in Paterson does not currently comply with standard Austroads Guidelines of the posted speed limit of 50 km/h through Paterson,

However, discussion with the road authority (Maitland City Council and Dungog Shire Council) indicate that the above issues have been reviewed and the following advice has been provided:

- The railway crossing on Grace Avenue has been reviewed by ARTC, who are the authority in control of all level crossings and they have no timeframe to upgrade this crossing, given the cost of this upgrade balanced against the volume and frequency of trains and the alignment of the road and the approaches. It is noted that the quarry trucks will only continue to use this crossing until new access connection to Dungog Road is completed.

These issues relate to existing traffic issues along the road network that forms the haulage route for the Revised Project. The Revised Project represents a reduction in the volume of quarry related trucks compared to historic operations and the Original Project as per the 2016 EIS. As part of the Revised Project, Daracon committed to make financial contributions to Council for the on-going maintenance of the haul route as required. Discussions are on-going with Council to resolve the road maintenance levy.

The review of the performance of the signal-controlled intersections on Melbourne Street highlight there are capacity issues currently occurring along this length of the road, due to the volume of traffic in this location. As part of the regional road network, TfNSW will continue to monitor the performance of this intersection and upgrade this intersection if required. However, it is noted that this intersection is physically constrained on each approach and corner and no additional physical capacity can be provided at this intersection.

### 5.2 Improvements to Accommodate Background Traffic

Advice from Maitland City Council indicates that there is no expected increase in traffic flows along the key routes due to other developments in the general locality of the subject site.

### 5.3 Additional Improvements to Accommodate Development Traffic

To allow for the on-going use of the major route utilised by the Revised Project, Daracon have committed to provide the following road upgrades which shall be designed in consultation with the road authority and in accordance with Austroads Guidelines:

1 - Provide a new access road for the quarry including a new intersection on Dungog Road by the end of Year 4, to eliminate the need for quarry trucks to use the Station Street / Grace Avenue intersection. This will eliminate the

majority of heavy vehicles that currently travel along Station Street and Grace Avenue and eliminate the truck movements over the at-grade railway crossing. This also eliminates the use of Vogeles Rd entrance when loading trains.

2 - Upgrade the Dungog Road and Gresford Road intersection to provide a dedicated sheltered right turn lane. This design work shall be completed in consultation with the road authority and will be in accordance with taking into account Austroads Guidelines and constructed within 12 months of the s138 Roads Act approval from Dungog Shire Council.

3 - Upgrade of the 90 degree bend in Paterson at the King Street / Duke Street intersection. This will be designed in consultation with the road authority and will be designed and constructed in accordance with the road authority requirements and taking into account Austroads Guidelines. The upgrades will be completed within 12 months of the s138 Roads Act approval from Dungog Shire Council.

4 – Upgrade and realignment of Dungog Road by introducing a series of curves, new line marking and Vehicle Activated Signage alerting drivers approaching the bridge to reduce speed. This design work shall be completed in consultation with the road authority taking into account Austroads Guidelines and constructed within 12 months of the s138 Roads Act approval from Dungog Shire Council.

The proposed road works detailed above will provide the following benefits:

- New access on Dungog Road will address current traffic safety issues at Station Street entrance and the rail crossing. This new access will remove all quarry related trucks from Station Street and Grace Street and the existing access will only be used by light vehicles in an emergency event.
- New access on Dungog Rd will address the current traffic issues with the use of Vogeles Rd entrance while train loading.
- Providing a sheltered right turn lane on Gresford Road at Dungog Road will improve road safety, by reducing or eliminating the potential for rear end type accidents. The current layout (Rural Type AUR) can lead to drivers of through vehicles on Gresford Road running into the rear of a vehicle propped on Gresford Road waiting to turn right into Dungog Road. The upgrade will direct all through traffic to steer to the left of any vehicle waiting to turn right at this location. This upgrade is in line with TfNSW policy (RMS Publication 17.336 version 2.0 dated 31/8/2017) which no longer permits Rural Type AUR intersection controls and requires a Rural CHR type intersection.
- The upgrade at the 90 degree bend in Paterson will ensure that all vehicles drive on the correct side of the road and do not cross over the centre line. The upgrade allows for a refresh of the dividing line marking through the intersection to delineate and separate opposing traffic movements. No car parking spaces will be lost due to the relocation of the drive way, and this proposed approach.
- Gostwyck Bridge approach upgrade. The upgrade allows for the realignment of Dungog Road by incorporating a series of curves to raise driver awareness and associated new line marking, as well as Vehicle Activated Signage alerting drivers approaching the bridge to reduce speed.

#### 5.4 Alternative Improvements

No other alternatives are put forward for consideration. Alternatives have been considered by Daracon, and options consulted with authorities and community. The proposed improvements consider the feedback during these consultations.

## 6 Summary and Recommendations

### 6.1 Summary

The Revised Project seeks approval expansion of quarrying operations at the Martins Creek Quarry for the proposed extraction of up to 1,100,00 tonnes per annum with hauling up to 500,000 tonnes of quarry product per annum by road. The hourly number of trucks associated with the Revised Project will be limited to a maximum peak 20 laden trucks per hour reducing to 15 loaded trucks per hour between 3.00 and 6.00 PM. The maximum peak per day will be 140 laden trucks per day for 50 days per annum, with 100 loaded trucks for the remaining 200 days per year.

Traffic data along the key route associated with the haulage of material has been collected at mid-block locations as well as at the key intersections impacted upon by the quarry. This data shows that the majority of the length of the road network impacted upon by the quarry currently carries traffic flows well within their capacity, reflective of the rural setting for the majority of the haulage length. In the urban settings for the haulage route the capacity of the road, as determined by TfNSW, is higher and the operation of these roads is well within their capacity.

As part of the Revised Project, it is proposed to have a primary haulage route via Flat Road and Melbourne Street to connect with the New England Highway, thus removing most trucks from the routes via Lorn and Brandy Hill which have been historically used for the quarry site. Whilst improving the road environment through Lorn and Brandy Hill, this will impact upon the operation and capacity of the signal-controlled intersection of Pitnacree Road and Melbourne Street as well as the New England Highway with Melbourne Street.

The signal-controlled intersection of the New England Highway with Melbourne Street currently suffers from a poor level of service on all approaches in both the AM and PM peak periods, however this intersection is physically constrained on all approaches and the 4 corners bounding the intersection. The maximum of 20 laden truck movements per hour associated with the Revised Project will enable these roads to continue to operate in a similar manner to the recent operations. The proposed cap of 20 trucks outbound and 20 trucks inbound per hour (including inbound material trucks) is significantly less than the historical use of the site. The cap of 15 trucks between 3.00 and 6.00 PM could also provide a minor improvement to the overall operation of this intersection.

As part of the assessment, a safety review has also been completed (September 2014) along the haulage route associated with Martins Creek Quarry as well as a review of the recent accident data for the route provided by TfNSW. This review shows that the existing accident rates along the route are low. Dungog Council has provided comment with regard to lack of a sheltered right turn lane at the intersection of Gresford Road / Dungog Road, and the safety audit noted this upgrade is required to bring the road network up to current design standards.

From the updated assessment completed for the Revised Project, it can be seen that the proposed annual output of the quarry for which approval is being sought will have an acceptable impact upon the road network that forms the haul route between the New England Highway and the site. The assessment above shows that the road has adequate capacity and is currently operating within acceptable guidelines provided by the RTA Guide to Traffic Generating Developments. The application seeks approval for a maximum of 20 trucks per hour and 140 per day for 50 days per annum (and 100 trucks for the remaining 200 days). The weighbridge on site has a capacity to allow for 20 trucks per hour to exit the site. For the financial year 2014/2015 the peak daily flow was 316 loads, which relates to 40 trucks per hour for an 8 hour day, with this decreasing to a peak of 183 trucks in financial year 2017/2018. The 183 trucks, spread over 8 hours gives 23 trucks per hour. Under this application, the peak hourly truck flow will be 20 per hour whilst the average will be lower than this and dependent upon market demands.

## 6.2 Recommendations

To maintain and improve the capacity, efficiency and safety of the road network used by the Revised Project, intersection and road upgrades are also proposed at the following locations:

- 1 - Provide a new access road for the quarry including a new intersection on Dungog Road to eliminate the need for quarry trucks to use the Station Street / Grace Avenue intersection, and the Vogeles Road entrance during train loading.
- 2 - Upgrade the Dungog Road and Gresford Road intersection to provide a dedicated sheltered right turn lane.
- 3 - Upgrade the King / Duke street intersection in Patterson by providing a refresh of the dividing line marking through the intersection for vehicles to manoeuvre around the 90 degree bend, including relocating the existing driveway on the north side of the intersection slightly west to improve the space allocation for parking on either side of the intersection and improve carparking capacity along this northern kerb line.
- 4 – Upgrade to the Gostwyck Bridge approach, allowing for the realignment of Dungog Road by introducing a series of curves, new line marking and Vehicle Activated Signage alerting drivers approaching the bridge to reduce speed.

These upgrades will be designed in consultation with the road authority and in accordance with Austroads Guidelines.

The proposed road works detailed above will provide the following benefits:

- Providing a sheltered right turn lane on Gresford Road at Dungog Road will improve road safety, by reducing or eliminating the potential for rear end type accidents. The current layout (Rural Type AUR) can lead to drivers of through vehicles on Gresford Road running into the rear of a vehicle propped on Gresford Road waiting to turn right into Dungog Road. The upgrade will direct all through traffic to steer to the left of any vehicle waiting to turn right at this location. This upgrade is in line with the TfNSW policy which no longer permits Rural Type AUR intersection controls and requires a Rural CHR type intersection.
- The new access on Dungog Road removes all heavy vehicles associated with Martins Creek quarry from Station Street and Grace Avenue and improves the amenity for residents along this road. The current access on Station Street shall only be used by light vehicles during an emergency.
- New access on Dungog Rd will address the current traffic issues with the use of Vogeles Rd entrance while train loading.
- The upgrade at the 90-degree bend in Paterson will ensure that all vehicles drive on the correct side of the road and do not cross over the centre line. The upgrade will also allow for improved carparking capacity in this location and improve road safety for these pedestrians.
- Raise driver awareness and improve road safety for all users of Gostwyck Bridge.

## 6.3 Traffic Management and Mitigation Measures

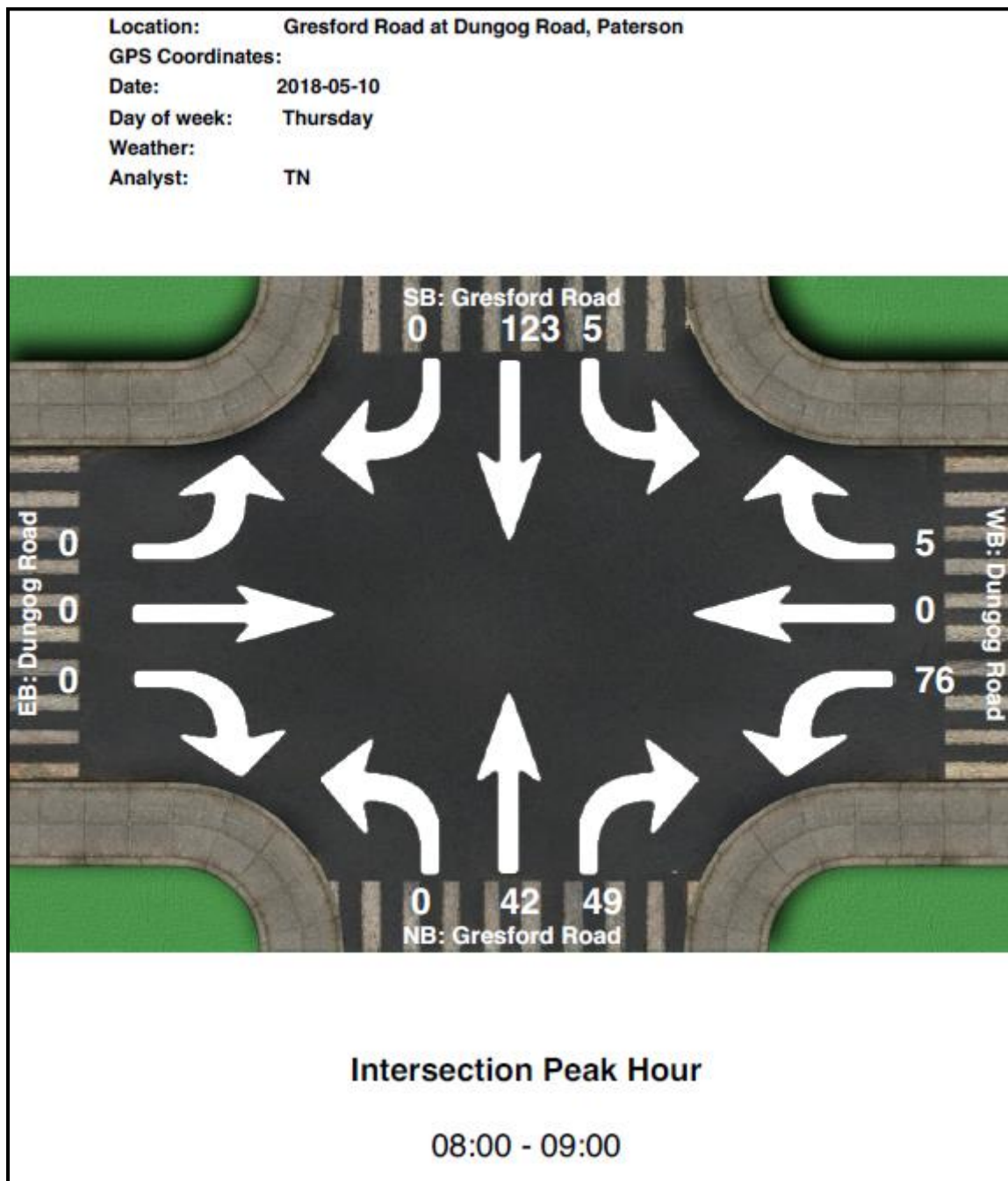
A site-specific Construction Traffic Management Plan (CTMP) will be prepared for the Revised Project prior to the works commencing at the quarry. This will be prepared in accordance with RMS Traffic Control at Work Sites manual and will include TCPs to control traffic through and in / out of the construction site. During construction work, traffic control measures will be in place on at the construction zones to manage road safety and the safety of the construction staff. The requirements of the traffic control will be determined as part of the construction work and this could include speed reduction through the construction zone and associated delays to through traffic movements.

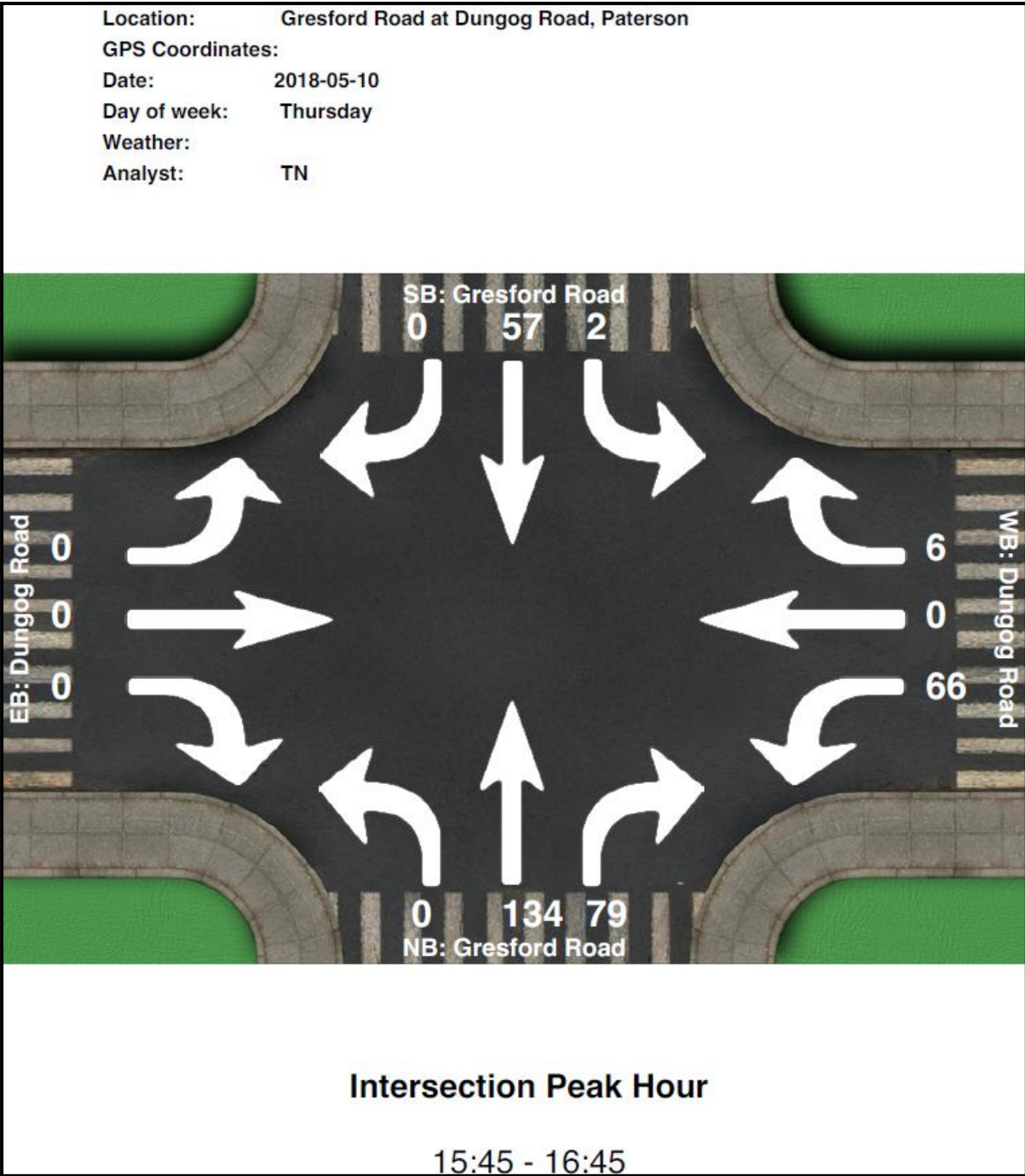
In addition, Daracon have committed to a suite of traffic controls as part of the Revised Project to further mitigate and manage traffic related impacts along the primary haul route:

- No quarry trucks through Paterson prior to 6.45 am Monday to Friday.

