



APPENDIX K: TRAFFIC IMPACT ASSESSMENT





QUARRY DEVELOPMENT

**LOT 48 IN DP 753178 AND LOT 472 IN DP 1162208
279 DEEP CREEK ROAD, LIMEBURNERS CREEK**

PREPARED FOR: IRONSTONE DEVELOPMENTS PTY LTD

SEPTEMBER 2021

REF: 20/018

**TRAFFIC IMPACT ASSESSMENT
IRONSTONE DEVELOPMENTS PTY LTD****QUARRY DEVELOPMENT
279 DEEP CREEK ROAD, LIMEBURNERS CREEK**

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Date 20th September 2021**Disclaimer**

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1.0 INTRODUCTION

Intersect Traffic Pty Ltd has been engaged by Ironstone Developments Pty Ltd to prepare a traffic impact assessment for a new hard rock quarry at Lot 48 in DP 753178 and Lot 472 in DP 1162208 - 279 Deep Creek Road, Limeburner's Creek. Access to the quarry will be via a dedicated quarry access road constructed within a portion of land to be subdivided from Lot 551 and Lot 552 DP 1238818.

The new quarry, to be known as Deep Creek Quarry, is seeking approval to produce up to 500,000 tonnes of rock per annum. At capacity the quarry is expected to operate for 49 weeks of the year, 5.5 days per week. The rock is proposed for use in the full range of engineering products such as concrete, asphalt and decorative landscape applications. The rock is mostly igneous (rhyolite), approximately 90%, and the balance sedimentary (sandstone). The quarry will provide a sought after source of rhyolite rock to service the demand for aggregates with high grip and reflective qualities as well as the usual array of quarry rock products. The concept plan showing the layout of the various aspects of the operational area of the proposed new hard rock quarry is provided in **Attachment A**.

This report is required to support the development application to the Department of Planning, Industry and Environment and allow the various government departments as well as Port Stephens Council and MidCoast Council (Council) to assess the proposal in respect of its impact on the local and state road network.

This report presents the findings of the traffic assessment and includes the following:

- ◆ An outline of the existing situation in the vicinity of the site.
- ◆ An assessment of the traffic impacts of the proposed development including the predicted traffic generation and its impact on existing road and intersection capacities.
- ◆ An assessment of cumulative impacts of other known developments in the area. In this regard the only other known significant development in the area is the proposed Hillview quarry.
- ◆ Reviews parking, public transport, pedestrian, and cycle way requirements for the proposed development, including assessment against Council and Transport for NSW (TfNSW) standards and requirements.
- ◆ Presentation of conclusions and recommendations.

In regard to the SEARS issued for this project this assessment addresses all requirements of the SEARS as requested by the Department, TfNSW, Mid-Coast Council and Port Stephens Council as reference in the **Table 1** below.