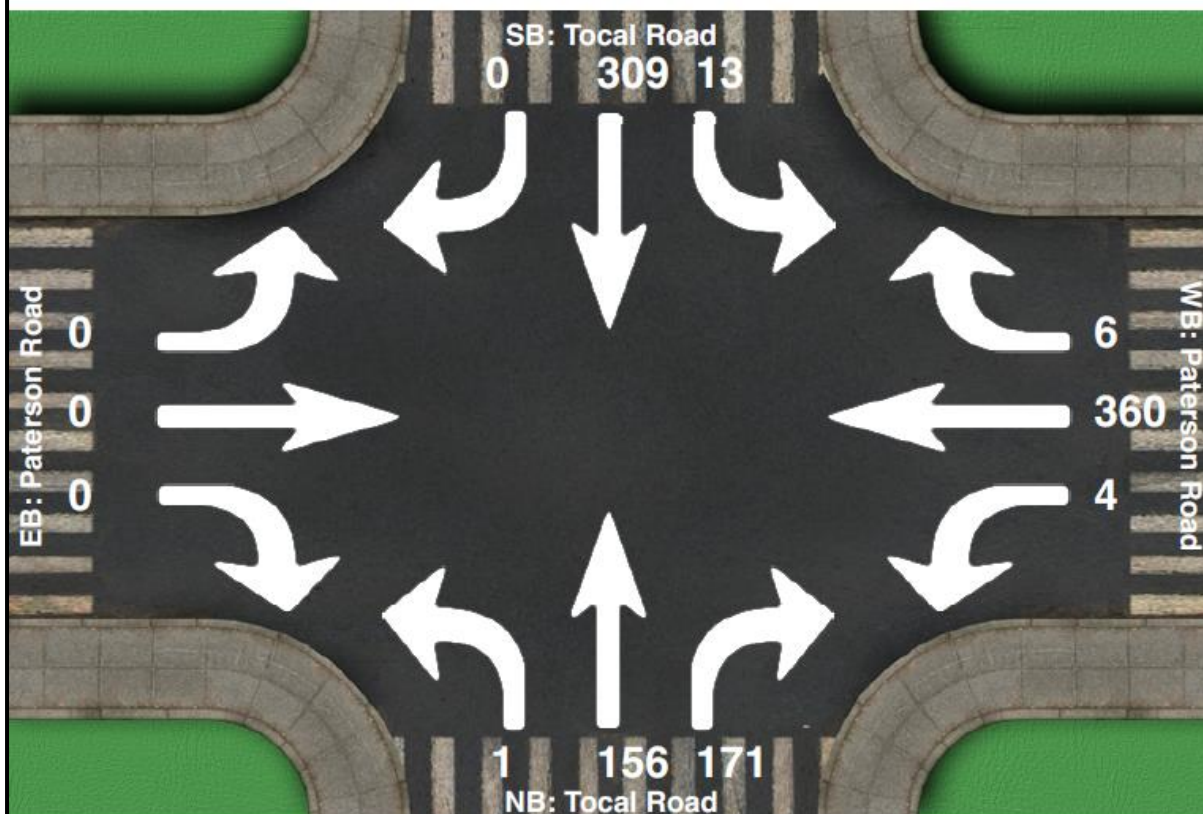
- With prior notification, revise haulage as required to pause trucks travelling through Paterson when there are large community events in Paterson, such as a funeral.
- Continued rigorous assessment and pre-qualification process prior to the engagement of any transport subcontractors, including thorough review of subcontractor's relevant management processes and procedures to ensure compliance with the Heavy Vehicle National Law (HVNL) and associated Chain of Responsibility (CoR)
- All drivers attending the quarry are required to sign and adhere to the Driver Code of Conduct. The Driver Code of Conduct is published on Martins Creek Quarry page of Daracon website at: <https://daracon.com.au/storage/app/media/Enviro%20and%20Quarries%20Documents/Martins%20Creek/Martins-Creek-Code-of-Conduct.pdf>
- The Driver Code of Conduct will require drivers to report any substantial road pavement irregularities along the haul route, with these reports being passed on Council for attention
- Reinforce through regular communication and consultation the truck speed limits in the Driver Code of Conduct, including:
  - 40 km/hr through Paterson, Bolwarra and Vacy
  - 20-25 km/hr at the intersection of King and Duke St Paterson
  - 20 km/hr on Station St Martins Creek
- The Driver Code of Conduct will outline the necessary communication and traffic controls around temporary reduction or cessation of haulage to supply material in an emergency, including flooding events.
- Review and update the Driver Code of Conduct annually and as the need arises
- Undertake regular audits of transport subcontractors to ensure compliance with the HVNL and CoR
- Conduct regular monitoring, spot checks and observation of driver behaviour
- Investigate all complaints and potential breaches of Daracon's Traffic and Transport policies and procedure to the fullest extent possible and initiate disciplinary action as required
- Continue planning to expand rail markets and gain access to rail unloading capacity, in order to optimise transportation of product by rail, where reasonable and feasible.
- If Daracon is called upon to assist in providing Quarry material in response to an emergency event it will; advise the community, Dungog Shire Council and the EPA, at the soonest possible opportunity, in accordance with any emergency response plan enacted by the relevant State or National authority
- As part of the Traffic Management Plan, explore additional opportunities to further monitor driver conduct and truck convoying, as suggested by the community, including fleet management technologies as they become available and GPS monitoring for non-Daracon vehicles.

## Appendix A – Intersection survey data



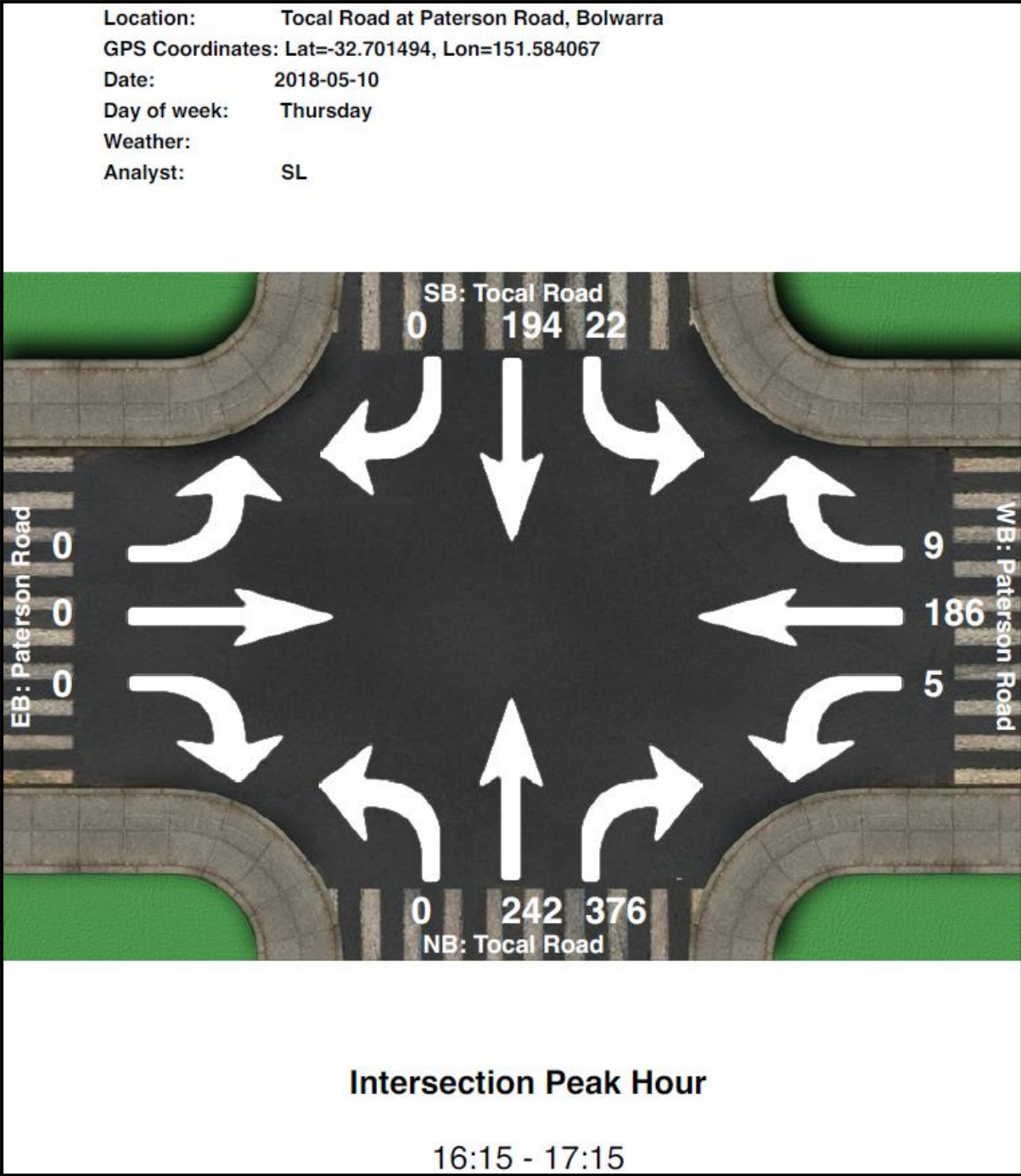


Location: Tocal Road at Paterson Road, Bolwarra  
 GPS Coordinates: Lat=-32.701494, Lon=151.584067  
 Date: 2018-05-10  
 Day of week: Thursday  
 Weather:  
 Analyst: SL

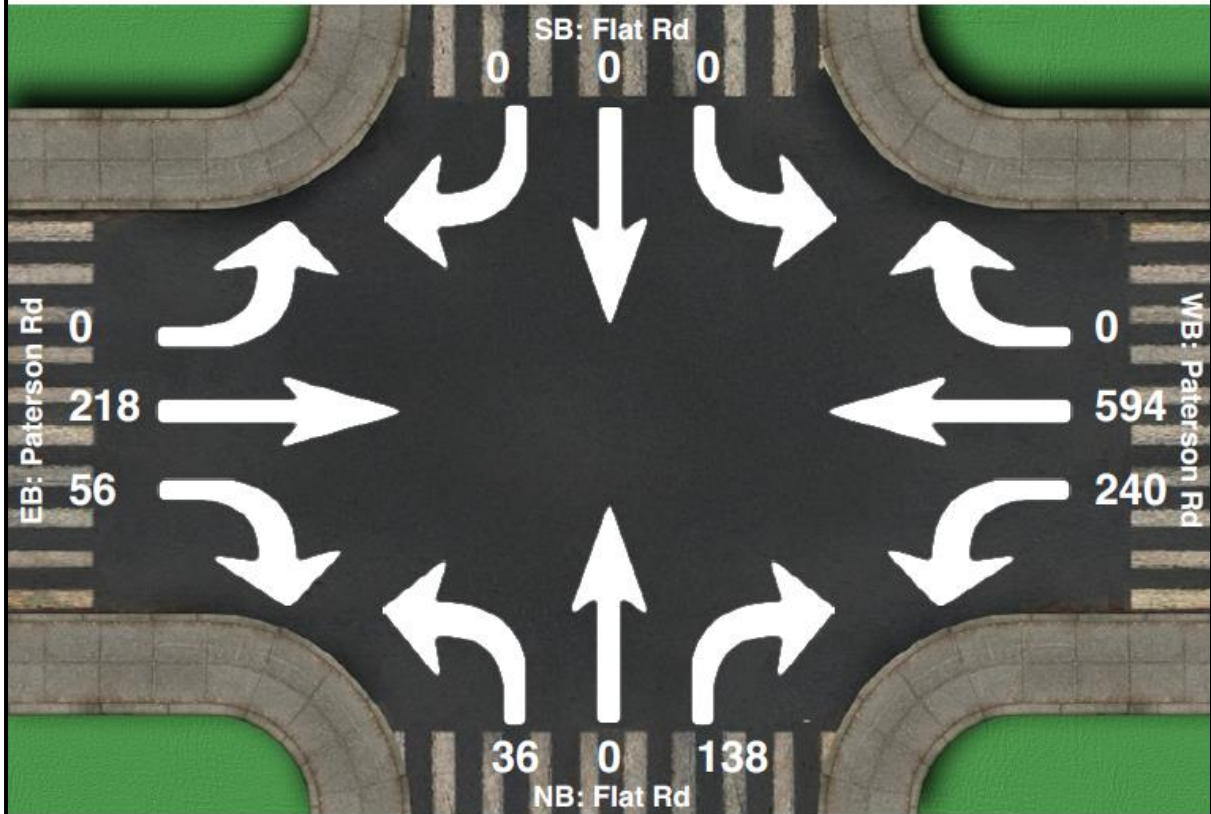


**Intersection Peak Hour**

08:15 - 09:15

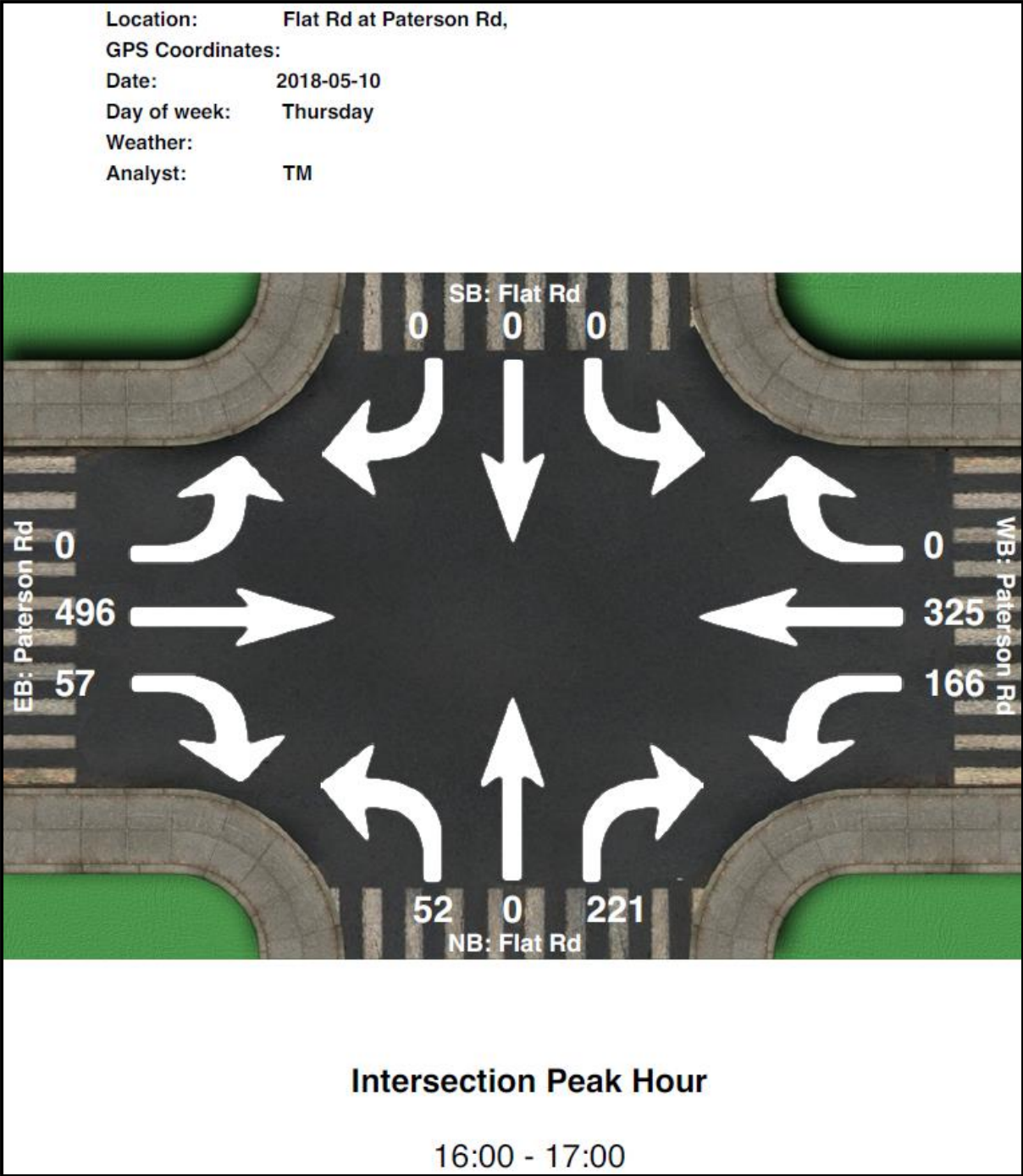


Location: Flat Rd at Paterson Rd,  
 GPS Coordinates:  
 Date: 2018-05-10  
 Day of week: Thursday  
 Weather:  
 Analyst: TM

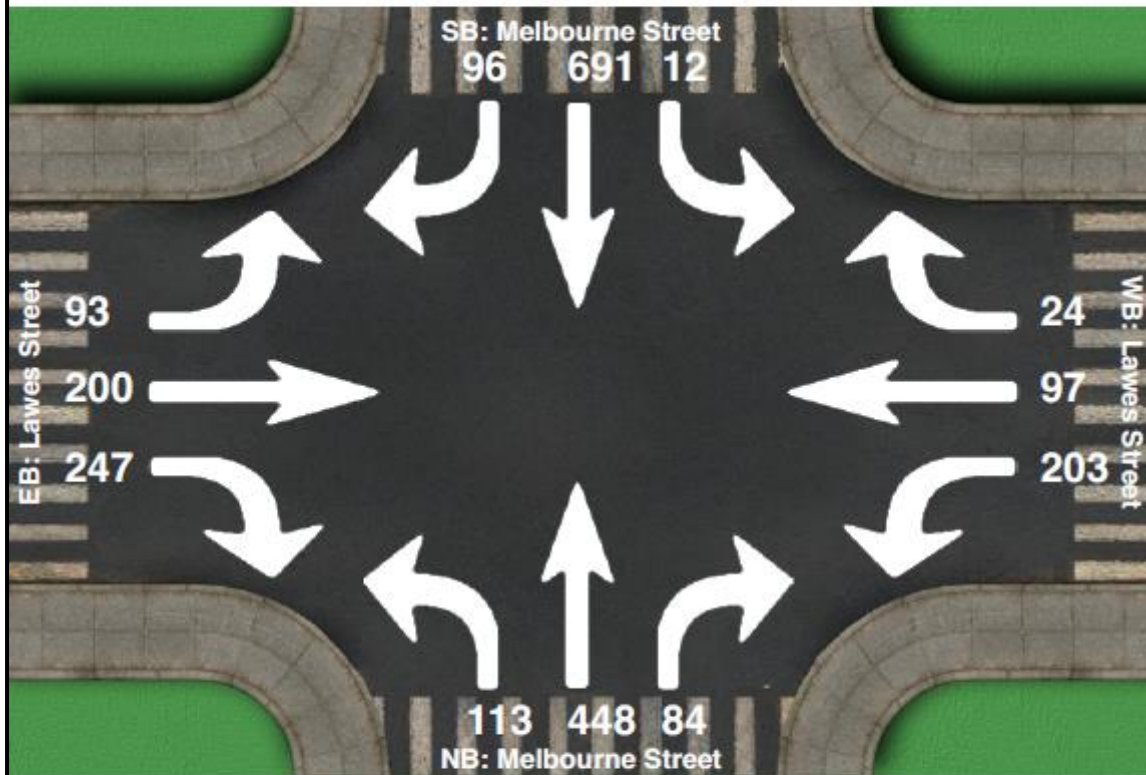


**Intersection Peak Hour**

08:15 - 09:15



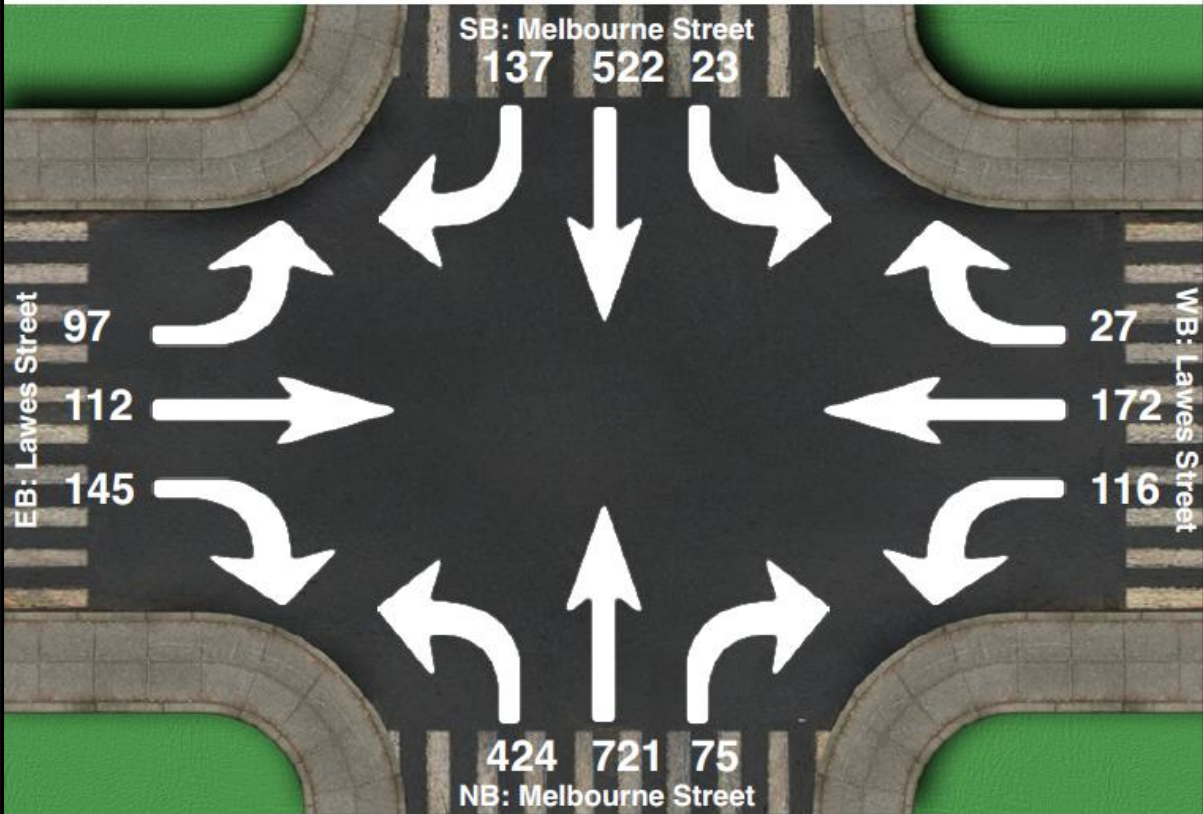
Location: Melbourne Street at Lawes Street,  
GPS Coordinates: Lat=-32.744618, Lon=151.585179  
Date: 2018-05-08  
Day of week: Tuesday  
Weather:  
Analyst: SL



**Intersection Peak Hour**

08:15 - 09:15

Location: Melbourne Street at Lawes Street,  
GPS Coordinates: Lat=-32.744618, Lon=151.585179  
Date: 2018-05-08  
Day of week: Tuesday  
Weather:  
Analyst: SL



**Intersection Peak Hour**

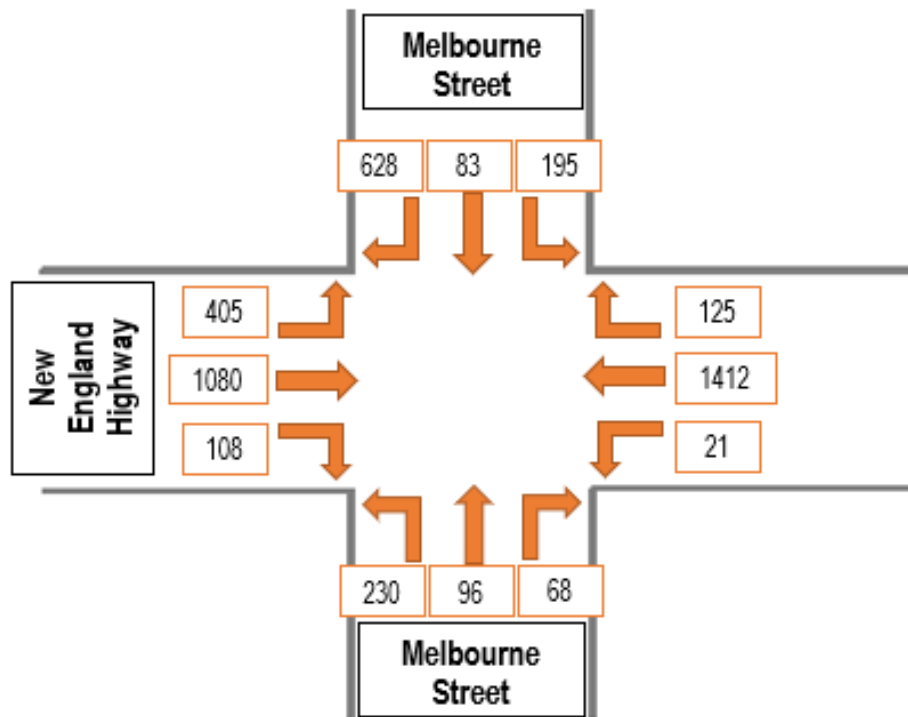
16:45 - 17:45

Location: Melbourne Street at New England Highway, East Maitland

Date: 2018-05-08

Day: Tuesday

Analyst(s): TN / TM



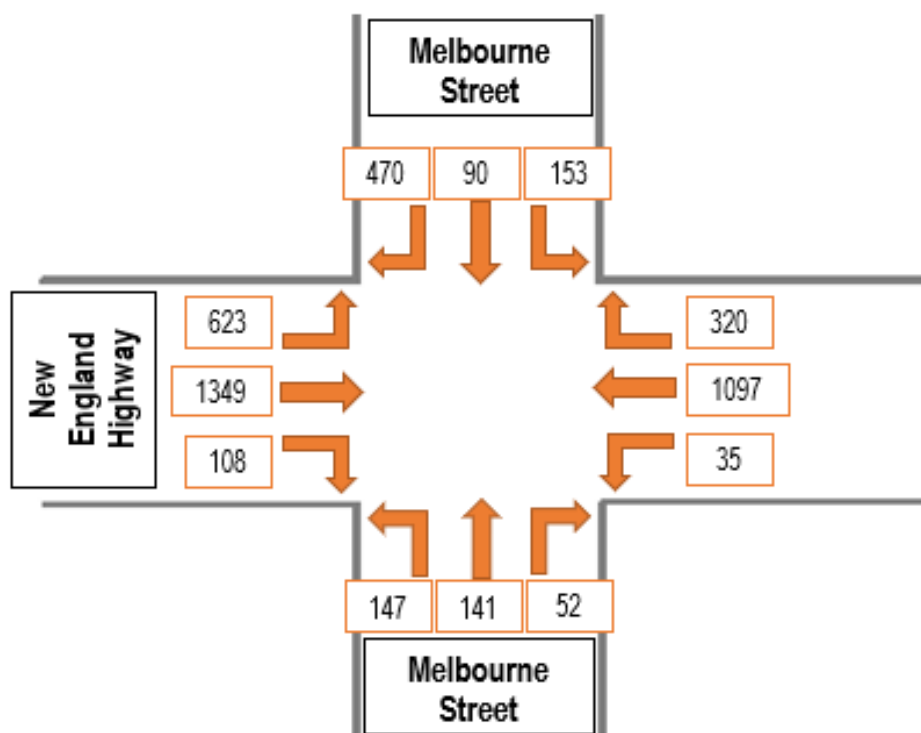
Intersection Peak Hour 08:15 – 09:15

Location: Melbourne Street at New England Highway, East Maitland

Date: 2018-05-08

Day: Tuesday

Analyst(s): TN / TM



Intersection Peak Hour 16:30 – 17:30

## Appendix B – Tube Count Volume Summaries

Week 1 – Beginning 28th April 2018

Job No	N3978	Menu
Client	Seca Solution	
Site	Dungog Road	
Location	between Cory Street and Gresford Road	
Site No	1	
Start Date	28-Apr-18	
Description	Volume Summary	
Direction	Combined	



Hour	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
Starting	30-Apr	1-May	2-May	3-May	4-May	28-Apr	29-Apr		
AM Peak	119	119	162	141	170	124	99		
PM Peak	128	137	126	145	169	116	92	1594	1436
0:00	3	0	3	3	1	8	7	2	4
1:00	2	3	4	3	3	4	4	3	3
2:00	2	1	2	0	1	0	4	1	1
3:00	6	8	4	8	3	5	1	6	5
4:00	14	9	12	11	6	7	3	10	9
5:00	31	30	37	38	44	11	4	36	28
6:00	114	107	102	118	99	33	9	108	83
7:00	110	109	111	116	117	56	23	113	92
8:00	112	119	162	141	170	98	48	141	121
9:00	96	114	109	120	155	95	64	119	108
10:00	119	94	100	116	126	97	85	111	105
11:00	110	82	106	103	119	124	99	104	106
12:00	114	99	94	105	115	110	81	105	103
13:00	83	97	116	93	117	87	74	101	95
14:00	94	117	95	115	157	116	59	116	108
15:00	99	129	110	118	169	77	92	125	113
16:00	128	137	123	145	145	66	72	136	117
17:00	84	102	126	122	138	79	56	114	101
18:00	53	51	62	66	66	32	34	60	52
19:00	24	40	30	41	24	15	26	32	29
20:00	12	20	18	29	24	11	22	21	19
21:00	7	10	18	20	25	30	17	16	18
22:00	5	9	11	8	19	16	2	10	10
23:00	3	1	6	7	5	15	5	4	6
Total	1425	1488	1561	1646	1848	1192	891	1594	1436

Job No	N3978	Menu
Client	Seca Solution	
Site	Gresford Road	
Location	between Dungog Road and Patterson township (Tocal Road)	
Site No	2	
Start Date	28-Apr-18	
Description	Volume Summary	
Direction	Combined	



Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	30-Apr	1-May	2-May	3-May	4-May	28-Apr	29-Apr		
AM Peak	272	299	330	331	337	322	293		
PM Peak	313	309	327	339	391	308	248	3607	3401
0:00	7	3	8	7	5	14	12	6	8
1:00	5	9	9	4	5	6	9	6	7
2:00	9	4	6	7	4	2	6	6	5
3:00	8	10	8	8	4	9	1	8	7
4:00	25	23	23	31	22	8	8	25	20
5:00	77	66	87	71	77	27	11	76	59
6:00	190	201	180	214	187	87	37	194	157
7:00	252	262	244	265	249	144	63	254	211
8:00	272	299	330	331	337	279	150	314	285
9:00	233	255	240	248	335	252	192	262	251
10:00	234	213	198	258	271	322	258	235	251
11:00	221	191	207	213	253	312	293	217	241
12:00	223	206	206	222	250	281	248	221	234
13:00	212	211	223	197	262	227	240	221	225
14:00	220	233	203	267	320	308	181	249	247
15:00	261	290	284	330	391	228	241	311	289
16:00	313	309	327	339	346	217	193	327	292
17:00	233	248	294	282	354	172	174	282	251
18:00	168	156	171	176	202	111	80	175	152
19:00	57	94	76	114	74	50	64	83	76
20:00	45	62	55	75	63	47	34	60	54
21:00	15	31	49	47	55	55	25	39	40
22:00	13	13	19	27	55	46	6	25	26
23:00	5	9	10	11	15	37	5	10	13
Total	3298	3398	3457	3744	4136	3241	2531	3607	3401

Job No	N3978	Menu
Client	Seca Solution	
Site	Tocal Road	
Location	between Patterson township and Bolwarra Heights	
Site No	3	
Start Date	28-Apr-18	
Description	Volume Summary	
Direction	Combined	



Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	30-Apr	1-May	2-May	3-May	4-May	28-Apr	29-Apr		
AM Peak	332	367	391	405	685	357	332		
PM Peak	383	365	415	499	718	400	320	5094	4639
0:00	5	6	10	8	12	15	24	8	11
1:00	3	8	11	7	6	9	10	7	8
2:00	5	5	10	6	4	3	7	6	6
3:00	12	10	10	6	6	6	2	9	7
4:00	28	28	35	35	27	9	10	31	25
5:00	95	98	110	96	110	36	11	102	79
6:00	206	213	218	219	279	88	38	227	180
7:00	277	305	324	316	482	159	67	341	276
8:00	332	367	391	405	605	253	150	420	358
9:00	261	317	276	351	685	294	235	378	346
10:00	255	252	271	373	534	357	321	337	338
11:00	264	235	258	321	449	331	332	305	313
12:00	279	243	273	357	522	321	320	335	331
13:00	261	249	269	378	592	318	288	350	336
14:00	267	263	302	457	672	400	300	392	380
15:00	313	336	400	491	718	265	276	452	400
16:00	383	365	415	499	614	250	229	455	394
17:00	309	333	393	429	691	246	195	431	371
18:00	195	195	227	235	219	141	107	214	188
19:00	73	120	102	144	112	67	83	110	100
20:00	68	78	88	91	90	74	56	83	78
21:00	29	47	58	72	58	90	39	53	56
22:00	21	21	36	29	66	84	14	35	39
23:00	9	10	12	17	21	63	9	14	20
Total	3950	4104	4499	5342	7574	3879	3123	5094	4639

Job No	N3978	Menu
Client	Seca Solution	
Site	Paterson Road	
Location	between Bolwarra Heights and Flat Road	
Site No	4	
Start Date	28-Apr-18	
Description	Volume Summary	
Direction	Combined	



Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	30-Apr	1-May	2-May	3-May	4-May	28-Apr	29-Apr		
AM Peak	1032	1211	1225	1307	1362	1163	898		
PM Peak	1158	1229	1261	1283	1503	1009	895	13987	13052
0:00	19	32	39	25	27	62	86	28	41
1:00	15	17	24	19	27	31	38	20	24
2:00	13	10	25	17	20	23	32	17	20
3:00	25	27	33	27	27	30	19	28	27
4:00	131	106	121	117	97	45	34	114	93
5:00	282	321	305	295	312	94	66	303	239
6:00	632	646	639	590	660	237	124	633	504
7:00	916	964	990	961	1066	514	236	979	807
8:00	1032	1211	1225	1307	1362	888	463	1227	1070
9:00	748	883	864	964	1262	996	702	944	917
10:00	723	737	756	820	1019	1163	855	811	868
11:00	745	730	707	811	917	1083	898	782	842
12:00	741	701	775	820	939	1005	895	795	839
13:00	706	703	722	854	1122	1009	813	821	847
14:00	787	817	880	1008	1263	905	842	951	929
15:00	977	1146	1138	1175	1503	776	760	1188	1068
16:00	1158	1229	1209	1283	1386	761	726	1253	1107
17:00	1119	1178	1261	1267	1391	726	587	1243	1076
18:00	771	744	772	835	824	468	361	789	682
19:00	361	419	438	474	388	254	292	416	375
20:00	261	322	294	325	317	265	222	304	287
21:00	120	158	198	197	245	238	118	184	182
22:00	72	87	101	108	159	338	68	105	133
23:00	44	40	41	36	85	229	50	49	75
Total	12398	13228	13557	14335	16418	12140	9287	13987	13052

Job No	N3978	Menu
Client	Seca Solution	
Site	Flat Road/Glenarvon Road/Pitnacree Road	
Location	between Paterson Road and Melbourne Street (East Maitland)	
Site No	5	
Start Date	28-Apr-18	
Description	Volume Summary	
Direction	Combined	



Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon 30-Apr	Tue 1-May	Wed 2-May	Thu 3-May	Fri 4-May	Sat 28-Apr	Sun 29-Apr		
AM Peak	767	881	903	948	979	984	642		
PM Peak	915	985	1012	1060	1113	875	607	10596	9859
0:00	28	14	20	27	15	56	58	21	31
1:00	13	15	22	13	21	32	33	17	21
2:00	24	11	18	16	17	16	19	17	17
3:00	15	18	26	16	19	12	5	19	16
4:00	61	54	64	60	65	31	11	61	49
5:00	214	215	223	225	201	60	48	216	169
6:00	466	509	498	488	511	154	79	494	386
7:00	734	761	804	803	791	337	152	779	626
8:00	767	881	903	948	979	691	275	896	778
9:00	560	652	654	698	871	793	491	687	674
10:00	538	546	543	552	620	984	572	560	622
11:00	505	577	568	512	633	938	642	559	625
12:00	509	518	587	588	642	875	607	569	618
13:00	487	537	516	624	722	819	569	577	611
14:00	564	605	675	784	776	693	562	681	666
15:00	797	897	952	933	1113	602	568	938	837
16:00	915	970	1012	1060	1056	611	483	1003	872
17:00	850	985	1011	1029	1032	518	449	981	839
18:00	571	574	635	696	611	364	316	617	538
19:00	273	328	321	417	302	196	244	328	297
20:00	173	239	252	291	293	180	161	250	227
21:00	100	160	181	214	252	190	105	181	172
22:00	71	74	81	108	168	217	58	100	111
23:00	28	30	39	33	99	122	33	46	55
Total	9263	10170	10605	11135	11809	9491	6540	10596	9859

**Week 2 – Beginning 5<sup>th</sup> May 2018**

Job No	N3978	Menu
Client	Seca Solution	
Site	Dungog Road	
Location	between Cory Street and Gresford Road	
Site No	1	
Start Date	5-May-18	
Description	Volume Summary	
Direction	Combined	



Hour	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
Starting	7-May	8-May	9-May	10-May	11-May	5-May	6-May		
AM Peak	149	145	178	160	169	181	131		
PM Peak	128	148	154	146	137	132	125	1679	1611
0:00	3	1	3	3	3	6	6	3	4
1:00	2	3	3	4	1	2	3	3	3
2:00	1	1	2	0	4	0	3	2	2
3:00	6	4	10	3	3	2	7	5	5
4:00	8	7	6	9	8	6	6	8	7
5:00	32	48	38	45	32	11	9	39	31
6:00	124	141	140	160	149	48	14	143	111
7:00	149	138	123	130	112	60	35	130	107
8:00	140	145	178	141	169	137	104	155	145
9:00	122	120	129	125	118	181	109	123	129
10:00	88	104	131	122	135	171	131	116	126
11:00	108	100	92	110	127	135	117	107	113
12:00	83	115	123	97	137	126	98	111	111
13:00	113	97	119	104	124	117	109	111	112
14:00	122	113	99	94	137	112	125	113	115
15:00	117	121	141	114	112	132	125	121	123
16:00	128	148	154	146	123	115	119	140	133
17:00	109	119	110	99	100	94	81	107	102
18:00	63	41	67	62	70	38	37	61	54
19:00	23	34	35	37	23	23	26	30	29
20:00	18	20	22	26	22	22	20	22	21
21:00	15	15	14	16	29	16	14	18	17
22:00	5	8	12	9	5	10	12	8	9
23:00	2	1	0	4	16	6	4	5	5
Total	1581	1644	1751	1660	1759	1570	1314	1679	1611

Job No	N3978	Menu
Client	Seca Solution	
Site	Gresford Road	
Location	between Dungog Road and Patterson township (Tocal Road)	
Site No	2	
Start Date	5-May-18	
Description	Volume Summary	
Direction	Combined	



Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	7-May	8-May	9-May	10-May	11-May	5-May	6-May		
AM Peak	315	309	317	306	314	354	319		
PM Peak	304	319	326	347	302	292	298	3605	3511
0:00	3	5	6	3	3	12	16	4	7
1:00	4	5	3	5	1	3	7	4	4
2:00	5	4	5	5	11	2	4	6	5
3:00	8	6	11	4	7	3	5	7	6
4:00	24	19	17	29	16	6	9	21	17
5:00	82	120	92	113	90	29	15	99	77
6:00	212	203	213	233	188	68	33	210	164
7:00	290	266	254	250	244	162	78	261	221
8:00	315	309	317	306	314	290	210	312	294
9:00	256	243	288	233	240	342	240	252	263
10:00	227	217	233	230	242	354	319	230	260
11:00	220	189	214	226	228	326	266	215	238
12:00	216	207	276	206	242	262	261	229	239
13:00	212	209	216	211	242	287	268	218	235
14:00	245	206	228	225	266	265	262	234	242
15:00	281	303	305	279	296	292	298	293	293
16:00	304	319	326	347	302	269	277	320	306
17:00	272	315	283	271	263	233	201	281	263
18:00	182	151	199	171	202	105	101	181	159
19:00	61	92	74	98	73	67	66	80	76
20:00	49	48	61	67	64	45	39	58	53
21:00	45	45	36	62	82	30	28	54	47
22:00	12	18	20	27	47	43	20	25	27
23:00	12	2	4	13	29	28	5	12	13
Total	3537	3501	3681	3614	3692	3523	3028	3605	3511

Job No	N3978	Menu
Client	Seca Solution	
Site	Tocal Road	
Location	between Patterson township and Bolwarra Heights	
Site No	3	
Start Date	5-May-18	
Description	Volume Summary	
Direction	Combined	



Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	7-May	8-May	9-May	10-May	11-May	5-May	6-May		
AM Peak	432	378	614	356	335	738	762		
PM Peak	364	377	551	399	365	743	796	4492	5495
0:00	2	6	9	6	8	9	20	6	9
1:00	7	7	5	6	6	5	8	6	6
2:00	4	3	4	6	6	3	3	5	4
3:00	15	10	9	7	7	5	7	10	9
4:00	29	35	28	29	24	6	10	29	23
5:00	114	128	116	119	86	51	25	113	91
6:00	224	231	235	217	216	99	74	225	185
7:00	360	298	330	303	289	377	312	316	324
8:00	432	378	467	356	335	689	595	394	465
9:00	336	318	614	289	279	738	723	367	471
10:00	282	245	278	274	265	721	762	269	404
11:00	331	245	393	256	281	692	633	301	404
12:00	299	263	551	255	290	699	716	332	439
13:00	286	231	259	249	318	740	789	269	410
14:00	310	245	291	284	349	743	790	296	430
15:00	345	361	365	331	359	739	784	352	469
16:00	364	377	360	399	365	706	796	373	481
17:00	349	314	345	319	338	646	426	333	391
18:00	224	177	202	215	214	162	194	206	198
19:00	101	117	98	135	82	83	97	107	102
20:00	54	79	82	79	77	63	52	74	69
21:00	56	48	58	72	84	51	37	64	58
22:00	23	19	28	24	64	41	24	32	32
23:00	13	8	8	10	42	49	7	16	20
Total	4560	4143	5135	4240	4384	8117	7884	4492	5495

Job No	N3978	Menu
Client	Seca Solution	
Site	Paterson Road	
Location	between Bolwarra Heights and Flat Road	
Site No	4	
Start Date	5-May-18	
Description	Volume Summary	
Direction	Combined	



Hour	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
Starting	7-May	8-May	9-May	10-May	11-May	5-May	6-May		
AM Peak	1350	1212	1347	1206	1214	1517	1311		
PM Peak	1204	1215	1212	1208	1252	1302	1243	13512	13834
0:00	18	25	28	35	38	46	81	29	39
1:00	10	22	19	24	19	24	52	19	24
2:00	11	14	18	23	19	19	29	17	19
3:00	42	35	28	29	37	24	29	34	32
4:00	113	115	109	117	106	49	35	112	92
5:00	294	319	319	331	265	130	70	306	247
6:00	623	647	654	608	595	267	196	625	513
7:00	936	950	977	954	912	719	468	946	845
8:00	1350	1212	1347	1206	1214	1318	878	1266	1218
9:00	937	918	1144	923	834	1324	1201	951	1040
10:00	778	693	723	760	764	1517	1311	744	935
11:00	803	729	818	731	755	1379	1140	767	908
12:00	800	696	1030	722	734	1302	1145	796	918
13:00	713	682	691	699	777	1266	1188	712	859
14:00	869	813	858	829	960	1253	1229	866	973
15:00	1125	1088	1073	1138	1173	1231	1243	1119	1153
16:00	1155	1215	1160	1208	1252	1163	1201	1198	1193
17:00	1204	1213	1212	1206	1158	1182	873	1199	1150
18:00	761	736	786	798	707	547	518	758	693
19:00	353	445	437	484	352	243	267	414	369
20:00	231	280	318	343	260	188	181	286	257
21:00	174	174	188	228	211	172	125	195	182
22:00	79	75	88	90	183	185	74	103	111
23:00	32	36	39	40	100	178	17	49	63
Total	13411	13132	14064	13526	13425	15726	13551	13512	13834

Job No	N3978	Menu
Client	Seca Solution	
Site	Flat Road/Glenarvon Road/Pitnacree Road	
Location	between Paterson Road and Melbourne Street (East Maitland)	
Site No	5	
Start Date	5-May-18	
Description	Volume Summary	
Direction	Combined	



Hour	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
Starting	7-May	8-May	9-May	10-May	11-May	5-May	6-May		
AM Peak	978	843	899	946	938	1063	807		
PM Peak	943	1032	1080	1008	980	868	854	10566	10398
0:00	6	18	20	22	22	41	72	18	29
1:00	13	9	17	19	27	24	37	17	21
2:00	15	12	12	22	15	11	28	15	16
3:00	20	17	20	16	20	19	10	19	17
4:00	64	64	57	74	56	22	23	63	51
5:00	224	242	227	230	209	84	40	226	179
6:00	476	490	507	523	507	164	96	501	395
7:00	762	826	787	781	759	484	236	783	662
8:00	978	843	899	946	938	844	499	921	850
9:00	620	677	750	661	655	945	720	673	718
10:00	505	516	572	579	600	1063	807	554	663
11:00	545	519	618	530	583	964	720	559	640
12:00	549	516	676	557	581	854	733	576	638
13:00	528	519	521	560	613	868	728	548	620
14:00	609	643	658	737	749	818	780	679	713
15:00	943	899	937	988	962	864	828	946	917
16:00	848	981	979	980	980	820	854	954	920
17:00	875	1032	1080	1008	942	837	630	987	915
18:00	562	595	681	727	603	463	367	634	571
19:00	281	346	351	395	300	236	207	335	302
20:00	166	248	238	312	240	180	163	241	221
21:00	153	163	157	246	201	161	105	184	169
22:00	78	71	87	101	137	245	62	95	112
23:00	28	27	36	29	82	171	25	40	57
Total	9848	10273	10887	11043	10781	11182	8770	10566	10398

Week 3 – Beginning 12<sup>th</sup> May 2018

Job No	N3978	Menu
Client	Seca Solution	
Site	Dungog Road	
Location	between Cory Street and Gresford Road	
Site No	1	
Start Date	12-May-18	
Description	Volume Summary	
Direction	Combined	



Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	14-May	15-May	16-May	17-May	18-May	12-May	13-May		
AM Peak	123	128	176	150	141	121	130		
PM Peak	117	126	137	148	135	93	102	1590	1460
0:00	6	1	3	6	2	5	4	4	4
1:00	7	1	1	3	2	3	6	3	3
2:00	3	1	2	2	0	1	2	2	2
3:00	4	3	8	6	6	5	0	5	5
4:00	4	5	4	7	8	2	5	6	5
5:00	44	27	48	36	42	17	2	39	31
6:00	101	114	129	126	114	49	5	117	91
7:00	117	123	176	120	114	76	21	130	107
8:00	123	128	158	150	141	88	44	140	119
9:00	100	119	119	129	137	107	75	121	112
10:00	100	113	120	112	105	115	94	110	108
11:00	89	99	105	98	100	121	130	98	106
12:00	104	94	131	99	103	93	101	106	104
13:00	81	94	123	79	121	85	74	100	94
14:00	84	106	127	101	135	92	102	111	107
15:00	91	106	114	95	128	79	96	107	101
16:00	117	126	137	148	131	90	101	132	121
17:00	112	107	120	92	116	67	71	109	98
18:00	57	43	57	76	63	43	38	59	54
19:00	19	38	32	39	41	26	28	34	32
20:00	20	22	20	30	22	20	29	23	23
21:00	12	9	22	26	29	15	11	20	18
22:00	3	13	9	15	15	18	6	11	11
23:00	2	4	4	4	9	7	3	5	5
Total	1400	1496	1769	1599	1684	1224	1048	1590	1460

Job No	N3978	Menu
Client	Seca Solution	
Site	Gresford Road	
Location	between Dungog Road and Patterson township (Tocal Road)	
Site No	2	
Start Date	12-May-18	
Description	Volume Summary	
Direction	Combined	



Hour	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
Starting	14-May	15-May	16-May	17-May	18-May	12-May	13-May		
AM Peak	277	297	324	302	324	331	298		
PM Peak	291	300	321	344	315	269	267	3516	3337
0:00	6	10	2	9	4	15	10	6	8
1:00	8	5	7	6	5	6	8	6	6
2:00	8	4	5	6	5	1	8	6	5
3:00	6	4	10	8	7	9	1	7	6
4:00	22	21	25	25	26	8	3	24	19
5:00	85	80	78	74	82	28	10	80	62
6:00	176	173	220	209	179	70	27	191	151
7:00	256	269	308	264	232	149	48	266	218
8:00	277	297	324	302	324	265	115	305	272
9:00	249	236	240	267	271	259	206	253	247
10:00	200	219	245	232	226	331	243	224	242
11:00	213	195	188	229	201	284	298	205	230
12:00	211	204	264	215	233	269	267	225	238
13:00	183	180	213	198	241	239	204	203	208
14:00	211	252	258	252	281	230	231	251	245
15:00	235	276	280	277	315	208	254	277	264
16:00	291	300	321	344	313	261	219	314	293
17:00	259	277	312	253	297	209	193	280	257
18:00	137	168	177	200	186	107	86	174	152
19:00	56	94	79	98	88	54	73	83	77
20:00	55	56	44	73	46	63	46	55	55
21:00	29	37	42	66	61	44	34	47	45
22:00	9	23	23	25	43	38	13	25	25
23:00	8	6	6	16	17	24	10	11	12
Total	3190	3386	3671	3648	3683	3171	2607	3516	3337

Job No	N3978	Menu
Client	Seca Solution	
Site	Tocal Road	
Location	between Patterson township and Bolwarra Heights	
Site No	3	
Start Date	12-May-18	
Description	Volume Summary	
Direction	Combined	



Hour	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
Starting	14-May	15-May	16-May	17-May	18-May	12-May	13-May		
AM Peak	339	335	348	356	342	343	352		
PM Peak	351	342	343	378	395	316	336	4058	3905
0:00	7	6	6	13	5	10	16	7	9
1:00	12	8	4	11	11	17	12	9	11
2:00	5	5	6	10	5	4	5	6	6
3:00	10	5	9	8	12	15	2	9	9
4:00	33	27	29	29	27	20	4	29	24
5:00	88	88	104	101	92	57	13	95	78
6:00	197	219	226	217	223	75	36	216	170
7:00	307	309	335	307	273	161	66	306	251
8:00	339	335	348	356	342	298	137	344	308
9:00	276	250	300	262	295	291	230	277	272
10:00	246	235	229	242	218	343	314	234	261
11:00	242	221	220	252	248	332	352	237	267
12:00	248	227	233	241	280	316	336	246	269
13:00	227	247	238	232	297	306	280	248	261
14:00	262	254	268	273	370	271	288	285	284
15:00	302	316	304	332	346	266	333	320	314
16:00	351	342	343	378	395	277	289	362	339
17:00	310	311	338	328	335	249	231	324	300
18:00	198	186	194	236	234	133	102	210	183
19:00	78	107	107	121	121	81	83	107	100
20:00	70	77	73	80	77	85	68	75	76
21:00	46	62	67	72	85	63	43	66	63
22:00	21	15	26	26	57	58	24	29	32
23:00	12	10	12	23	22	39	13	16	19
Total	3887	3862	4019	4150	4370	3767	3277	4058	3905

Job No	N3978	Menu
Client	Seca Solution	
Site	Paterson Road	
Location	between Bolwarra Heights and Flat Road	
Site No	4	
Start Date	12-May-18	
Description	Volume Summary	
Direction	Combined	



Hour	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
Starting	14-May	15-May	16-May	17-May	18-May	12-May	13-May		
AM Peak	1189	1134	1142	1187	1177	1073	985		
PM Peak	1185	1208	1218	1177	1193	1003	884	13114	12466
0:00	24	22	22	26	26	57	68	24	35
1:00	17	16	22	19	23	39	46	19	26
2:00	18	18	20	26	12	19	28	19	20
3:00	26	28	45	33	33	33	18	33	31
4:00	122	111	105	118	117	58	20	115	93
5:00	285	295	330	303	314	126	50	305	243
6:00	592	642	638	641	604	227	109	623	493
7:00	957	897	968	908	928	469	238	932	766
8:00	1189	1134	1142	1187	1177	887	504	1166	1031
9:00	871	859	868	836	926	988	663	872	859
10:00	711	672	655	754	681	1073	838	695	769
11:00	734	629	677	734	781	1061	985	711	800
12:00	693	672	724	718	778	1003	875	717	780
13:00	685	700	716	637	802	980	759	708	754
14:00	793	789	787	861	973	922	796	841	846
15:00	1081	1126	1106	1134	1153	806	884	1120	1041
16:00	1185	1143	1179	1177	1193	849	782	1175	1073
17:00	1107	1208	1218	1142	1165	824	716	1168	1054
18:00	759	799	766	819	822	528	389	793	697
19:00	375	439	432	457	404	328	261	421	385
20:00	250	305	293	327	313	271	248	298	287
21:00	168	174	187	212	270	237	155	202	200
22:00	73	68	92	90	189	207	79	102	114
23:00	46	34	51	42	103	143	42	55	66
Total	12761	12780	13043	13201	13787	12135	9553	13114	12466

Job No	N3978	Menu
Client	Seca Solution	
Site	Flat Road/Glenarvon Road/Pitnacree Road	
Location	between Paterson Road and Melbourne Street (East Maitland)	
Site No	5	
Start Date	12-May-18	
Description	Volume Summary	
Direction	Combined	



Hour	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
Starting	14-May	15-May	16-May	17-May	18-May	12-May	13-May		
AM Peak	920	837	866	890	889	893	714		
PM Peak	912	1004	965	1032	967	838	745	10314	9816
0:00	18	8	16	19	22	61	49	17	28
1:00	17	11	16	10	10	38	33	13	19
2:00	12	13	12	13	12	23	22	12	15
3:00	15	18	20	18	18	23	11	18	18
4:00	72	65	49	65	76	37	8	65	53
5:00	217	205	247	231	201	74	23	220	171
6:00	457	472	496	480	460	185	81	473	376
7:00	771	765	838	777	786	370	178	787	641
8:00	920	837	866	890	889	627	347	880	768
9:00	635	658	625	624	700	768	544	648	651
10:00	491	545	539	541	533	893	679	530	603
11:00	503	489	564	551	557	880	714	533	608
12:00	527	527	568	565	582	838	745	554	622
13:00	503	518	484	555	584	728	516	529	555
14:00	595	639	684	748	733	703	591	680	670
15:00	910	883	883	911	967	676	686	911	845
16:00	885	1004	956	937	946	670	648	946	864
17:00	912	953	965	1032	965	667	556	965	864
18:00	526	584	647	680	640	448	321	615	549
19:00	289	326	338	404	314	251	246	334	310
20:00	191	231	236	341	273	240	216	254	247
21:00	146	160	181	227	221	205	143	187	183
22:00	79	80	77	102	166	185	70	101	108
23:00	30	32	21	35	85	103	25	41	47
Total	9721	10023	10328	10756	10740	9693	7452	10314	9816

Week beginning 17<sup>th</sup> February 2020. Gresford Road on northern side of Paterson. Martins Creek Quarry non-operational

<b>Job No</b>	N5596	Menu
<b>Client</b>	SECA	
<b>Site</b>	Gresford Road	
<b>Location</b>	North of Church St	
<b>Site No</b>	ATC 1	
<b>Start Date</b>	11-Feb-20	
<b>Description</b>	Volume Summary	
<b>Direction</b>	Combined	



Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon 17-Feb	Tue 11-Feb	Wed 12-Feb	Thu 13-Feb	Fri 14-Feb	Sat 15-Feb	Sun 16-Feb		
AM Peak	274	278	291	282	303	290	284		
PM Peak	253	292	318	297	305	252	266	<b>3307</b>	<b>3156</b>
0:00	3	4	9	7	7	18	13	6	9
1:00	8	4	4	6	4	9	6	5	6
2:00	5	5	6	10	7	11	6	7	7
3:00	4	7	6	6	9	6	5	6	6
4:00	21	22	30	26	15	9	6	23	18
5:00	78	75	82	93	73	28	12	80	63
6:00	153	160	178	172	162	69	26	165	131
7:00	243	267	229	244	220	121	74	241	200
8:00	274	278	291	282	303	201	122	286	250
9:00	224	250	219	239	235	236	182	233	226
10:00	175	192	191	198	223	254	264	196	214
11:00	160	199	169	166	228	290	284	184	214
12:00	169	200	189	196	229	252	266	197	214
13:00	170	206	175	195	243	224	219	198	205
14:00	202	212	217	200	262	212	259	219	223
15:00	251	272	276	297	304	211	223	280	262
16:00	253	292	318	276	305	166	195	289	258
17:00	229	218	270	250	302	189	177	254	234
18:00	153	155	205	180	188	140	114	176	162
19:00	81	83	72	107	115	81	69	92	87
20:00	55	80	63	79	86	61	69	73	70
21:00	31	35	58	63	81	51	31	54	50
22:00	11	25	25	33	64	44	20	32	32
23:00	6	11	7	13	33	27	7	14	15
<b>Total</b>	<b>2959</b>	<b>3252</b>	<b>3289</b>	<b>3338</b>	<b>3698</b>	<b>2910</b>	<b>2649</b>	<b>3307</b>	<b>3156</b>

7-19	2503	2741	2749	2723	3042	2496	2379	2752	2662
6-22	2823	3099	3120	3144	3486	2758	2574	3134	3001
6-24	2840	3135	3152	3190	3583	2829	2601	3180	3047
0-24	2959	3252	3289	3338	3698	2910	2649	3307	3156

## Appendix C – Criteria for interpreting the results of Sidra.

The capacity of an urban road is typically limited by the overall performance of the various intersections. The RMS Guide to Traffic Generating Developments specifies delays and queuing as the key performance measures for assessing the effectiveness of both signalised and unsignalised intersections. Degree of saturation is also recommended for assessing the performance of roundabouts and traffic signals.

A summary of the key criteria for assessing the operation of signalised and unsignalised intersections is provided below.

### Average Delays

The level of service criteria for each intersection type is outlined below.

Level of Service	Average Delay per Vehicle (secs)	Traffic Signals, Roundabouts	Give Way & Stop Signs
A	$d \leq 14.5$	Good operation.	Good operation.
B	$14.5 \leq d \leq 28.5$	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
C	$28.5 \leq d \leq 42.5$	Satisfactory.	Satisfactory, accident study required.
D	$42.5 \leq d \leq 56.5$	Operating near capacity.	Near capacity, accident study required.
E	$56.5 \leq d \leq 70.5$	At capacity; at signals, incidents will cause excessive delays. Roundabout requires other control mode.	At capacity, requires other control mode.
F	$70.5 < d$	Failure.	Failure.