Table 1 – SEARS Requirements Compliance Table

TRAFFIC			
Aspect	Department / Authority	Requirements	Section
Traffic and Transport	NSW DPIE - Generic Requirements	The Environmental Impact Statement (EIS) for the development must comply with the requirements in Clauses 6 and 7 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000.	Full Report
Traffic and Transport	NSW DPIE - Generic Requirements	- 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;	Section 9
Traffic and Transport	NSW DPIE - Generic Requirements	- a detailed assessment of the proposed new intersection location, design, sight distance, predicted performance and site access arrangements and road safety, including consideration of any bus routes;	Section 10.2
Traffic and Transport	NSW DPIE - Generic Requirements	- a detailed assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State road network (as identified above), including undertaking a road safety audit; and	Section 10
Traffic and Transport	NSW DPIE - Generic Requirements	- a description of the measures that would be implemented to mitigate and/or manage any impacts;	Section 10
Traffic and Transport	NSW EPA	Road • Noise on public roads from increased road traffic generated by land use developments should be assessed using the guidelines contained in the NSW Road Noise Policy (DECCW, 2011). • Noise from new or upgraded public roads should be assessed using the NSW Road Noise Policy (DECCW, 2011). • Monitoring • Detail monitoring that will be conducted to assess the impacts of the proposal.	NA - see Noise report
Traffic and Transport	MidCoast Council	• Assess in detail the construction and operational traffic impacts of the development. • Provide details of traffic volumes (both light and heavy vehicles) and transport routes during construction and operation, including traffic associated with sourcing raw materials. • Assess the potential traffic impacts of the project on road network function including intersection performance and site access arrangements and road safety, including any bus routes. • Assess the capacity of the existing road network to accommodate the type and volume of traffic generated by the project (including over-mass / over-dimensional traffic) during construction and operation. • Provide details of measures to mitigate and / or manage potential impacts including a schedule and designs of all required road upgrades, road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authority.	Sections 9 & 10
Traffic and Transport	Port Stephens Council	The Scoping document states an assessment of traffic impacts is to be completed and included in the EIS. Council is satisfied that the key traffic impact matters will be considered as part of the Traffic Impact Assessment to be undertaken as part of the proposal.	Full report
Traffic and Transport	Port Stephens Council	Development Contributions It is noted the initial proposal to access the Deep Creek Road from The Bucket's Way was not adopted. Should the proposal result in the use of a Regional classified road, which is managed and financed by Council, development contributions would be applied in accordance with the Port Stephens Council Local Infrastructure Contribution Plan. As Council finances the maintenance of The Bucket's Way, it is expected that contributions would be applied in accordance with the Local Infrastructure Contribution Plan. For development involving extractive industries, Council will collect monetary contributions towards the maintenance of Council financed roads used as haulage routes.	NA - accepted as condition of consent.
Traffic and Transport	Transport for NSW (TfNSW)	TfNSW's primary interests are in the road network, traffic and broader transport issues. In particular, the efficiency and safety of the classified road network, the security of property assets and the integration of land use and transport.	
Traffic and Transport	Transport for NSW (TfNSW)	TfNSW recommends that the Environmental Impact Statement (EIS) should refer to the following guidelines with regard to the traffic and transport impacts of the proposed development: • Road and Related Facilities within the Department of Planning EIS Guidelines, and, • Section 2 Traffic Impact Studies of Roads and Maritime's NSW's Guide to Traffic Generating Developments 2002, and, • Austroads Guide to Traffic Management, Part 12, Integrated Transport Assessments for Developments.	Compliant
Traffic and Transport	Transport for NSW (TfNSW)	Furthermore, a traffic and transport study shall be prepared in accordance with the Roads and Maritime Services NSW's Guide to Traffic Generating Developments 2002 and is to include (but not be limited to) the following: • Assessment of all relevant vehicular traffic routes and intersections for access to / from the subject site. • Details of all traffic types and volumes likely to be generated by the proposal during construction, operation and rehabilitation, including description of heavy vehicle types, and haul route origins and destinations. • Daily inbound and outbound traffic profile by time of day and day of week broken down per vehicle types. • Investigate the use of vehicles with higher carrying capacity such as Performance Based Standards combinations to reduce the number of heavy vehicle movements. • Detailed site layout to demonstrate that the site will be able to accommodate the most productive vehicle type as well as the worst performing vehicle type. This includes parking layout on site in accordance with the relevant Australian Standard and Council's Development Control Plan. • Details of access to, from and within the site from the road network including assessment of intersection location, design and sight distance. It must be demonstrated that the site plan, site access and surrounding road network can accommodate the largest vehicles entering, exiting and maneuvering throughout the site. • Assessment of the forecasted daily and peak (AM, PM) vehicle movements' impact on road safety and midblock capacity of road network, including potential impact on pavement lifespan. • Traffic analysis of any major / relevant intersections impacted, including but not limited to the new intersection on The Bucketts Way and the intersection of Pacific Highway with The Bucketts Way, using SIDRA or similar traffic model, including: - o Current traffic counts and traffic growth projections over the operational life (30 years) - o With and without development scenarios - o 95th percentile back of queue lengths - o Delays and level of service on all legs for the relevant intersections - o Electronic data for Transport for NSW review.	Compliant - See sections 9 and 10
Traffic and Transport	Transport for NSW (TfNSW)	• An assessment of the cumulative study area traffic impacts associated with the development and any other known proposed/approved developments in the area. • If required, identification of any dangerous goods likely to be transported on arterial and local roads to/ from the site and, if necessary, the preparation of an incident management strategy. • Conduct a road safety audit by a qualified road safety auditor to identify potential existing and future safety issues with the new intersection on The Bucketts Way and existing Pacific Highway/The Bucketts Way intersection to accommodate development traffic over the operational life (30 years) of the proposed quarry. • Identify the necessary road network infrastructure upgrades that are required to maintain existing levels of service and improve road safety on surrounding road network. In this regard, preliminary concept drawings shall be submitted with the EIS for any identified road infrastructure upgrades. However, it should be noted that any identified road infrastructure upgrades will need to be to the satisfaction of Transport for NSW and Council. • An assessment of any other impacts on the regional and state road network including consideration of pedestrian, cyclist and public transport facilities and provision for service vehicles. On determination of this matter, please forward a copy to TfNSW for record and / or action purposes. Should you require further information please contact Dipen Nathwani, Development Assessment Officer, on 0418 514 166 or by emailing development.hunter@rms.nsw.gov.au.	

2.0 SITE DESCRIPTION

The subject site is shown in **Figure 1** below while **Figure 2** shows the proposed Quarry layout. It is located on Deep Creek Road approximately 1.8 kilometres west of The Bucketts Way, Limeburners Creek. The locality of Limeburner's Creek is approximately 7 km south of the site while the Pacific Motorway at Twelve Mile Creek is 14 km south of the site. The site is also 24 km north-west of Karuah, 30 km north-east of Raymond Terrace and 45 km north-east of Newcastle.