### Degree of Saturation

Degree of Saturation (DoS) is another measure for assessing the performance of an intersection. It is usually calculated based on as the highest ratio of traffic volumes on an approach to its theoretical capacity and is a measure of the utilisation of available green time at traffic signals.

For intersections controlled by traffic signals, both queues and delays increase rapidly as the DoS approaches 1.0, with overflow queuing starting to become a problem at around 0.8-0.85. A satisfactory level of operation is generally achieved when DoS is kept below 0.75.

## Appendix D – Sidra Outputs

## Scenario – No Quarry Trucks

## MOVEMENT SUMMARY

 Site: 101 [Dungog / Gresford AM]

Dungog Site	Road	/	Gresford	Road (None)
Giveway / Yield (Two-Way)		Category:		

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gresford Road												
2	T1	44	7.1	0.062	0.4	LOS A	0.3	1.9	0.22	0.33	0.22	87.8
3	R2	46	4.5	0.062	8.5	LOS A	0.3	1.9	0.22	0.33	0.22	72.0
Approach		91	5.8	0.062	4.6	NA	0.3	1.9	0.22	0.33	0.22	79.0
East: Dungog Road												
4	L2	75	4.2	0.052	7.4	LOS A	0.2	1.5	0.23	0.59	0.23	66.7
6	R2	5	0.0	0.006	8.0	LOS A	0.0	0.1	0.34	0.59	0.34	68.2
Approach		80	3.9	0.052	7.5	LOS A	0.2	1.5	0.23	0.59	0.23	66.8
North: Gresford Road												
7	L2	5	20.0	0.003	8.4	LOS A	0.0	0.0	0.00	0.66	0.00	67.6
8	T1	129	2.4	0.067	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
Approach		135	3.1	0.067	0.3	NA	0.0	0.0	0.00	0.03	0.00	98.1
All Vehicles		305	4.1	0.067	3.5	NA	0.3	1.9	0.13	0.26	0.13	82.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY

▽ Site: 101 [Dungog / Gresford PM]

Dungog Road / Gresford Road  
 Site Category: (None)  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gresford Road												
2	T1	141	3.7	0.134	0.1	LOS A	0.5	3.6	0.12	0.23	0.12	91.5
3	R2	78	2.7	0.134	8.2	LOS A	0.5	3.6	0.12	0.23	0.12	75.3
Approach		219	3.4	0.134	3.0	NA	0.5	3.6	0.12	0.23	0.12	85.0
East: Dungog Road												
4	L2	64	13.1	0.044	7.4	LOS A	0.2	1.4	0.15	0.59	0.15	64.5
6	R2	6	16.7	0.008	9.0	LOS A	0.0	0.2	0.40	0.62	0.40	62.0
Approach		71	13.4	0.044	7.5	LOS A	0.2	1.4	0.17	0.59	0.17	64.2
North: Gresford Road												
7	L2	2	0.0	0.001	7.8	LOS A	0.0	0.0	0.00	0.66	0.00	75.3
8	T1	60	10.5	0.033	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
Approach		62	10.2	0.033	0.3	NA	0.0	0.0	0.00	0.02	0.00	98.9
All Vehicles		352	6.6	0.134	3.4	NA	0.5	3.6	0.11	0.27	0.11	81.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY

 **Site: 101 [Paterson / Tocal AM]**

Paterson Road / Tocal Road  
 Site Category: (None)  
 Stop (Two-Way)

### Movement Performance - Vehicles

Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Paterson Road												
2	T1	159	6.6	0.086	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
3	R2	180	3.5	0.141	6.9	LOS A	0.6	4.7	0.44	0.64	0.44	52.1
Approach		339	5.0	0.141	3.7	NA	0.6	4.7	0.23	0.34	0.23	55.5
East: Paterson Road												
4	L2	383	3.8	0.212	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	54.8
6	R2	6	16.7	0.017	15.6	LOS B	0.1	0.5	0.64	0.92	0.64	46.8
Approach		389	4.1	0.212	5.8	LOS A	0.1	0.5	0.01	0.53	0.01	54.6
North: Tocal Road												
7	L2	14	7.7	0.175	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	57.8
8	T1	320	2.6	0.175	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	59.8
Approach		334	2.8	0.175	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.7
All Vehicles		1062	4.0	0.212	3.4	NA	0.6	4.7	0.08	0.31	0.08	56.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY

 **Site: 101 [Paterson / Tocal PM]**

Paterson Road / Tocal  
 Site Category:  
 Stop (Two-Way) Road (None)

### Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Deg. HV %	Average Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Paterson Road												
2	T1	249	0.8	0.130	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
3	R2	396	2.9	0.275	6.5	LOS A	1.5	10.5	0.39	0.60	0.39	52.3
Approach		645	2.1	0.275	4.0	NA	1.5	10.5	0.24	0.37	0.24	55.0
East: Paterson Road												
4	L2	201	3.1	0.111	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	54.8
6	R2	9	0.0	0.029	17.0	LOS B	0.1	0.7	0.71	0.97	0.71	46.2
Approach		211	3.0	0.111	6.2	LOS A	0.1	0.7	0.03	0.55	0.03	54.4
North: Tocal Road												
7	L2	23	0.0	0.118	5.6	LOS A	0.0	0.0	0.00	0.06	0.00	57.8
8	T1	199	5.3	0.118	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	59.4
Approach		222	4.7	0.118	0.6	NA	0.0	0.0	0.00	0.06	0.00	59.2
All Vehicles		1078	2.8	0.275	3.7	NA	1.5	10.5	0.15	0.34	0.15	55.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY



Site: 101 [Paterson / Flat AM]

Paterson Road / Flat Road  
 Site Category: (None)  
 Roundabout

### Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Deg. Satn HV % v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Flat Road											
21a	L1	38	0.0	0.220	7.6	LOS A	1.4	9.7	0.70	0.79	50.8
6	R2	140	3.0	0.220	12.6	LOS A	1.4	9.7	0.70	0.79	51.0
Approach		178	2.4	0.220	11.5	LOS A	1.4	9.7	0.70	0.79	51.0
NorthEast: Paterson Road											
7	L2	247	4.3	0.589	4.5	LOS A	5.9	42.4	0.35	0.54	52.3
26a	R1	625	2.7	0.589	8.2	LOS A	5.9	42.4	0.35	0.54	53.0
Approach		873	3.1	0.589	7.1	LOS A	5.9	42.4	0.35	0.54	52.8
West: Paterson Road											
10a	L1	229	7.8	0.241	4.6	LOS A	1.6	11.5	0.39	0.51	54.3
12a	R1	59	3.6	0.241	8.4	LOS A	1.6	11.5	0.39	0.51	54.2
Approach		288	6.9	0.241	5.4	LOS A	1.6	11.5	0.39	0.51	54.2
All Vehicles		1339	3.9	0.589	7.3	LOS A	5.9	42.4	0.40	0.57	52.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY



**Site: 101 [Paterson / Flat PM]**

Paterson Site Roundabout	Road  	/	Flat	Road (None)
Category:				

### Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Deg. HV %	Average Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Flat Road												
21a	L1	55	0.0	0.269	5.8	LOS A	1.6	11.3	0.55	0.70	0.55	51.9
6	R2	227	0.0	0.269	10.7	LOS A	1.6	11.3	0.55	0.70	0.55	52.2
Approach		282	0.0	0.269	9.7	LOS A	1.6	11.3	0.55	0.70	0.55	52.1
NorthEast: Paterson Road												
7	L2	169	5.6	0.358	4.3	LOS A	2.7	19.7	0.27	0.55	0.27	52.6
26a	R1	342	4.0	0.358	8.0	LOS A	2.7	19.7	0.27	0.55	0.27	53.3
Approach		512	4.5	0.358	6.8	LOS A	2.7	19.7	0.27	0.55	0.27	53.1
West: Paterson Road												
10a	L1	522	2.8	0.499	5.4	LOS A	4.0	28.7	0.59	0.60	0.59	53.9
12a	R1	60	0.0	0.499	9.3	LOS A	4.0	28.7	0.59	0.60	0.59	53.8
Approach		582	2.5	0.499	5.8	LOS A	4.0	28.7	0.59	0.60	0.59	53.8
All Vehicles		1376	2.8	0.499	7.0	LOS A	4.0	28.7	0.46	0.60	0.46	53.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY

 **Site: 1 [Melbourne / Pitnacree AM]**

Melbourne Street / Pitnacree Road  
 Site Category:  
 Signals - Fixed Time Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)  
 Variable Sequence Analysis applied. The results are given for the selected output sequence.

### Movement Performance - Vehicles

Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lawes Street												
4	L2	214	4.4	0.643	59.2	LOS E	12.7	92.6	0.98	0.83	0.98	23.5
5	T1	102	3.1	0.797	69.3	LOS E	8.6	62.1	1.00	0.90	1.22	24.8
6	R2	25	4.2	0.797	74.8	LOS F	8.6	62.1	1.00	0.90	1.22	21.1
Approach		341	4.0	0.797	63.4	LOS E	12.7	92.6	0.99	0.85	1.07	23.7
East: Melbourne St												
7	L2	13	8.3	0.910	37.5	LOS C	29.6	212.8	0.96	0.97	1.11	32.1
8	T1	727	3.0	0.910	31.8	LOS C	29.6	212.8	0.96	0.97	1.11	33.5
9	R2	101	2.1	0.479	65.2	LOS E	6.2	44.0	0.98	0.78	0.98	25.7
Approach		841	3.0	0.910	35.9	LOS C	29.6	212.8	0.96	0.95	1.10	32.1
North: Pitnacree Rd												
10	L2	98	3.2	0.885	77.4	LOS F	21.0	149.1	1.00	1.08	1.71	24.1
11	T1	211	1.0	0.885	71.8	LOS F	21.0	149.1	1.00	1.08	1.71	24.2
12	R2	255	4.1	0.798	65.7	LOS E	16.6	120.2	1.00	0.89	1.13	25.8
Approach		563	2.8	0.885	70.0	LOS E	21.0	149.1	1.00	1.00	1.45	24.9
West: Melbourne St												
1	L2	114	0.0	0.093	13.8	LOS A	2.5	17.7	0.38	0.67	0.38	45.9
2	T1	472	6.3	0.646	17.9	LOS B	14.0	103.6	0.87	0.76	0.87	41.6
3	R2	88	4.8	0.914	87.0	LOS F	6.6	47.8	1.00	0.98	1.55	18.3
Approach		674	5.0	0.914	26.3	LOS B	14.0	103.6	0.80	0.77	0.88	36.6
All Vehicles		2419	3.7	0.914	45.1	LOS D	29.6	212.8	0.93	0.90	1.11	29.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

### Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P2	South Full Crossing	21	16.6	LOS B	0.0	0.0	0.72	0.72
P3	East Full Crossing	21	56.4	LOS E	0.1	0.1	0.93	0.93
P4	North Full Crossing	21	20.9	LOS C	0.0	0.0	0.80	0.80
P1	West Full Crossing	21	59.2	LOS E	0.1	0.1	0.95	0.95
All Pedestrians		84	38.3	LOS D			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

## MOVEMENT SUMMARY

### Site: 1 [Melbourne / Pitnacree PM]

Melbourne Street / Pitnacree Road  
 Site Category: (None)  
 Signals - Fixed Time Isolated Cycle Time = 180 seconds (Site User-Given Cycle Time)  
 Variable Sequence Analysis applied. The results are given for the selected output sequence.

#### Movement Performance - Vehicles

Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lawes Street												
4	L2	122	7.8	0.278	63.6	LOS E	8.6	63.9	0.85	0.78	0.85	22.5
5	T1	181	1.7	0.858	91.6	LOS F	19.5	138.7	1.00	0.95	1.19	21.0
6	R2	28	3.7	0.858	97.1	LOS F	19.5	138.7	1.00	0.95	1.19	17.6
Approach		332	4.1	0.858	81.7	LOS F	19.5	138.7	0.95	0.89	1.06	21.1
East: Melbourne St												
7	L2	24	4.3	0.712	24.6	LOS B	22.3	161.8	0.79	0.71	0.79	39.0
8	T1	549	4.0	0.712	19.0	LOS B	22.3	161.8	0.79	0.71	0.79	40.7
9	R2	144	1.5	0.883	105.2	LOS F	13.9	98.3	1.00	0.92	1.29	19.2
Approach		718	3.5	0.883	36.5	LOS C	22.3	161.8	0.83	0.75	0.89	32.1
North: Pitnacree Rd												
10	L2	102	3.1	0.823	90.8	LOS F	18.4	131.4	1.00	0.99	1.50	21.7
11	T1	118	1.8	0.823	85.2	LOS F	18.4	131.4	1.00	0.99	1.50	21.7
12	R2	149	9.2	0.643	86.4	LOS F	12.6	95.3	1.00	0.82	1.00	21.9
Approach		369	5.1	0.823	87.2	LOS F	18.4	131.4	1.00	0.92	1.30	21.8
West: Melbourne St												
1	L2	443	1.4	0.353	18.0	LOS B	15.7	111.6	0.45	0.72	0.45	43.2
2	T1	759	3.9	0.884	27.4	LOS B	38.2	276.1	0.93	0.87	0.97	35.7
3	R2	79	5.3	0.496	91.8	LOS F	6.8	49.6	1.00	0.78	1.00	17.6
Approach		1281	3.1	0.884	28.1	LOS B	38.2	276.1	0.77	0.81	0.79	36.2
All Vehicles		2700	3.6	0.884	45.0	LOS D	38.2	276.1	0.84	0.82	0.92	29.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

#### Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	South Full Crossing	21	19.0	LOS B	0.0	0.0	0.64	0.64
P3	East Full Crossing	21	80.3	LOS F	0.1	0.1	0.95	0.95
P4	North Full Crossing	21	21.0	LOS C	0.0	0.0	0.67	0.67
P1	West Full Crossing	21	81.3	LOS F	0.1	0.1	0.95	0.95
All Pedestrians		84	50.4	LOS E			0.80	0.80

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

## MOVEMENT SUMMARY

 **Site: 1 [NEH / Melbourne AM]**

New Site: England Highway / Melbourne Street  
 Category: Street (None)  
 Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)  
 Variable Sequence Analysis applied. The results are given for the selected output sequence.

### Movement Performance - Vehicles

Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: New England Highway												
1	L2	22	0.0	0.976	79.8	LOS F	62.3	450.4	1.00	1.21	1.39	26.7
2	T1	1486	4.0	0.976	74.2	LOS F	62.3	450.4	1.00	1.22	1.39	27.1
3	R2	126	5.0	0.528	67.6	LOS E	3.8	27.7	1.00	0.76	1.00	25.4
Approach		1635	4.0	0.976	73.8	LOS F	62.3	450.4	1.00	1.18	1.36	27.0
East: Melbourne Street												
4	L2	200	6.3	0.338	37.8	LOS C	8.8	64.7	0.80	0.78	0.80	33.6
5	T1	87	1.2	0.956	78.1	LOS F	27.5	196.4	1.00	1.11	1.46	23.0
6	R2	656	2.6	0.956	83.8	LOS F	28.6	205.0	1.00	1.09	1.46	22.6
Approach		943	3.2	0.956	73.6	LOS F	28.6	205.0	0.96	1.02	1.32	24.3
North: New England Highway												
7	L2	421	5.8	0.373	11.4	LOS A	6.6	48.3	0.51	0.73	0.51	47.5
8	T1	1137	6.8	0.773	32.1	LOS C	30.3	224.2	0.90	0.82	0.92	39.4
9	R2	114	4.6	0.949	87.4	LOS F	8.2	59.8	1.00	1.05	1.66	24.3
Approach		1672	6.4	0.949	30.6	LOS C	30.3	224.2	0.81	0.81	0.86	39.1
West: Melbourne Street												
10	L2	242	1.7	0.792	38.1	LOS C	9.6	68.0	1.00	0.88	1.14	36.3
11	T1	101	5.2	0.925	75.1	LOS F	12.1	87.1	1.00	1.06	1.50	23.8
12	R2	72	1.5	0.925	80.7	LOS F	12.1	87.1	1.00	1.06	1.50	26.3
Approach		415	2.5	0.925	54.5	LOS D	12.1	87.1	1.00	0.96	1.29	30.8
All Vehicles		4664	4.6	0.976	56.5	LOS E	62.3	450.4	0.92	1.00	1.17	30.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

### Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	21	54.2	LOS E	0.1	0.1	0.95	0.95
P2	East Full Crossing	21	30.1	LOS D	0.1	0.1	0.71	0.71
P3	North Full Crossing	21	54.2	LOS E	0.1	0.1	0.95	0.95
P4	West Full Crossing	21	29.4	LOS C	0.1	0.1	0.70	0.70
All Pedestrians		84	42.0	LOS E			0.83	0.83

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

## MOVEMENT SUMMARY



**Site: 1 [NEH / Melbourne PM]**

New Site: England Highway / Melbourne Street (None)  
 Category: Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)  
 Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: New England Highway												
1	L2	37	2.9	0.831	44.0	LOS D	35.5	252.9	0.97	0.92	1.03	36.1
2	T1	1155	2.0	0.831	38.0	LOS C	35.5	252.9	0.94	0.90	1.01	37.0
3	R2	336	1.3	0.912	78.5	LOS F	11.5	81.6	1.00	1.01	1.46	23.3
Approach		1527	1.9	0.912	47.0	LOS D	35.5	252.9	0.95	0.92	1.11	33.2
East: Melbourne Street												
4	L2	159	13.2	0.281	37.3	LOS C	6.8	53.2	0.78	0.77	0.78	33.7
5	T1	95	2.2	0.869	61.2	LOS E	19.1	136.3	1.00	0.99	1.25	26.4
6	R2	494	1.9	0.869	66.9	LOS E	19.1	136.3	1.00	0.97	1.25	25.9
Approach		747	4.4	0.869	59.9	LOS E	19.1	136.3	0.95	0.93	1.15	27.3
North: New England Highway												
7	L2	654	1.6	0.610	14.4	LOS A	13.3	94.0	0.70	0.80	0.70	45.5
8	T1	1420	3.1	0.967	70.8	LOS F	57.8	415.4	1.00	1.20	1.37	27.8
9	R2	101	2.1	0.552	63.2	LOS E	5.9	41.8	1.00	0.78	1.00	29.0
Approach		2175	2.6	0.967	53.5	LOS D	57.8	415.4	0.91	1.06	1.15	31.1
West: Melbourne Street												
10	L2	155	2.7	0.392	29.8	LOS C	5.1	36.8	0.90	0.78	0.90	39.5
11	T1	148	0.7	0.915	72.1	LOS F	14.0	99.2	1.00	1.05	1.43	24.6
12	R2	55	3.8	0.915	77.8	LOS F	14.0	99.2	1.00	1.05	1.43	27.0
Approach		358	2.1	0.915	54.7	LOS D	14.0	99.2	0.96	0.94	1.20	30.3
All Vehicles		4807	2.6	0.967	52.5	LOS D	57.8	415.4	0.93	0.99	1.14	31.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	21	54.2	LOS E	0.1	0.1	0.95	0.95
P2	East Full Crossing	21	31.6	LOS D	0.1	0.1	0.73	0.73
P3	North Full Crossing	21	54.2	LOS E	0.1	0.1	0.95	0.95
P4	West Full Crossing	21	30.8	LOS D	0.1	0.1	0.72	0.72
All Pedestrians		84	42.7	LOS E			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

## Scenario – No Quarry Trucks with Background Growth

## MOVEMENT SUMMARY

## ▽ Site: 101 [Dungog / Gresford AM (Background Growth)]

Dungog Road / Gresford Road  
 Site Category: (None)  
 Giveway / Yield (Two-Way)  
 Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles													
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h	
South: Gresford Road													
2	T1	53	7.1	0.075	0.5	LOS A	0.3	2.4	0.25	0.33	0.25	87.6	
3	R2	56	4.5	0.075	8.6	LOS A	0.3	2.4	0.25	0.33	0.25	71.9	
Approach		109	5.8	0.075	4.7	NA	0.3	2.4	0.25	0.33	0.25	78.8	
East: Dungog Road													
4	L2	90	4.2	0.064	7.5	LOS A	0.3	1.9	0.25	0.60	0.25	66.6	
6	R2	6	0.0	0.007	8.2	LOS A	0.0	0.2	0.37	0.60	0.37	68.0	
Approach		96	3.9	0.064	7.6	LOS A	0.3	1.9	0.26	0.60	0.26	66.7	
North: Gresford Road													
7	L2	6	20.0	0.004	8.4	LOS A	0.0	0.0	0.00	0.66	0.00	67.6	
8	T1	155	2.4	0.081	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0	
Approach		162	3.1	0.081	0.3	NA	0.0	0.0	0.00	0.03	0.00	98.1	
All Vehicles		366	4.1	0.081	3.5	NA	0.3	2.4	0.14	0.27	0.14	82.0	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: C:\Sidra folders\P0254 Martins Creek Quarry Route Assessment Jan 2019\P0254 Martins Creek Quarry Scenario 1 (No Quarry Trucks).sip8

## MOVEMENT SUMMARY

▽ Site: 101 [Dungog / Gresford PM (Background Growth)]

Dungog Road / Gresford Road  
 Site Category: Yield  
 Giveway / (None)  
 Design Life Analysis (Final Year): Results for 10 years (Two-Way)

### Movement Performance - Vehicles

Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Gresford Road												
2	T1	169	3.7	0.161	0.2	LOS A	0.6	4.5	0.14	0.23	0.14	91.3
3	R2	93	2.7	0.161	8.2	LOS A	0.6	4.5	0.14	0.23	0.14	75.2
Approach		263	3.4	0.161	3.1	NA	0.6	4.5	0.14	0.23	0.14	84.8
East: Dungog Road												
4	L2	77	13.1	0.054	7.4	LOS A	0.2	1.7	0.17	0.59	0.17	64.4
6	R2	8	16.7	0.011	9.5	LOS A	0.0	0.3	0.44	0.64	0.44	61.5
Approach		85	13.4	0.054	7.6	LOS A	0.2	1.7	0.19	0.59	0.19	64.1
North: Gresford Road												
7	L2	3	0.0	0.001	7.8	LOS A	0.0	0.0	0.00	0.66	0.00	75.3
8	T1	72	10.5	0.039	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
Approach		75	10.2	0.039	0.3	NA	0.0	0.0	0.00	0.02	0.00	98.9
All Vehicles		422	6.6	0.161	3.5	NA	0.6	4.5	0.13	0.27	0.13	81.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: SECA SOLUTION | Processed: Monday, 18 March 2019 5:50:18 PM

Project: C:\Sidra folders\P0254 Martins Creek Quarry Route Assessment Jan 2019\P0254 Martins Creek Quarry Scenario 1 (No Quarry Trucks).sip8

## MOVEMENT SUMMARY



**Site: 101 [Paterson / Tocal AM (Background Growth)]**

Paterson Road / Tocal  
 Site Category:  
 Stop  
 Design Life Analysis (Final Year): Results for 10 years  
 Road (None)  
 (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Paterson Road												
2	T1	191	6.6	0.103	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
3	R2	216	3.5	0.183	7.3	LOS A	0.8	6.1	0.49	0.68	0.49	51.9
Approach		407	5.0	0.183	3.9	NA	0.8	6.1	0.26	0.36	0.26	55.4
East: Paterson Road												
4	L2	460	3.8	0.254	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	54.8
6	R2	8	16.7	0.026	18.6	LOS B	0.1	0.7	0.72	0.98	0.72	45.1
Approach		467	4.1	0.254	5.9	LOS A	0.1	0.7	0.01	0.53	0.01	54.6
North: Tocal Road												
7	L2	16	7.7	0.210	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	57.7
8	T1	384	2.6	0.210	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	59.7
Approach		400	2.8	0.210	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.7
All Vehicles		1275	4.0	0.254	3.5	NA	0.8	6.1	0.09	0.32	0.09	56.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY

 **Site: 101 [Paterson / Tocal PM (Background Growth)]**

Paterson Road / Tocal  
 Site Category:  
 Stop  
 Design Life Analysis (Final Year): Results for 10 years  
 Road (None) (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Paterson Road												
2	T1	299	0.8	0.155	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
3	R2	475	2.9	0.346	6.8	LOS A	1.9	13.7	0.45	0.64	0.45	52.1
Approach		774	2.1	0.346	4.2	NA	1.9	13.7	0.28	0.39	0.28	54.9
East: Paterson Road												
4	L2	241	3.1	0.133	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	54.8
6	R2	11	0.0	0.048	21.4	LOS B	0.2	1.1	0.79	1.00	0.79	43.9
Approach		253	3.0	0.133	6.4	LOS A	0.2	1.1	0.04	0.55	0.04	54.2
North: Tocal Road												
7	L2	28	0.0	0.142	5.6	LOS A	0.0	0.0	0.00	0.06	0.00	57.8
8	T1	239	5.3	0.142	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	59.4
Approach		267	4.7	0.142	0.6	NA	0.0	0.0	0.00	0.06	0.00	59.2
All Vehicles		1293	2.8	0.346	3.9	NA	1.9	13.7	0.17	0.35	0.17	55.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY



**Site: 101 [Paterson / Flat AM (Background Growth)]**

Paterson Road / Flat Road  
 Site Category: (None)  
 Roundabout  
 Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Flat Road												
21a	L1	45	0.0	0.310	9.0	LOS A	2.1	15.1	0.82	0.87	0.82	49.9
6	R2	168	3.0	0.310	14.0	LOS A	2.1	15.1	0.82	0.87	0.82	50.0
Approach		213	2.4	0.310	13.0	LOS A	2.1	15.1	0.82	0.87	0.82	50.0
NorthEast: Paterson Road												
7	L2	297	4.3	0.717	4.8	LOS A	9.3	66.9	0.49	0.54	0.49	51.9
26a	R1	750	2.7	0.717	8.5	LOS A	9.3	66.9	0.49	0.54	0.49	52.6
Approach		1047	3.1	0.717	7.4	LOS A	9.3	66.9	0.49	0.54	0.49	52.4
West: Paterson Road												
10a	L1	275	7.8	0.299	4.9	LOS A	2.1	15.3	0.46	0.54	0.46	54.0
12a	R1	71	3.6	0.299	8.7	LOS A	2.1	15.3	0.46	0.54	0.46	53.9
Approach		346	6.9	0.299	5.6	LOS A	2.1	15.3	0.46	0.54	0.46	54.0
All Vehicles		1607	3.9	0.717	7.8	LOS A	9.3	66.9	0.53	0.58	0.53	52.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY



**Site: 101 [Paterson / Flat PM (Background Growth)]**

Paterson Road / Flat Road  
 Site Category: Road (None)  
 Roundabout

Design Life Analysis (Final Year): Results for 10 years

### Movement Performance - Vehicles

Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Flat Road												
21a	L1	66	0.0	0.344	6.4	LOS A	2.2	15.6	0.63	0.75	0.63	51.5
6	R2	273	0.0	0.344	11.3	LOS A	2.2	15.6	0.63	0.75	0.63	51.8
Approach		339	0.0	0.344	10.3	LOS A	2.2	15.6	0.63	0.75	0.63	51.8
NorthEast: Paterson Road												
7	L2	203	5.6	0.437	4.4	LOS A	3.8	27.3	0.34	0.55	0.34	52.4
26a	R1	411	4.0	0.437	8.1	LOS A	3.8	27.3	0.34	0.55	0.34	53.1
Approach		614	4.5	0.437	6.9	LOS A	3.8	27.3	0.34	0.55	0.34	52.9
West: Paterson Road												
10a	L1	627	2.8	0.628	6.5	LOS A	6.2	44.7	0.74	0.69	0.77	53.3
12a	R1	72	0.0	0.628	10.3	LOS A	6.2	44.7	0.74	0.69	0.77	53.2
Approach		699	2.5	0.628	6.9	LOS A	6.2	44.7	0.74	0.69	0.77	53.2
All Vehicles		1651	2.8	0.628	7.6	LOS A	6.2	44.7	0.57	0.65	0.58	52.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY

 **Site: 1 [Melbourne / Pitnacree AM (Background Growth)]**

Melbourne Street / Pitnacree Road  
 Site Category:  
 Signals - Fixed Time Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)  
 Variable Sequence Analysis applied. The results are given for the selected output sequence.  
 Design Life Analysis (Final Year): Results for 10 years

### Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Deg. Satn HV %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lawes Street											
4	L2	256	4.4 0.772	63.5	LOS E <sup>11</sup>	16.3	118.6	1.00	0.88	1.09	22.5
5	T1	123	3.1 1.052	135.4	LOS F <sup>11</sup>	15.2	109.4	1.00	1.25	1.95	15.7
6	R2	30	4.2 1.052	141.0	LOS F <sup>11</sup>	15.2	109.4	1.00	1.25	1.95	13.0
Approach		409	4.0 1.052	90.8	LOS F <sup>11</sup>	16.3	118.6	1.00	1.02	1.41	18.7
East: Melbourne St											
7	L2	15	8.3 1.092	141.6	LOS F <sup>11</sup>	79.8	573.7	1.00	1.53	1.86	11.9
8	T1	873	3.0 1.092	136.0	LOS F <sup>11</sup>	79.8	573.7	1.00	1.53	1.86	12.3
9	R2	121	2.1 0.453	61.3	LOS E <sup>11</sup>	7.2	51.1	0.96	0.79	0.96	26.6
Approach		1009	3.0 1.092	127.1	LOS F <sup>11</sup>	79.8	573.7	1.00	1.44	1.75	13.3
North: Pitnacree Rd											
10	L2	117	3.2 1.062	119.8	LOS F <sup>11</sup>	29.2	207.4	1.00	1.23	1.85	14.8
11	T1	253	1.0 1.062	114.2	LOS F <sup>11</sup>	29.2	207.4	1.00	1.23	1.85	14.6
12	R2	306	4.1 0.958	91.4	LOS F <sup>11</sup>	24.7	179.4	1.00	1.04	1.47	21.2
Approach		676	2.8 1.062	104.9	LOS F <sup>11</sup>	29.2	207.4	1.00	1.15	1.68	17.1
West: Melbourne St											
1	L2	136	0.0 0.115	15.1	LOS B	3.3	23.0	0.41	0.68	0.41	45.0
2	T1	566	6.3 0.874	30.3	LOS C	23.3	171.9	0.97	0.94	1.10	34.3
3	R2	106	4.8 0.960	96.1	LOS F <sup>11</sup>	8.4	61.0	1.00	1.04	1.67	17.1
Approach		808	5.0 0.960	36.4	LOS C	23.3	171.9	0.88	0.91	1.06	31.9
All Vehicles		2903	3.7 1.092	91.5	LOS F <sup>11</sup>	79.8	573.7	0.96	1.16	1.49	17.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

<sup>11</sup> Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

### Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	South Full Crossing	25	16.7	LOS B	0.0	0.0	0.72	0.72
P3	East Full Crossing	25	56.4	LOS E <sup>12</sup>	0.1	0.1	0.93	0.93
P4	North Full Crossing	25	23.6	LOS C	0.0	0.0	0.85	0.85
P1	West Full Crossing	25	59.2	LOS E <sup>12</sup>	0.1	0.1	0.95	0.95
All Pedestrians		101	38.9	LOS D			0.86	0.86

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

<sup>12</sup> Level of Service is worse than the Pedestrian Level of Service Target specified in the Parameter Settings dialog.

## MOVEMENT SUMMARY

### Site: 1 [Melbourne / Pitnacree PM (Background Growth)]

Melbourne Site Street / Pitnacree Road  
 Category: (None)  
 Signals - Fixed Time Isolated Cycle Time = 180 seconds (Site User-Given Cycle Time)  
 Variable Sequence Analysis applied. The results are given for the selected output sequence.  
 Design Life Analysis (Final Year): Results for 10 years

#### Movement Performance - Vehicles

Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lawes Street												
4	L2	147	7.8	0.306	60.9	LOS E <sup>11</sup>	10.1	75.4	0.84	0.79	0.84	23.1
5	T1	217	1.7	1.034	149.5	LOS F <sup>11</sup>	30.9	219.8	1.00	1.23	1.60	14.7
6	R2	34	3.7	1.034	155.0	LOS F <sup>11</sup>	30.9	219.8	1.00	1.23	1.60	12.1
Approach		398	4.1	1.034	117.3	LOS F <sup>11</sup>	30.9	219.8	0.94	1.07	1.32	16.3
East: Melbourne St												
7	L2	29	4.3	0.897	38.2	LOS C	36.9	267.5	0.90	0.87	0.98	31.8
8	T1	659	4.0	0.897	32.6	LOS C	36.9	267.5	0.90	0.87	0.98	33.1
9	R2	173	1.5	1.047	166.2	LOS F <sup>11</sup>	21.8	154.8	1.00	1.08	1.70	13.6
Approach		861	3.5	1.047	59.6	LOS E <sup>11</sup>	36.9	267.5	0.92	0.91	1.12	24.6
North: Pitnacree Rd												
10	L2	123	3.1	1.028	114.9	LOS F <sup>11</sup>	23.0	164.0	1.00	1.10	1.57	14.5
11	T1	141	1.8	1.028	109.4	LOS F <sup>11</sup>	23.0	164.0	1.00	1.10	1.57	14.4
12	R2	179	9.2	0.805	93.7	LOS F <sup>11</sup>	16.2	122.4	1.00	0.88	1.13	20.8
Approach		443	5.1	1.028	104.6	LOS F <sup>11</sup>	23.0	164.0	1.00	1.01	1.39	16.5
West: Melbourne St												
1	L2	532	1.4	0.438	20.8	LOS B	21.6	153.2	0.52	0.75	0.52	41.6
2	T1	911	3.9	1.097	150.1	LOS F <sup>11</sup>	106.2	768.1	1.00	1.40	1.64	11.2
3	R2	95	5.3	0.502	89.0	LOS F <sup>11</sup>	8.0	58.6	0.99	0.79	0.99	18.0
Approach		1537	3.1	1.097	101.6	LOS F <sup>11</sup>	106.2	768.1	0.83	1.14	1.21	16.3
All Vehicles		3240	3.6	1.097	92.8	LOS F <sup>11</sup>	106.2	768.1	0.89	1.05	1.23	17.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

<sup>11</sup> Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

#### Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian Distance ped m	Prop. Queued	Effective Stop Rate
P2	South Full Crossing	25	20.3	LOS C	0.1	0.1	0.66
P3	East Full Crossing	25	81.3	LOS F <sup>12</sup>	0.1	0.1	0.95
P4	North Full Crossing	25	22.3	LOS C	0.1	0.1	0.69
P1	West Full Crossing	25	80.4	LOS F <sup>12</sup>	0.1	0.1	0.95
All Pedestrians		101	51.1	LOS E <sup>12</sup>		0.81	0.81

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

<sup>12</sup> Level of Service is worse than the Pedestrian Level of Service Target specified in the Parameter Settings dialog.

## MOVEMENT SUMMARY

### Site: 1 [NEH / Melbourne AM (Background Growth)]

New Site: England Highway / Melbourne Street  
Category: Street (None)  
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)  
Variable Sequence Analysis applied. The results are given for the selected output sequence.  
Design Life Analysis (Final Year): Results for 10 years

#### Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Deg. HV %	Average Delay sec	Level of Service	95% Back of Queue Vehicles	Prop. Queue Distance m	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: New England Highway										
1	L2	27	0.0 1.171	220.0	LOS F <sup>11</sup>	124.7	901.7	1.00	1.96	2.33
2	T1	1784	4.0 1.171	214.8	LOS F <sup>11</sup>	124.7	901.7	1.00	1.97	2.33
3	R2	152	5.0 0.634	68.7	LOS E <sup>11</sup>	4.6	33.9	1.00	0.80	1.08
Approach		1962	4.0 1.171	203.6	LOS F <sup>11</sup>	124.7	901.7	1.00	1.88	2.24
East: Melbourne Street										
4	L2	240	6.3 0.405	38.7	LOS C	10.8	79.7	0.82	0.80	0.82
5	T1	105	1.2 1.155	207.4	LOS F <sup>11</sup>	55.3	394.7	1.00	1.59	2.34
6	R2	787	2.6 1.155	212.8	LOS F <sup>11</sup>	57.9	414.2	1.00	1.52	2.34
Approach		1132	3.2 1.155	175.4	LOS F <sup>11</sup>	57.9	414.2	0.96	1.38	2.02
North: New England Highway										
7	L2	505	5.8 0.447	11.8	LOS A	8.4	61.9	0.55	0.74	0.55
8	T1	1364	6.8 0.928	54.9	LOS D <sup>11</sup>	50.0	370.4	0.98	1.08	1.22
9	R2	136	4.6 1.138	200.8	LOS F <sup>11</sup>	16.2	118.1	1.00	1.37	2.42
Approach		2006	6.4 1.138	53.9	LOS D <sup>11</sup>	50.0	370.4	0.87	1.02	1.14
West: Melbourne Street										
10	L2	291	1.7 0.950	59.5	LOS E <sup>11</sup>	15.3	108.7	1.00	1.03	1.49
11	T1	121	5.2 1.110	173.0	LOS F <sup>11</sup>	23.1	166.9	1.00	1.44	2.23
12	R2	86	1.5 1.110	178.6	LOS F <sup>11</sup>	23.1	166.9	1.00	1.44	2.23
Approach		498	2.5 1.110	107.7	LOS F <sup>11</sup>	23.1	166.9	1.00	1.20	1.80
All Vehicles		5597	4.6 1.171	135.7	LOS F <sup>11</sup>	124.7	901.7	0.95	1.41	1.76

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

<sup>11</sup> Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

#### Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian Distance ped	Prop. Queue Distance m	Effective Stop Rate
P1	South Full Crossing	25	54.2	LOS E <sup>12</sup>	0.1	0.1	0.95
P2	East Full Crossing	25	30.1	LOS D	0.1	0.1	0.71
P3	North Full Crossing	25	54.2	LOS E <sup>12</sup>	0.1	0.1	0.95
P4	West Full Crossing	25	29.4	LOS C	0.1	0.1	0.70
All Pedestrians		101	42.0	LOS E <sup>12</sup>			0.83

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

<sup>12</sup> Level of Service is worse than the Pedestrian Level of Service Target specified in the Parameter Settings dialog.