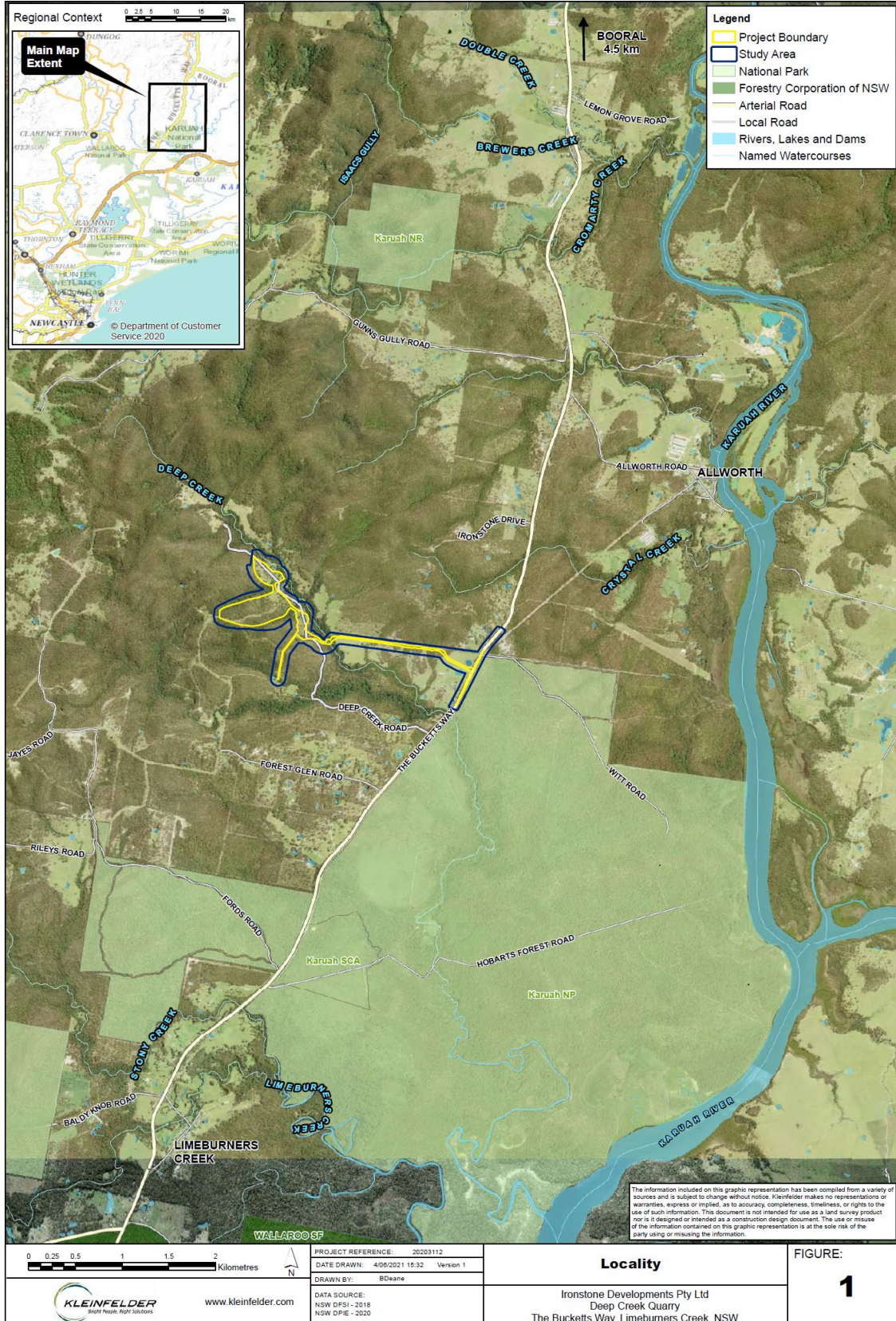


Figure 1 – Site Location

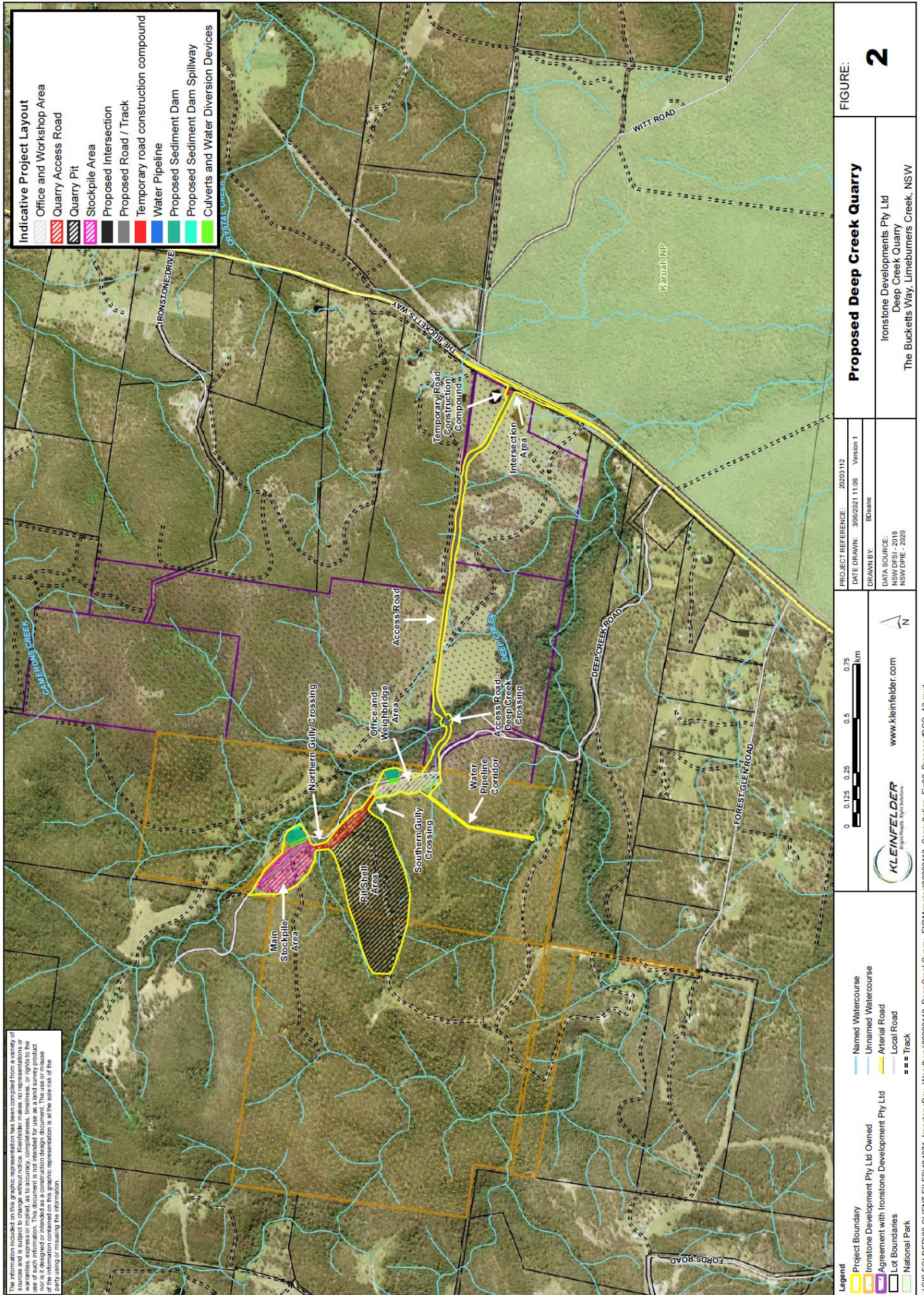


Figure 2 – Quarry Layout

The site has the following property descriptors:

- ◆ Land titles of Lot 48 in DP 753178 and Lot 472 in DP 1162208. Access to the quarry will be via a dedicated quarry access road constructed within a portion of land to be subdivided from Lot 551 and Lot 552 DP 1238818.
- ◆ Property address of 279 Deep Creek Road, Limeburners Creek,
- ◆ Total area of approximately 3 km², and
- ◆ Land Zoning of RU2 – Rural Landscape pursuant to the Great Lakes LEP (2014).

The site is currently predominantly vegetated and partially cleared land without any structures. It is surrounded by similar rural land to the north, south, east and west. Deep Creek Road and Deep Creek run through the property between the northwest corner of the adjacent Lot 551 in DP 1238818 (adjoining the east of the site) and the south west corner of the adjacent Lot 30 in DP 753178 (adjoining the north and west of the site). The existing vehicular access to the site is provided via Deep Creek Road. **Photograph 1** below shows a section of the subject site and **Photograph 2** below shows Deep Creek Road (a Crown Reserve Road) the current access to the site.



Photograph 1: Section of the site



Photograph 2: Deep Creek Road – access to the site

3.0 EXISTING ROAD NETWORK

The primary haulage route proposed is south via The Bucketts Way, Limeburners Creek to the Pacific Highway, Twelve Mile Creek then south to Newcastle via Raymond Terrace via the Pacific Highway. A small number of trips may head north from the site along The Bucketts Way or will head north along the Pacific Highway at Twelve Mile Creek.

3.1 – The Pacific Highway

The Pacific Highway (A1) in the vicinity of the site is under the care and control of Transport for NSW (TfNSW) and would under a functional road hierarchy be classified as a major arterial road. Its main function is to distribute and collect traffic to and from all regions, suburbs, roads, and accesses in the area to service Northern NSW, Central Coast and Sydney and connect to other arterial and sub-arterial roads to service eastern and western regions. South of the site the Pacific Highway connects to The New England Highway as well as other major arterial roads within and to the Lower and Upper Hunter region.

Near The Bucketts Way intersection it is a four lane two way sealed road with 2 travel lanes in each direction, approximately 3.5 metre wide each, and varying width sealed shoulders generally 0.3 metres (outside lane) to 2.5 metres (inside lane) wide, except where widening occurs at intersections. It has a central grassed median and has a 100 km/h speed zoning. **Photograph 3** below shows the standard of The Pacific Highway near its intersection with The Bucketts Way. At the time of inspection, The Pacific Highway was in excellent condition and considered suitable for use by heavy vehicles associated with the quarry.



Photograph 3: The Pacific Highway south from The Bucketts Way

TfNSW have recently completed improvements to the Pacific Motorway / The Bucketts Way intersection to improve the efficiency and safety of the intersection. This work is part of a project to improve road safety on The Pacific Highway south of the intersection and the main improvements to the intersection included the introduction of a left turn slip lane from The Pacific Highway to The Bucketts Way and the provision of a dedicated left turn lane on The Bucketts Way. Other improvements to The Pacific Highway are likely to occur in the future as part of the \$25 million program of improvement under Roads of Strategic Importance Commonwealth funding program.

3.2 – The Bucketts Way

The Bucketts Way near the site is a Regional Road therefore is under the care and control of MidCoast Council with funding assistance from TfNSW. Under a functional road hierarchy the Bucketts Way is classified as a major collector road. Its main function is to distribute and collect traffic including to and from suburbs and properties in the area between The Pacific Motorway at Twelve Mile Creek to the south and the Stroud and Gloucester townships to the north and Krambach and Nabiac to the north. Currently heavy haulage vehicle use the road to transport freight to these areas. Near the site it is a two lane two way sealed road with approximately 3.2 metre travel lanes and varying sealed shoulders from 0.5 to 1 metre wide. It is centre line marked and has a 90 km/h speed zoning. **Photograph 4** below shows the standard of the Bucketts Way in the vicinity of the site. At the time of inspection, the Bucketts Way was in good condition and considered suitable for use by heavy vehicles associated with the quarry.



Photograph 4: The Bucketts Way near the site

4.0 TRAFFIC VOLUMES

To determine existing traffic volumes on the local road network Intersect Traffic commissioned Northern Transport and Planning (NTP) to undertake manual traffic counts at the Pacific Motorway / the Bucketts Way give way controlled seagull T-intersection shown in **Photograph 5** below. The counts were undertaken on 21 February 2019 and determined the AM and PM peak hour periods at the road intersection were 8.00 am – 9.00 am and 3.45 pm – 4.45 pm. A copy of the tally sheets for the manual traffic counts are shown in **Attachment B**.

The two-way mid-block traffic volumes extracted from this count were:

- ◆ The Pacific Motorway east of the Bucketts Way – 1,254 vtpm AM and 1,450 vtpm PM,
- ◆ The Pacific Motorway east of the Bucketts Way – 1,450 vtpm AM and 1,790 vtpm PM, and
- ◆ The Bucketts Way north of the Pacific Motorway – 264 vtpm AM and 423 vtpm PM.

These volumes have been used as the 2020 mid-block peak hour volumes in this assessment. The 2030 volumes and 2052 volumes (quarry life) have been calculated by increasing the 2020 volumes by an annual growth rate factor of 2.0% for a period of 10 years. The 2020, 2030 and 2052 mid-block peak hour traffic volumes are shown below in **Table 2**. Historically traffic growth on The Bucketts Way has been less than 1% per annum therefore adoption of a 2% per annum background

traffic growth on The Bucketts Way allows the cumulative traffic impacts of other known developments in the area such as Hillview Quarry to be considered particularly when modelling is extended out to 2052 being the life of the Deep Creek Quarry.

Table 2 - Summary of traffic count data – Peak two way mid-block volumes.