## MOVEMENT SUMMARY

### Site: 1 [NEH / Melbourne PM (Background Growth)]

New Site: England Highway / Melbourne Street  
 Category: Street (None)  
 Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)  
 Variable Sequence Analysis applied. The results are given for the selected output sequence.  
 Design Life Analysis (Final Year): Results for 10 years

#### Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Deg. HV %	Average Delay sec	Level of Service	95% Back of Queue Vehicles	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: New England Highway										
1	L2	44	2.9 0.998	92.6	LOS F <sup>11</sup>	66.2	1.00	1.28	1.48	24.4
2	T1	1386	2.0 0.998	87.0	LOS F <sup>11</sup>	66.2	0.99	1.29	1.49	24.7
3	R2	403	1.3 1.095	166.7	LOS F <sup>11</sup>	21.6	1.00	1.32	2.17	13.6
Approach		1833	1.9 1.095	104.7	LOS F <sup>11</sup>	66.2	1.00	1.30	1.64	21.4
East: Melbourne Street										
4	L2	191	13.2 0.337	38.0	LOS C	8.4	0.80	0.78	0.80	33.5
5	T1	114	2.2 1.045	125.6	LOS F <sup>11</sup>	34.1	1.00	1.34	1.85	16.8
6	R2	592	1.9 1.045	131.3	LOS F <sup>11</sup>	34.1	1.00	1.28	1.85	16.6
Approach		897	4.4 1.045	110.8	LOS F <sup>11</sup>	34.1	0.96	1.18	1.63	18.6
North: New England Highway										
7	L2	784	1.6 0.732	15.5	LOS B	17.9	0.78	0.83	0.78	44.8
8	T1	1704	3.1 1.160	206.4	LOS F <sup>11</sup>	116.4	1.00	1.94	2.29	13.5
9	R2	121	2.1 0.663	64.8	LOS E <sup>11</sup>	7.2	1.00	0.82	1.07	28.7
Approach		2610	2.6 1.160	142.4	LOS F <sup>11</sup>	116.4	0.94	1.55	1.78	17.0
West: Melbourne Street										
10	L2	186	2.7 0.470	30.3	LOS C	6.3	0.92	0.80	0.92	39.3
11	T1	178	0.7 1.098	163.3	LOS F <sup>11</sup>	26.4	1.00	1.45	2.15	13.9
12	R2	66	3.8 1.098	168.9	LOS F <sup>11</sup>	26.4	1.00	1.45	2.15	15.8
Approach		429	2.1 1.098	106.7	LOS F <sup>11</sup>	26.4	0.96	1.17	1.62	20.4
All Vehicles		5769	2.6 1.160	122.9	LOS F <sup>11</sup>	116.4	0.96	1.38	1.70	18.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

<sup>11</sup> Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

#### Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian Distance ped m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	25	54.2	LOS E <sup>12</sup>	0.1	0.1	0.95
P2	East Full Crossing	25	31.6	LOS D	0.1	0.1	0.73
P3	North Full Crossing	25	54.2	LOS E <sup>12</sup>	0.1	0.1	0.95
P4	West Full Crossing	25	30.8	LOS D	0.1	0.1	0.72
All Pedestrians		101	42.7	LOS E <sup>12</sup>			0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

<sup>12</sup> Level of Service is worse than the Pedestrian Level of Service Target specified in the Parameter Settings dialog.

2030 traffic flows with 20 inbound and outbound trucks per hour (Revised Project)

## MOVEMENT SUMMARY

**Site: 101 [Dungog / Gresford AM (Site Folder: General)]**

Dungog Road / Gresford Road  
Revised project 20 trucks per hour  
Site Category: (None)  
Give-Way (Two-Way)

### Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service		95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total	HV ]	[ Total	HV ]					[ Veh.	Dist ]				
		veh/h	veh/h	veh/h	%	v/c	sec			veh	m				km/h
South: Gresford Road															
2	T1	42	3	44	7.1	0.091	0.7	LOS A		0.4	3.5	0.26	0.37	0.26	87.4
3	R2	64	22	67	34.4	0.091	9.5	LOS A		0.4	3.5	0.26	0.37	0.26	61.2
Approach		106	25	112	23.6	0.091	6.0	NA		0.4	3.5	0.26	0.37	0.26	69.4
East: Dungog Road															
4	L2	91	23	96	25.3	0.075	7.9	LOS A		0.3	2.6	0.24	0.59	0.24	60.8
6	R2	5	0	5	0.0	0.006	8.1	LOS A		0.0	0.2	0.36	0.60	0.36	68.1
Approach		96	23	101	24.0	0.075	7.9	LOS A		0.3	2.6	0.25	0.59	0.25	61.1
North: Gresford Road															
7	L2	5	1	5	20.0	0.003		8.4	LOS A	0.0	0.0	0.00	0.66	0.00	67.6
8	T1	123	3	129	2.4	0.067		0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
Approach		128	4	135	3.1	0.067		0.3	NA	0.0	0.0	0.00	0.03	0.00	98.1
All Vehicles		330	52	347	15.8	0.091		4.4	NA	0.4	3.5	0.16	0.30	0.16	75.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY

▽ Site: 101 [Dungog / Gresford PM (Site Folder: General)]

Dungog Road / Gresford Road  
Revised project 20 trucks per hour  
Site Category: (None)  
Give-Way (Two-Way)

### Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
		veh/h	veh/h	veh/h	%	v/c	sec		veh	m				km/h
South: Gresford Road														
2	T1	134	5	141	3.7	0.162	0.2	LOS A	0.7	5.5	0.15	0.26	0.15	91.2
3	R2	94	22	99	23.4	0.162	8.8	LOS A	0.7	5.5	0.15	0.26	0.15	66.7
Approach		228	27	240	11.8	0.162	3.8	NA	0.7	5.5	0.15	0.26	0.15	79.2
East: Dungog Road														
4	L2	81	28	85	34.6	0.065	7.8	LOS A	0.3	2.4	0.16	0.59	0.16	58.8
6	R2	6	1	6	16.7	0.009	9.2	LOS A	0.0	0.3	0.42	0.63	0.42	61.7
Approach		87	29	92	33.3	0.065	7.9	LOS A	0.3	2.4	0.18	0.59	0.18	59.0
North: Gresford Road														
7	L2	2	0	2	0.0	0.001	7.8	LOS A	0.0	0.0	0.00	0.66	0.00	75.3
8	T1	57	6	60	10.5	0.033	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
Approach		59	6	62	10.2	0.033	0.3	NA	0.0	0.0	0.00	0.02	0.00	98.9
All Vehicles		374	62	394	16.6	0.162	4.2	NA	0.7	5.5	0.13	0.30	0.13	75.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Revised project 20 trucks.sip9

## MOVEMENT SUMMARY

 **Site: 101 [Paterson / Tocal AM (Site Folder: General)]**

Paterson Road / Tocal Road  
 Revised project 20 trucks per hour  
 Site Category: (None)  
 Stop (Two-Way)

### Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
		veh/h	veh/h	veh/h	%	v/c	sec		veh	m				km/h
South: Paterson Road														
2	T1	171	30	180	17.5	0.103	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	171	6	180	3.5	0.146	7.1	LOS A	0.7	4.8	0.46	0.65	0.46	52.0
Approach		342	36	360	10.5	0.146	3.5	NA	0.7	4.8	0.23	0.33	0.23	55.7
East: Paterson Road														
4	L2	364	14	383	3.8	0.212	6.5	LOS A	0.0	0.0	0.00	0.53	0.00	54.7
6	R2	6	1	6	16.7	0.019	16.9	LOS B	0.1	0.5	0.67	0.94	0.67	46.1
Approach		370	15	389	4.1	0.212	6.7	LOS A	0.1	0.5	0.01	0.53	0.01	54.6
North: Tocal Road														
7	L2	13	1	14	7.7	0.192	5.7	LOS A	0.0	0.0	0.00	0.02	0.00	57.7
8	T1	324	28	341	8.6	0.192	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.7
Approach		337	29	355	8.6	0.192	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.6
All Vehicles		1049	80	1104	7.6	0.212	3.6	NA	0.7	4.8	0.08	0.30	0.08	56.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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 Revised project 20 trucks.sip9

## MOVEMENT SUMMARY

 **Site: 101 [Paterson / Tocal PM (Site Folder: General)]**

Paterson Road / Tocal Road  
 Revised project 20 trucks per hour  
 Site Category: (None)  
 Stop (Two-Way)

### Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
		veh/h	veh/h	veh/h	%	v/c	sec		veh	m				km/h
South: Paterson Road														
2	T1	257	22	271	8.6	0.148	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	376	11	396	2.9	0.284	6.7	LOS A	1.5	10.7	0.42	0.62	0.42	52.2
Approach		633	33	666	5.2	0.284	4.0	NA	1.5	10.7	0.25	0.37	0.25	55.1
East: Paterson Road														
4	L2	191	6	201	3.1	0.111	6.1	LOS A	0.0	0.0	0.00	0.53	0.00	54.8
6	R2	9	0	9	0.0	0.032	18.2	LOS B	0.1	0.8	0.74	0.99	0.74	45.5
Approach		200	6	211	3.0	0.111	6.7	LOS A	0.1	0.8	0.03	0.55	0.03	54.3
North: Tocal Road														
7	L2	22	0	23	0.0	0.136	5.6	LOS A	0.0	0.0	0.00	0.06	0.00	57.8
8	T1	209	30	220	14.4	0.136	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	59.3
Approach		231	30	243	13.0	0.136	0.6	NA	0.0	0.0	0.00	0.06	0.00	59.2
All Vehicles		1064	69	1120	6.5	0.284	3.7	NA	1.5	10.7	0.16	0.33	0.16	55.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY

 **Site: 101 [Paterson / Flat AM (Site Folder: General)]**

Paterson Road / Flat Road  
Revised project 20 trucks per hour  
Site Category: (None)  
Roundabout

### Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
		veh/h	veh/h	veh/h	%	v/c	sec		veh	m				km/h
SouthEast: Flat Road														
21a	L1	36	0	38	0.0	0.265	7.7	LOS A	1.6	12.7	0.72	0.82	0.72	50.5
6	R2	153	24	161	15.7	0.265	13.2	LOS A	1.6	12.7	0.72	0.82	0.72	50.2
Approach		189	24	199	12.7	0.265	12.2	LOS A	1.6	12.7	0.72	0.82	0.72	50.3
NorthEast: Paterson Road														
7	L2	255	30	268	11.8	0.610	4.6	LOS A	6.4	47.0	0.36	0.54	0.36	52.0
26a	R1	594	16	625	2.7	0.610	8.2	LOS A	6.4	47.0	0.36	0.54	0.36	52.9
Approach		849	46	894	5.4	0.610	7.1	LOS A	6.4	47.0	0.36	0.54	0.36	52.7
West: Paterson Road														
10a	L1	218	17	229	7.8	0.251	4.8	LOS A	1.6	12.1	0.43	0.53	0.43	54.1
12a	R1	56	2	59	3.6	0.251	8.6	LOS A	1.6	12.1	0.43	0.53	0.43	54.0
Approach		274	19	288	6.9	0.251	5.6	LOS A	1.6	12.1	0.43	0.53	0.43	54.1
All Vehicles		1312	89	1381	6.8	0.610	7.5	LOS A	6.4	47.0	0.43	0.58	0.43	52.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY

 **Site: 101 [Paterson / Flat PM (Site Folder: General)]**

Paterson Road / Flat Road  
Revised project 20 trucks per hour  
Site Category: (None)  
Roundabout

### Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
		veh/h	veh/h	veh/h	%	v/c	sec		veh	m				km/h
SouthEast: Flat Road														
21a	L1	52	0	55	0.0	0.304	5.8	LOS A	1.8	13.7	0.57	0.71	0.57	51.8
6	R2	236	20	248	8.5	0.304	11.0	LOS A	1.8	13.7	0.57	0.71	0.57	51.8
Approach		288	20	303	6.9	0.304	10.1	LOS A	1.8	13.7	0.57	0.71	0.57	51.8
NorthEast: Paterson Road														
7	L2	181	29	191	16.0	0.381	4.5	LOS A	3.0	22.3	0.28	0.55	0.28	52.3
26a	R1	325	13	342	4.0	0.381	8.0	LOS A	3.0	22.3	0.28	0.55	0.28	53.3
Approach		506	42	533	8.3	0.381	6.8	LOS A	3.0	22.3	0.28	0.55	0.28	52.9
West: Paterson Road														
10a	L1	496	14	522	2.8	0.521	5.7	LOS A	4.2	30.0	0.64	0.63	0.64	53.7
12a	R1	57	0	60	0.0	0.521	9.5	LOS A	4.2	30.0	0.64	0.63	0.64	53.6
Approach		553	14	582	2.5	0.521	6.1	LOS A	4.2	30.0	0.64	0.63	0.64	53.7
All Vehicles		1347	76	1418	5.6	0.521	7.2	LOS A	4.2	30.0	0.49	0.62	0.49	53.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## MOVEMENT SUMMARY

**Site: 1 [Melbourne / Pitnacree AM (Site Folder: General)]**

Melbourne Street / Pitnacree Road

Revised project 20 trucks per hour

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
		veh/h	veh/h	veh/h	%	v/c	sec		veh	m				km/h
South: Lawes Street														
4	L2	203	9	214	4.4	0.643	59.2	LOS E	12.7	92.6	0.98	0.83	0.98	23.5
5	T1	97	3	102	3.1	0.797	69.3	LOS E	8.6	62.1	1.00	0.90	1.22	24.8
6	R2	24	1	25	4.2	0.797	74.8	LOS F	8.6	62.1	1.00	0.90	1.22	21.1
Approach		324	13	341	4.0	0.797	63.4	LOS E	12.7	92.6	0.99	0.85	1.07	23.7
East: Melbourne St														
7	L2	12	1	13	8.3	0.910*	37.5	LOS C	29.6	212.5	0.95	0.97	1.11	32.1
8	T1	691	21	727	3.0	0.910*	31.8	LOS C	29.6	212.5	0.95	0.97	1.11	33.5
9	R2	96	2	101	2.1	0.513	66.5	LOS E	6.3	44.6	0.99	0.78	0.99	25.5
Approach		799	24	841	3.0	0.910	36.1	LOS C	29.6	212.5	0.96	0.95	1.10	32.0
North: Pitnacree Rd														
10	L2	93	3	98	3.2	0.885	77.6	LOS F	21.0	149.1	1.00	1.09	1.26	24.1
11	T1	200	2	211	1.0	0.885*	72.0	LOS F	21.0	149.1	1.00	1.09	1.26	24.1
12	R2	262	30	276	11.5	0.908	78.6	LOS F	20.4	156.6	1.00	0.99	1.34	23.2
Approach		555	35	584	6.3	0.908	76.1	LOS F	21.0	156.6	1.00	1.04	1.29	23.7
West: Melbourne St														
1	L2	128	20	135	15.6	0.120	13.8	LOS A	3.0	23.8	0.38	0.67	0.38	45.5
2	T1	448	28	472	6.3	0.629	17.4	LOS B	13.7	101.2	0.86	0.75	0.86	41.9
3	R2	84	4	88	4.8	0.914*	87.0	LOS F	6.6	47.8	1.00	0.98	1.55	18.3
Approach		660	52	695	7.9	0.914	25.6	LOS B	13.7	101.2	0.78	0.76	0.85	37.0
All Vehicles		2338	124	2461	5.3	0.914	46.4	LOS D	29.6	212.5	0.92	0.90	1.07	28.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Critical Movement (Signal Timing)

\*

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ped	Dist ] m			sec	m	m/sec
South: Lawes Street												
P2	Full	20	21	16.6	LOS B	0.0	0.0	0.72	0.72	44.3	36.0	0.81
East: Melbourne St												
P3	Full	20	21	56.4	LOS E	0.1	0.1	0.93	0.93	87.4	40.4	0.46
North: Pitnacree Rd												
P4	Full	20	21	20.5	LOS C	0.0	0.0	0.79	0.79	51.5	40.4	0.78
West: Melbourne St												
P1	Full	20	21	59.2	LOS E	0.1	0.1	0.95	0.95	90.3	40.4	0.45
All Pedestrians		80	84	38.2	LOS D	0.1	0.1	0.85	0.85	68.4	39.3	0.57

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Revised project 20 trucks.sip9

## MOVEMENT SUMMARY

### Site: 1 [Melbourne / Pitnacree PM (Site Folder: General)]

Melbourne Street / Pitnacree Road

Revised project 20 trucks per hour

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 180 seconds (Site User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

#### Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
		veh/h	veh/h	veh/h	%	v/c	sec		veh	m				km/h
South: Lawes Street														
4	L2	116	9	122	7.8	0.255	60.1	LOS E	8.3	61.8	0.83	0.77	0.83	23.3
5	T1	172	3	181	1.7	0.897	97.4	LOS F	20.2	144.0	1.00	1.00	1.26	20.1
6	R2	27	1	28	3.7	0.897	102.9	LOS F	20.2	144.0	1.00	1.00	1.26	16.9
Approach		315	13	332	4.1	0.897	84.1	LOS F	20.2	144.0	0.94	0.92	1.10	20.7
East: Melbourne St														
7	L2	23	1	24	4.3	0.719*	26.3	LOS B	23.9	173.1	0.82	0.73	0.82	37.9
8	T1	522	21	549	4.0	0.719	20.7	LOS B	23.9	173.1	0.82	0.73	0.82	39.5
9	R2	137	2	144	1.5	0.673	89.3	LOS F	12.4	87.9	1.00	0.82	1.02	21.4
Approach		682	24	718	3.5	0.719	34.7	LOS C	23.9	173.1	0.85	0.75	0.86	32.8
North: Pitnacree Rd														
10	L2	97	3	102	3.1	0.856*	93.3	LOS F	18.9	135.3	1.00	1.01	1.18	21.3
11	T1	112	2	118	1.8	0.856*	87.8	LOS F	18.9	135.3	1.00	1.01	1.18	21.3
12	R2	162	33	171	20.4	0.823	95.7	LOS F	15.7	128.9	1.00	0.89	1.16	20.4
Approach		371	38	391	10.2	0.856	92.7	LOS F	18.9	135.3	1.00	0.96	1.17	20.9
West: Melbourne St														
1	L2	441	26	464	5.9	0.394	20.2	LOS B	18.1	133.5	0.50	0.74	0.50	41.8
2	T1	721	28	759	3.9	0.914*	36.6	LOS C	44.7	323.2	0.96	0.94	1.05	31.5
3	R2	75	4	79	5.3	0.378	85.7	LOS F	6.5	47.5	0.97	0.78	0.97	18.5
Approach		1237	58	1302	4.7	0.914	33.7	LOS C	44.7	323.2	0.79	0.86	0.84	33.6
All Vehicles		2605	133	2742	5.1	0.914	48.5	LOS D	44.7	323.2	0.86	0.85	0.93	28.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Critical Movement (Signal Timing)

\*

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped	Dist ]			sec	m	m/sec
South: Lawes Street												
P2	Full	20	21	20.3	LOS C	0.0	0.0	0.66	0.66	48.0	36.0	0.75
East: Melbourne St												
P3	Full	20	21	81.3	LOS F	0.1	0.1	0.95	0.95	112.4	40.4	0.36
North: Pitnacree Rd												
P4	Full	20	21	22.3	LOS C	0.0	0.0	0.69	0.69	53.4	40.4	0.76
West: Melbourne St												
P1	Full	20	21	82.2	LOS F	0.1	0.1	0.96	0.96	113.3	40.4	0.36
All Pedestrians		80	84	51.5	LOS E	0.1	0.1	0.81	0.81	81.8	39.3	0.48

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Revised project 20 trucks.sip9