Road	Section	2020 AM peak vtp	2020 PM peak vtp	2030 AM peak vtp	2030 PM peak vtp	2052 AM peak vtp	2052 PM peak vtp
The Pacific Highway	East of The Bucketts Way	1254	1493	1529	1820	2363	2814
The Pacific Highway	West of The Bucketts Way	1450	1790	1768	2182	2733	3373
The Bucketts Way	North of The Pacific Highway	264	347	322	423	498	654

It is noted from the counts that the existing heavy vehicle traffic is approximately 8% on The Bucketts Way and up to 13% on The Pacific Highway.



Photograph 5: The Pacific Highway / Bucketts Way T intersection

5.0 ROAD CAPACITY

Table 4.5 of the RTA's *Guide to Traffic Generating Developments (2002)* provides some guidance on likely levels of service being experienced on two lane two way rural roads for different terrain types. This table is reproduced below. The definitions for LoS B and LoS C are:

LoS B - this level is in the zone of stable flow and drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience is a little less than that of the level of Service A.

LoS C - this level is also in the zone of stable flow but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.

The desirable LoS for rural roads before upgrading works to increase the capacity of the roads need to be considered is a LoS C though a LoS D may still be acceptable in certain circumstances.

Table 4.5
peak hour flow on two-lane rural roads (veh/hr)
(Design speed of 100km/hr)

Terrain	Level of Service	Percent of Heavy Vehicles			
		0	5	10	15
Level	B	630	590	560	530
	C	1030	970	920	870
	D	1630	1550	1480	1410
	E	2630	2500	2390	2290
Rolling	B	500	420	380	310
	C	920	760	650	570
	D	1370	1140	970	700
	E	2420	2000	1720	1510
Mountainous	B	340	230	180	150
	C	600	410	320	260
	D	1050	680	500	400
	E	2160	1400	1040	820

The data for Table 4.5 assumes the following criteria:

- terrain level with 20% no overtaking.
- rolling with 40% no overtaking.
- mountainous with 60% no overtaking.
- 3.7 m traffic lane width with side clearances of at least 2m.
- 60/40 directional split of traffic.

Source: - RTA's Guide to Traffic Generating Developments (2002).

With a level terrain applying to The Pacific Highway (two lanes per direction) and a rolling terrain applying to The Bucketts Way the likely two way mid-block road capacities for these roads will be;

- ◆ The Pacific Highway – 2,820 vtp; and
- ◆ The Bucketts Way – 970 vtp.

As the existing road network around the proposed quarry site is currently operating below these thresholds (see **Table 1**) good levels of service up to a LoS C will be experienced by motorists on these roads and it is concluded that the existing road network has spare capacity to cater for traffic growth generated by additional development in the area.

6.0 INTERSECTION CAPACITY

In most situations roadway capacity is normally controlled by the intersection capacities within the road network. In this case there are two intersections of direct interest for the proposal because the main haulage route from the quarry is along The Bucketts Way. These are the Pacific Highway / The Bucketts Way (shown above in previous **Photograph 5**) and the proposed The Bucketts Way / Quarry Access Road intersection. The Northrop concept plan drawings showing more detail of the access intersection, are presented in **Attachment C**.

The Pacific Highway / The Bucketts Way intersection is a rural give way controlled rural seagull T-intersection while the proposed The Bucketts Way / Quarry Access T-intersection will operate as a rural give way controlled CHR (Channelised right turn) / AUL (Auxiliary left turn) T-intersection.

The Pacific Highway / The Bucketts Way intersection (modified as per current works) has been modelled using the Sidra Intersection 9 Network modelling package for existing traffic during the following AM and PM peak periods to demonstrate current operating conditions at these intersections. Future traffic was also modelled with volumes predicted on the basis of a 2% per annum background traffic growth rate over the future horizon period of 10 years to 2030.

- ◆ Quarry AM peak period – 6 am – 7 am.
- ◆ Road network AM peak period – 8 am – 9 am; and
- ◆ Quarry PM peak period – 2 pm – 3 pm.
- ◆ Road network PM peak period – 3.45 pm – 4.45 pm.

Data for the modelling was obtained by Northern Transport Planning and Engineering (NTPE) through manual intersect counts during non-school holiday periods within the defined peak hours. The field data sheets for these counts are provided within **Attachment B**. The Sidra Intersection 9 software package predicts likely delays, queue lengths and thus levels of service that will occur at intersections. Assessment is then based on the level of service requirements of the TfNSW shown below. The results of the modelling for existing traffic volumes are shown below in **Table 3** while the Summary Movement Tables output from the model are provided in **Attachment B**.

Table 3 –Sidra results - The Pacific Motorway / The Bucketts Way intersection.

Scenario	Deg. Satn (v/c)	Worst Average Delay (sec)	Worst Level of Service	95 % Back of Queue (veh)
2020 AM - 6 am - 7 am	0.177	10.4	LoS A	0.3
2020 AM - 8 am - 9 am	0.259	13.0	LoS A	0.5
2020 PM - 2 pm - 3 pm	0.263	17.5	LoS B	0.5
2020 PM – 3.45 pm – 4.45 pm	0.336	19.8	LoS B	0.6
2030 AM - 6 am - 7 am	0.248	11.5	LoS A	0.5
2030 AM - 8 am - 9 am	0.395	17.0	LoS B	0.9
2030 PM – 2 pm – 3 pm	0.390	23.3	LoS B	0.7
2030 PM – 3.45 pm – 4.45pm	0.601	34.1	LoS C	1.3
2052 AM – 6 am – 7 am	0.441	16.1	LoS B	1.1
2052 AM – 8 am – 9 am	0.855	43.3	LoS D	3.2
2052 PM – 2 pm – 3 pm	1.061	143.0	LoS F	6.1
2052 PM – 3.45 pm – 4.45 pm	1.887	787.8	LoS F	27.2

This modelling shows that the intersection currently operates with good levels of service for all movements for all AM and PM peak times modelled indicating little or no delay and / or queuing for motorists. Further with 10 years traffic growth at normal background growth levels i.e. 2% per annum, the intersection continues to operate satisfactorily. Future modelling shows that by 2052 which represents the possible quarry life end the intersection has reached capacity in the PM peak periods and some form of intersection upgrade MAY be required even without the quarry traffic. However this modelling is considered very inaccurate given the assumptions made in terms of background traffic growth and the time period involved for which network changes that affect the operation of the intersection may occur. Therefore, it is reasonable to conclude that the intersection has spare capacity to cater for additional traffic generated by development in the area through to and beyond 2031 however is likely to need either some form of upgrading or road network improvements to occur prior to the end of the quarry life. As this could happen without the quarry traffic this is considered a regional problem for which the road authority is responsible though the quarry may be responsible for fair and reasonable contribution to the future works. Therefore a nexus would exist for some form of fair and reasonable contribution to this work from the quarry.

Table 4.2
Level of service criteria for intersections

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

Source: - RTA's Guide to Traffic Generating Developments (2002)

7.0 ALTERNATE TRANSPORT MODES

There is no public transport (bus) service to the area that is within convenient walking distance to the site. The only service that travels along The Bucketts Way is NSW Transports pre-booked coach. Routes C135 from Newcastle and C136 from Gloucester operate a 1 weekday after 6 pm service in either direction to and from Broadmeadow or Gloucester stopping at Raymond Terrace, Limeburners Creek, Allworth and Booral, Stroud Wards River, Craven and Stratford. Whilst there are formal stops at the above towns, arrangements can be made to alight or pickup at pre-arranged safe locations along the route. This would not be convenient for use by staff or visitors of the quarry given the proposed future operating hours of the quarry.

As a rural area there are no constructed footpaths therefore facilities for pedestrians are non-existent. Pedestrians walking along the local road network would be required to use the unformed verges or utilise the road shoulder where necessary.

Similarly there are no designated on or off road cycle ways in the area therefore cyclists using the road network would either need to use the formed road shoulders or share the traffic lanes where necessary.

In regard to the haulage of extracted material from the site there are currently no alternatives to the use of road haulage to and from the site.

8.0 DEVELOPMENT PROPOSAL

The proposal involves the development of a new hard rock quarry on Lot 48 in DP 753178 and Lot 472 in DP 1162208 - 279 Deep Creek Road, Limeburners Creek. Access to the quarry will be via a dedicated quarry access road constructed within a portion of land to be subdivided from Lot 551 and Lot 552 DP 1238818.

The new quarry, with a total area of approximately 30 ha, will seek approval to produce up to 500,000 tonnes of rock per annum. The main operational section of the site is proposed to be located in an 18 hectare section of Lot 48, where Deep Creek Road crosses Lot 48 diagonally between northwest corner of adjoining Lot 551 in DP 1238818 and the south west corner of adjoining Lot 30 in DP 753178. This main operational section is to be contained within a 150 metre wide band width, approximately, and is proposed for the administration, production, stockpiling and dispatching of quarry rock products. The additional 12 ha of the site supports roads and other supporting infrastructure while the quarry itself lies within a 308 ha allotment of land. The proposed development specifically involves the following:

- ◆ Construction and operation of the operational area which includes:
 - Section A - Administration offices, amenities, wash bay, 27 m weighbridge and car parking areas for truck, office staff and customers.
 - Section B – Quarry production mechanics workshop, office, amenities, wash bay, fuel tank and car parking areas for machinery and quarry workers.
 - Section C – Dimension stone storage area.
 - Section D – Crushing and stockpile areas.
 - Section E – Premium products storage area.
 - Road and fencing construction including construction of new access to The Bucketts Way .
 - Clearing, rock breaking and transporting rock to the operational area.
 - Rock crushing and screening
 - Sedimentation and dust control
- ◆ All works to comply with the various government department requirements and the MidCoast Council regulations and requirements.

The development concept plans of the operational area are shown in **Attachment A**.

9.0 TRAFFIC GENERATION

The quarry is expected to quarry product 49 weeks of the year, 5.5 days per week. The quantity hauled, using 32 tonne truck and dog haulage vehicles, is estimated to be an average of 10,200 tonnes per week or 1,800 tonnes per day. The tonnage per day would vary greatly however a maximum of 4,000 tonnes could be supplied on any given day based on customers' needs. This maximum quantity would equate to a maximum peak of approximately 110 haulage vehicles leaving the quarry on a peak demand day and approximately 55 haulage vehicles on an average day. The highest peak hour traffic volume would be no greater than 25 laden haulage vehicles exiting in a peak hour based on loading / weighing dispatch times. It is important to realise this will not occur every day and every hour but would be a short term peak associated with a number of concurrent major orders.

It is anticipated that 10 staff would be employed for the operation of the quarry with approximately 6 inward deliveries / visitors per day in addition to the haulage truck trips

Summarising, the proposed traffic generation increase as a result of this development will be:

Daily Vehicles

- ♦ 220 vtpd (110 x 2 truck pick up plus delivery) + 20 vtpd (10 x 2 employees) + 12 vtpd (6 x 2 service / other delivery / visitors) = **252 vtpd**.

Peak Hour Vehicles

6 AM – 7 AM & 3.45 PM to 4.45 PM

- ♦ 50 vtpd (quarry) + 10 vtpd (employees) + 2 vtpd (service / visitors) = **62 vtpd**.

8 AM – 9 AM period & 2 PM – 3 PM

- ♦ 50 vtpd (quarry) + 4 vtpd (service / visitors) = **54 vtpd**

Before carrying out any traffic assessment the additional peak hour traffic generated by the development needs to be distributed through the adjoining road network. This involves making assumptions as to distribution patterns to and from the development. In distributing the peak hour traffic through the adjacent road network, the following assumptions have been made for this site. There may be some other traffic movements performed by peak hour traffic that have not been included in this assessment however these are considered to have an insignificant impact.