## MOVEMENT SUMMARY

### Site: 1 [NEH / Melbourne AM (Site Folder: General)]

New England Highway / Melbourne Street

Revised project 20 trucks per hour

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
		veh/h	veh/h	veh/h	%	v/c	sec		veh	m				km/h
South: New England Highway														
1	L2	21	0	22	0.0	0.979	81.4	LOS F	63.1	456.6	1.00	1.22	1.40	26.4
2	T1	1412	56	1486	4.0	<div><div>*</div>0.979</div>	75.8	LOS F	63.1	456.6	1.00	1.23	1.41	26.8
3	R2	130	16	137	12.3	0.601	68.6	LOS E	4.2	32.4	1.00	0.79	1.06	25.1
Approach		1563	72	1645	4.6	0.979	75.3	LOS F	63.1	456.6	1.00	1.19	1.38	26.6
East: Melbourne Street														
4	L2	200	22	211	11.0	0.367	38.3	LOS C	9.3	71.6	0.81	0.79	0.81	33.4
5	T1	83	1	87	1.2	<div><div>*</div>0.987</div>	91.6	LOS F	30.1	216.6	1.00	1.17	1.59	20.9
6	R2	633	26	666	4.1	0.987	97.3	LOS F	31.8	230.3	1.00	1.14	1.58	20.6
Approach		916	49	964	5.3	0.987	83.9	LOS F	31.8	230.3	0.96	1.07	1.41	22.5
North: New England Highway														
7	L2	410	33	432	8.0	0.388	11.5	LOS A	6.8	51.1	0.52	0.73	0.52	47.4
8	T1	1080	73	1137	6.8	0.773	32.1	LOS C	30.3	224.2	0.90	0.82	0.92	39.4
9	R2	108	5	114	4.6	<div><div>*</div>0.949</div>	87.4	LOS F	8.2	59.8	1.00	1.05	1.66	24.3
Approach		1598	111	1682	6.9	0.949	30.5	LOS C	30.3	224.2	0.81	0.81	0.86	39.1
West: Melbourne Street														
10	L2	230	4	242	1.7	0.792	38.1	LOS C	9.6	68.0	1.00	0.88	1.14	36.3
11	T1	96	5	101	5.2	<div><div>*</div>0.925</div>	75.1	LOS F	12.1	87.1	1.00	1.06	1.50	23.8
12	R2	68	1	72	1.5	0.925	80.7	LOS F	12.1	87.1	1.00	1.06	1.50	26.3
Approach		394	10	415	2.5	0.925	54.5	LOS D	12.1	87.1	1.00	0.96	1.29	30.8
All Vehicles		4471	242	4706	5.4	0.987	59.2	LOS E	63.1	456.6	0.92	1.01	1.19	29.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Critical Movement (Signal Timing)

\*

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ped	Dist ] m			sec	m	m/sec
South: New England Highway												
P1	Full	20	21	54.2	LOS E	0.1	0.1	0.95	0.95	87.9	43.8	0.50
East: Melbourne Street												
P2	Full	20	21	30.1	LOS D	0.1	0.1	0.71	0.71	61.7	41.0	0.66
North: New England Highway												
P3	Full	20	21	54.2	LOS E	0.1	0.1	0.95	0.95	87.9	43.8	0.50
West: Melbourne Street												
P4	Full	20	21	29.4	LOS C	0.1	0.1	0.70	0.70	59.8	39.5	0.66
All Pedestrians		80	84	42.0	LOS E	0.1	0.1	0.83	0.83	74.3	42.0	0.57

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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## MOVEMENT SUMMARY

### Site: 1 [NEH / Melbourne AM (Site Folder: General)]

New England Highway / Melbourne Street

Revised project 20 trucks per hour

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
		veh/h	veh/h	veh/h	%	v/c	sec		veh	m				km/h
South: New England Highway														
1	L2	21	0	22	0.0	0.979	81.4	LOS F	63.1	456.6	1.00	1.22	1.40	26.4
2	T1	1412	56	1486	4.0	<div><div>*</div>0.979</div>	75.8	LOS F	63.1	456.6	1.00	1.23	1.41	26.8
3	R2	130	16	137	12.3	0.601	68.6	LOS E	4.2	32.4	1.00	0.79	1.06	25.1
Approach		1563	72	1645	4.6	0.979	75.3	LOS F	63.1	456.6	1.00	1.19	1.38	26.6
East: Melbourne Street														
4	L2	200	22	211	11.0	0.367	38.3	LOS C	9.3	71.6	0.81	0.79	0.81	33.4
5	T1	83	1	87	1.2	<div><div>*</div>0.987</div>	91.6	LOS F	30.1	216.6	1.00	1.17	1.59	20.9
6	R2	633	26	666	4.1	0.987	97.3	LOS F	31.8	230.3	1.00	1.14	1.58	20.6
Approach		916	49	964	5.3	0.987	83.9	LOS F	31.8	230.3	0.96	1.07	1.41	22.5
North: New England Highway														
7	L2	410	33	432	8.0	0.388	11.5	LOS A	6.8	51.1	0.52	0.73	0.52	47.4
8	T1	1080	73	1137	6.8	0.773	32.1	LOS C	30.3	224.2	0.90	0.82	0.92	39.4
9	R2	108	5	114	4.6	<div><div>*</div>0.949</div>	87.4	LOS F	8.2	59.8	1.00	1.05	1.66	24.3
Approach		1598	111	1682	6.9	0.949	30.5	LOS C	30.3	224.2	0.81	0.81	0.86	39.1
West: Melbourne Street														
10	L2	230	4	242	1.7	0.792	38.1	LOS C	9.6	68.0	1.00	0.88	1.14	36.3
11	T1	96	5	101	5.2	<div><div>*</div>0.925</div>	75.1	LOS F	12.1	87.1	1.00	1.06	1.50	23.8
12	R2	68	1	72	1.5	0.925	80.7	LOS F	12.1	87.1	1.00	1.06	1.50	26.3
Approach		394	10	415	2.5	0.925	54.5	LOS D	12.1	87.1	1.00	0.96	1.29	30.8
All Vehicles		4471	242	4706	5.4	0.987	59.2	LOS E	63.1	456.6	0.92	1.01	1.19	29.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Critical Movement (Signal Timing)

\*

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ped	Dist ] m			sec	m	m/sec
South: New England Highway												
P1	Full	20	21	54.2	LOS E	0.1	0.1	0.95	0.95	87.9	43.8	0.50
East: Melbourne Street												
P2	Full	20	21	30.1	LOS D	0.1	0.1	0.71	0.71	61.7	41.0	0.66
North: New England Highway												
P3	Full	20	21	54.2	LOS E	0.1	0.1	0.95	0.95	87.9	43.8	0.50
West: Melbourne Street												
P4	Full	20	21	29.4	LOS C	0.1	0.1	0.70	0.70	59.8	39.5	0.66
All Pedestrians		80	84	42.0	LOS E	0.1	0.1	0.83	0.83	74.3	42.0	0.57

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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## Appendix E – Submissions and response sections

Issue	Detailed Submission	Where addressed in report
<b>DPE</b>		
<b>Staging of construction works</b>	<i>The Department requests the following clarification and/or additional information relating to the TIA: a) a description of the proposed staging of construction works for the new haul road, including identification of interim mitigation and management measures that would be implemented while the quarry is operating and prior to the completion of this work (e.g.. temporary reductions in truck movements, limits on production, or other arrangements such as upgrading Station Street and Grace Avenue);</i>	Section 3.1
<b>Intersection analysis</b>	<i>b) SIDRA modelling of all major intersections on proposed haul routes (these have been identified in section 2.4.1 of the TIA) and a description of any measures that would be implemented to minimise or mitigate traffic impacts, if necessary;</i>	Section 4.4.2
<b>Ancillary truck movements</b>	<i>c) an amended TIA that considers those unquantified truck movements associated with deliveries of fuel, parts, pre-coat and other chemical additives, blending products such as fly ash and any other service or delivery vehicles likely to access the site (e.g.. the NIA indicates regular delivery of consumables to supply the pug mill each morning of operation however this has not been quantified in the TIA, or elsewhere in the EIS); d) an impact assessment that includes a road safety appraisal of the proposed new driveway access to Dungog Road;</i>	Section 4.4  Section 4.3
<b>Traffic monitoring and management</b>	<i>e) a description of the measures that would be implemented to avoid or minimise haul trucks exceeding the speed limit on parts of the proposed haul routes (as reported in the TIA); f) a description of the measures that would be implemented to monitor and demonstrate that haul trucks do not travel through Lorn, as proposed;</i>	See separate Driver Code of Conduct prepared by Daracon
<b>Cumulative impacts</b>	<i>i) provide a cumulative impact assessment of the proposed volume of truck movements as they relate to existing approved and proposed truck movements from the Brandy Hill Quarry.</i>	Section 4.4.1
<b>Roads and Maritime Services</b>		
<b>Gostwyck Bridge capacity</b>	<ul style="list-style-type: none"> <li>• Gostwyck Bridge is a steel truss bridge under the care and control of Roads and Maritime.</li> <li>• Roads and Maritime is not aware of any discussions with the traffic consultant as noted in Section 2.4.2 of the TIA. The proponent should provide evidence of any discussions with Roads and Maritime regarding the proposal and the heritage listed bridge as noted in the Traffic Impact Assessment.</li> <li>• The documentation provided in the EIS does not address the impact of additional truck movements on the bridge structure.</li> <li>• Roads and Maritime considers that the bridge in its current form will be adversely affected by the increased level of traffic and high frequency of truck movements proposed.</li> <li>• Gostwyck Bridge currently operates as a single lane bridge with give way provision. Roads and Maritime considers with increased traffic volumes that a dual lane two-way bridge would be required at this location to comply with current design guides.</li> </ul>	Section 2.4.2 and separate report by Focus Bridge Engineering
<b>Intersection Analysis</b>	• The TIA has undertaken an intersection analysis using SIDRA for intersections where the haulage route meets the state road network at Pitnacree Road/ Melbourne Street and Melbourne Street / New England Highway (route 1).	Section 4.4.2

	<ul style="list-style-type: none"> <li>• The TIA has not carried out any analysis of state road intersections as part of route 2 and route 3.</li> <li>• Roads and Maritime considers that the TIA should provide intersection analysis of all intersections which impact on the classified state road network.</li> <li>• Roads and Maritime requests that the SIDRA files are provided for review and assessment.</li> </ul>	
<b>Dungog Shire Council</b>		
<b>Assessment of actual approved production levels</b>	Once the baseline increase from actual approved production levels is determined, traffic and transport components of the EIS and associated reports will then need to be reassessed to determine potential impacts between the approved production levels and the new proposed production levels.	Section 4.4.2
<b>Over-dimension vehicles Table 1-3</b>	Only limited reference is made to the haulage of over-dimension vehicles along MR301 and MR101. These include over width and overmass vehicles which cannot access via Gostwyck Bridge.	Section 3.2.1
	<ul style="list-style-type: none"> <li>• Increased use of Over-Dimension Haul Route has not been identified within the reports;</li> </ul>	Section 3.2.1
<b>Road safety</b>	<ul style="list-style-type: none"> <li>• Inadequate responses to a number of road access and safety concerns including:- <ul style="list-style-type: none"> <li>- Grace Avenue/Station Street/Rail Crossing - This intersection has been identified by both Council and the ARTC as requiring safety upgrades. Lack of available funding from both parties is the only reason works have not been undertaken. Whilst this intersection and crossing is projected to be abandoned within two (2) years as far as being part of the identified haul route is concerned, no consideration is given to interim measures;</li> <li>- Paterson Rail Crossing - Congestion on the northern side of the crossing is already problematic with respect to the blind crest on the approach to the crossing. The need for advanced warning for a closed rail crossing has not been adequately addressed;</li> <li>- Gostwyck Bridge Single Lane - Whilst the RMS have identified that the bridge can meet load standards, the alignment and lack of sight distance for traffic to "Give Way" is an ongoing concern;</li> <li>- Pavement Widths - Some sections of the identified haul routes have insufficient pavement widths for the design traffic loadings. Rehabilitation costs identified within the reports do not allow for required width increases;</li> <li>- Clear Zones - There is insufficient shoulder widths and clear zones on considerable lengths of the identified haul routes. Rehabilitation costs identified within the reports do not allow for required shoulder increases or clear zone creation;</li> <li>- Overtaking Areas - Whilst the reports identify the lack of suitable overtaking areas, no consideration is made to provide such;</li> <li>- Flood Free Access - The main haul route through Paterson has three (3) identified areas where flooding occurs. Alternate flood free access or quarry processes in times of flood have not been addressed;</li> </ul> </li> </ul>	Section 2.4.4
	<p>Review of Traffic Impact Assessment (Seca Solutions, August 2016) identified the following issues:</p> <ul style="list-style-type: none"> <li>• The report fails to adequately address all road safety concerns identified by Council;</li> <li>• Sight distance may be an issue at the proposed intersection of the internal haul route with Dungog Road;</li> <li>• Some statements and assumptions are erroneous with respect to Council's position regarding current and proposed works for the proposed haul routes;</li> </ul>	Section 4.3
	<p>The report identifies a number of safety concerns which have not been adequately addressed. These include:-</p> <ul style="list-style-type: none"> <li>• Station Street/Grace Avenue intersection conflict with rail crossing - The report identifies (p24) that the "ARTC has prepared plan for upgrade but no timeframe for works". This is contradicted later in the report (p52) which states that "the railway crossing on Grace Avenue has been reviewed by ARTC and they have no plans to</li> </ul>	Section 4.3

	<p>upgrade this crossing". As Council nor ARTC did not have any funds allocated for the works, the project was not undertaken.</p> <ul style="list-style-type: none"> <li>• One-way bridge operation on Dungog Road at Gostwyck Bridge - Council's issue is not with the capacity of the bridge (which is the RMS concern) but the lack of sight distance to the north and the increased potential for road accidents as a result of increased heavy vehicle movements.</li> <li>• Bus Routes and Associated Facilities - The report identifies that there are local school bus routes in operation along the haul route but "there are no bus stops within the general locality of the subject site".</li> <li>• On-street Parking Provision - The report does not consider the loss of on-street parking within the Paterson Business Area as a result of the proposed intersection modification works at King and Duke Street.</li> </ul>	
<b>Morning peak time conflicts</b>	The report identifies that typically there are expected to be 40 outbound trucks from the site per hour for the first three or more hours due to operational limitations within the quarry. These peak times conflict with morning peak times for commuter traffic and school buses.	Section 4.4.2
<b>Grace Avenue</b>	<p>The report identifies the major haul route as being MR101 through from Grace Avenue to Bolwarra. The report has the following issues identified:-</p> <ul style="list-style-type: none"> <li>• Lack of consideration given to sight distance for laden trucks coming on to Gostwyck Bridge (single lane timber bridge);</li> <li>• Omission of 100km/hr zone on Gresford Road;</li> <li>• Highlights the need for vehicle entering the King/Duke Street intersection in Paterson;</li> <li>• Highlights the lack of shoulders and formed verges along the haulage route;</li> <li>• Highlights the number of accesses to private rural holdings;</li> <li>• Highlights that there are no overtaking lanes provided along the route;</li> <li>• Only limited reference is made to the haulage of over-dimension vehicles along MR301 and MR101. These include over width and overmass vehicles which cannot access via Gostwyck Bridge.</li> </ul>	Section 4.4.2
<b>Traffic data</b>	<p>The current report identifies tube counters being installed in the week beginning 17th July 2015 over a minimum period of 7 days, however:-</p> <ul style="list-style-type: none"> <li>• This is a very small period to be extrapolating annual figures from;</li> <li>• There are some relatively small inconsistencies between the Seca figures obtained and Council data. Council data is, however, 12 months older than the Seca data but was taken over a two month period;</li> </ul>	Section 2.5.1
	There is no traffic data for Station Street nor Grace Avenue.	Table 1-3
<b>Sight distance</b>	<p>Visibility to the right for drivers exiting Station Street is impacted upon by the vertical alignment of the road over the rail crossing. The report then states that the visibility has been assessed as greater than 100m in both directions. This may be based on "the raised seating position for drivers of trucks" which should not be considered under the standards.</p>	Section 3.2.1
	No reference is made to the lack of sight distance on the northern side of the Paterson level crossing nor the conflict that may occur due to queueing vehicles.	Section 3.2.1
<b>Existing train services</b>	Level crossings in Martins Creek and Paterson are referred to as only causing minor traffic delays as "there is a limited train service in this location". The rail crossings service 5 local commuter trains (10 movements), 6 XPT services (6 movements) and numerous coal and freight services.	Section 3.2.1
<b>Ancillary truck movements</b>	The report identifies the use of 10-15kt per annum of flyash. On average, 12,500t of flyash is imported to the site per annum. Based on 32.5t per load, this would generate a further 385 laden and 385 unladen truck movements per annum. Therefore, based on Dungog Shire Council data from 2014, there would be significant increases in heavy vehicles on the various haul roads south of Martins Creek Quarry, as well as effects on traffic volumes. (REFER TO: Table on pg. 11 of Dungog Shire Council Submission)	Section 3.1
<b>Flood prone land</b>	The Traffic Impact Assessment also fails to take into consideration the issue of the major haul route being flood prone in at least three (3) separate locations within the	Section 2.4.4

	Dungog LGA. Alternate flood free access needs to be considered as part of this process.	
<b>Maitland City Council</b>		
<b>Road capacity</b>	<ul style="list-style-type: none"> <li>• There is some concern over the resulting hourly volume and its implications on the queuing of commuter traffic at the intersection of Pitnacree Road and Melbourne Street, East Maitland.</li> <li>• The stacking of trucks will have an impact on Council roads and their ability to move off will have an impact on normal traffic flows. This needs to be investigated and assessed during normal truck movements, movements at maximum extraction and at peak hour haulage rate to determine the stacking of trucks and their impact on queuing at these traffic signals.</li> </ul>	Section 4.4.2
<b>Port Stephens Council</b>		
<b>Road capacity and safety</b>	<p>Council raises the following issues:-</p> <ul style="list-style-type: none"> <li>• The assessment has identified the lack of shoulder width on Butterwick Road as being one of the main safety concerns on the proposed haulage routes. The assessment notes that the width of Butterwick Road does not comply with current design standards but dismisses these concerns because there have been no recorded crashes involving haulage trucks from the quarry. Although the Blackspot funding during the 2015-2016 year has allowed the Council to improve an 800m section of Butterwick Road, there remains approximately 1400m length of road at the northern end of Butterwick Road that still does not meet required standards.</li> <li>• The safety concerns regarding the lack of a right-turn bay at the intersection of Brandy Hill Drive and Clarence Town Road upgrade has been linked to the proposed expansion of the Brandy Hill Quarry. Council is of the opinion that the right hand turn will only affect Martins Creek Quarry and not Brandy Hill Quarry. Council will require this intersection to be upgraded to allow a right turn.</li> <li>• Based on unacceptable amounts of truck movements in 2015 (in excess of 1,000 per day) generated from Martins Creek Quarry and Brandy Hill Quarry, Council seeks to cap a limit on the truck movements. Mechanisms need to be considered and imposed to limit the movement of product to the distribution proportions considered in the Traffic Impact Assessment.</li> </ul>	Section 2.1
<b>Road Maintenance Contribution</b>	<ul style="list-style-type: none"> <li>• The existing road pavement is deteriorating at a rate which is considered the normal lifecycle. Additional trucking traffic on the road would reduce the lifespan of the existing road pavement. The proposed trucking movements will increase the ESA by a factor of seven. This indicates the Butterwick Road pavement will deteriorate within a number of years. This rate of deterioration will result in any maintenance works failing and hence the need for a full upgrade to the pavement to withstand the proposed ESAs. Full scoping has not yet been determined, however the anticipated cost to upgrade the Road is in the vicinity of \$12 million.</li> <li>• Section 4.5.1 of the Section 94 Development Contributions Plan identifies the need for Council to seek contributions from developments that generate significant truck movements. These funds would be expended on road upgrades, repairs and ongoing maintenance to roads affected by the haulage route.</li> </ul>	Refer to SMEC report