- ♦ Traffic at the quarry access will have origin / destinations 95% The Bucketts Way south and 5% The Bucketts Way north
- ♦ The Bucketts Way south traffic will have origin / destinations 80% west at the Pacific Highway and 20% east.
- ♦ In the 6-7 AM peak hour, truck traffic will be 50% inbound and 50% outbound, staff and visitors will be 100% inbound.
- ♦ In the 8-9 AM peak hour, truck traffic will be 50% inbound and 50% outbound, visitors will be 50% inbound and 50% outbound.
- ♦ In the 2-3 PM peak hour, truck traffic will be 50% inbound and 50% outbound, staff and visitors will be 100% outbound.

These assumptions will result in the additional trip distributions shown in **Figure 3** for the relevant traffic movements.

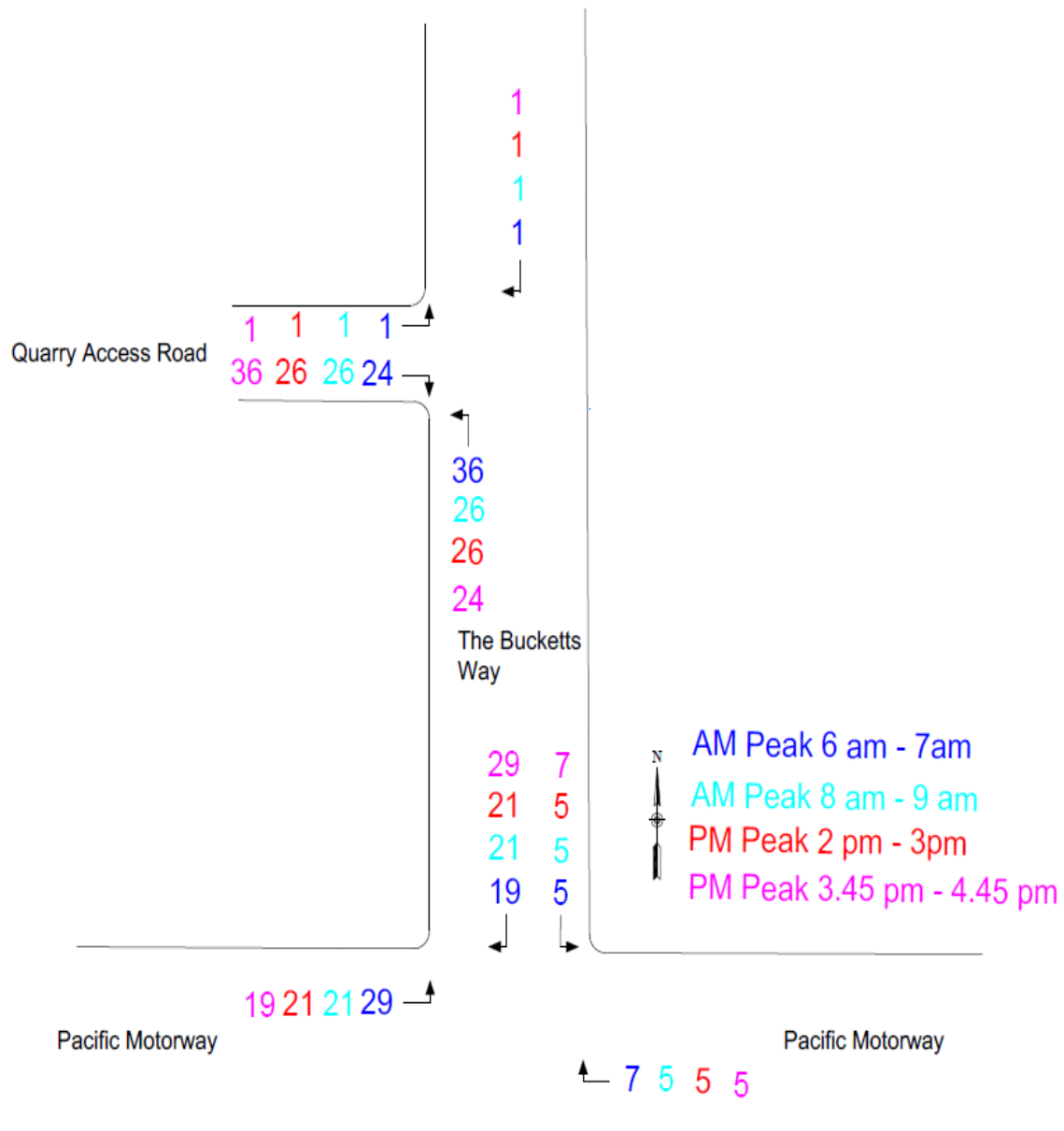


Figure 3 – Development Traffic Distribution

The cumulative impacts of known developments in the area within this assessment are catered for with the adoption of a 2 % per annum background traffic growth. Historically in recent years The Bucketts Way has experienced little if any growth as development in the area has been minimal. Therefore the adoption of a 2 % per annum traffic growth is considered conservative. At the time of drafting this report the only known other significant development that could proceed in the area is the nearby Hillview Quarry however there is still no certainty that this development will proceed. Therefore it is considered the 2 % per annum traffic growth assumption for future traffic conditions would cater for future other developments in the area including Hillview quarry particularly when extended through to 2052 and no other traffic increase need be applied.

10.0 TRAFFIC IMPACTS OF DEVELOPMENT

The main traffic impacts of a quarry development lie in the areas of traffic efficiency, amenity, road safety, road pavements and alternate transport modes. Within these areas the main issues usually relate to the levels of service (LoS) experienced on the road network particularly at intersections, the impacts of road noise and dust, the geometric standards of the haulage routes, the construction standard of the haulage routes and the availability and accessibility to alternate transport modes.

10.1 Traffic Efficiency

From the assessment of existing traffic volumes as well as road and intersection capacity it can be seen that the local road network around the site is currently operating at good levels of efficiency. The combination of low traffic volumes and a suitable standard of road construction mean that motorists on the local road network experience a good level of service with little or no delays.

As this proposal only results in an increase of up to 252 vtpd or 62 vtph during peak sales days on the road network it will not cause the two way mid-block technical capacity of the road network to be reached therefore satisfactory levels of LoS will still be experienced by motorists on the road network after the construction and operation of the quarry as demonstrated in **Table 4** below. By 2052 The Pacific Highway mid-block capacity MAY be reached in the PM peak may be reached requiring the provision of additional travel lanes however this would be dependent on the accuracy of the background traffic growth assumption made in this assessment. As this occurs with or without the development it is the responsibility of the road authority to undertake this work albeit a nexus would exist for a fair and reasonable contribution from the quarry to the works.

Table 4 – Two way mid-block road capacity assessment.

Road	Section	Capacity vtph	2020 AM	2020 PM	2030 AM	2030 PM	2052 AM	2052 PM	Development	
			peak vtph	peak vtph	peak vtph	peak vtph	peak vtph	peak vtph	AM	PM
The Pacific Highway	East of The Bucketts Way	2820	1266	1505	1541	1832	2375	2826	12	12
The Pacific Highway	West of The Bucketts Way	2820	1498	1838	1816	2230	2781	3421	48	48
The Bucketts Way	North of The Pacific Highway	970	324	407	382	483	558	714	60	60

In regard to The Pacific Highway / The Bucketts Way intersection the impact of the additional traffic has been assessed using the Sidra Intersection models established for the intersection as reported in **Section 6**. The additional development traffic has been added to the models as detailed in the trip distribution diagram shown in **Figure 3** of **Section 9**.

Assumptions made in this modelling were:

- ◆ Left turn slip lane from The Pacific Highway and the left turn lane on The Bucketts Way added to intersection configuration.
- ◆ Background traffic growth 2% per annum.
- ◆ As the intersection fails without development traffic by the likely end of the quarry life, 2052 modelling post development has not been undertaken as it has already been established that nexus exist for the development to pay a fair and reasonable contribution to any future upgrading of the intersection.

The results of the modelling are summarised in **Table 5** below. The Sidra movement summary tables are provided in **Attachment D**.

Table 5 –Sidra results – The Pacific Highway / The Bucketts Way T Intersection plus quarry

Scenario	Deg. Satn (v/c)	Worst Average Delay (sec)	Worst Leg Level of Service	95 % Back of Queue (veh)
2020 AM - 6 am - 7 am + dev	0.229	11.3	LoS A	0.4
2020 AM - 8 am - 9 am + dev	0.322	14.9	LoS B	0.7
2020 PM - 2 pm - 3 pm+ dev	0.381	21.3	LoS B	0.8
2020 PM – 3.45 pm – 4.45 pm + dev	0.422	21.4	LoS B	0.9
2030 AM - 6 am - 7 am + dev	0.290	12.5	LoS A	0.6
2030 AM - 8 am - 9 am + dev	0.469	19.4	LoS B	1.1
2030 PM -2 pm – 3 pm + dev	0.579	31.7	LoS C	1.3
2030 PM – 3.45 pm – 4.45 pm+ dev	0.704	38.8	LoS C	1.7

This modelling shows that the intersection will continue to operate satisfactorily post development during peak trading periods for the quarry through to at least 2030 with the average delay, levels of service and queue lengths for all movements remaining within the criteria determined by the TfNSW as representing satisfactory operation. It is noted that during the AM peaks there is no deterioration in overall LoS for the intersection while in the PM peak the LoS drops from B to C. However a LoS C is still satisfactory operation of the intersection and average delays only increase by up to 18 seconds while queue lengths increase by less than 1 vehicle.

In analysing the modelling results it is noted that the only turn movement that is adversely impacted is the right turn movement out of The Bucketts Way. Therefore by 2052 when the intersection may be failing in the PM peak a simple option to return the intersection to satisfactory operation and thus safety would be to physically impede the right turn movement out of The Bucketts Way ensuring all vehicles exiting The Bucketts Way are forced to turn left (north). Any vehicles with a destination to the south could then utilise the Karuah interchange of the Pacific Highway to conveniently undertake a safe U-turn movement.

The peak hour traffic at the private access to the Deep Creek Quarry development will be a maximum of 472 vtp/h on the Bucketts Way in 2030 and approximately 62 vtp/h on the new access road which indicates uninterrupted flow conditions at the private access intersection as the peak traffic volumes fall well below the thresholds for uninterrupted flow conditions contained in the following table sourced from Austroads *Guide to Traffic Management – Part 6 – Intersections, Interchanges & Crossings* (2009).

Major road type ¹	Major road flow (vph) ²	Minor road flow (vph) ³
Two-lane	400	250
	500	200
	650	100
Four-lane	1000	100
	1500	50
	2000	25

Notes:

1. Major road is through road (i.e. has priority).
2. Major road flow includes all major road traffic with priority over minor road traffic.
3. Minor road design volumes include through and turning volumes.

Source: - Austroads *Guide to Traffic Management – Part 6 – Intersections, Interchanges & Crossings* (2009)

Therefore the proposed quarry access will not adversely impact on the local and state road network. A turn lane warrant assessment for the access using 2030 traffic volumes and in accordance with Austroads *Guide to Road Design Part 4A Signalised and unsignalised intersections* has determined that the access will be required to be constructed to a CHR(s) / AUL standard particularly given the

heavy vehicle use on the quarry access road. The proposed development provides this standard of access as shown in **Attachment C**.

10.2 Amenity

Amenity issues for adjoining residents in regard to the traffic generated by a development usually relate to traffic noise and dust generation. In regard to dust generation the complete haulage route is proposed to be sealed as such dust generated from the haulage traffic will be insignificant provided all loads are covered as required by law in NSW. The only dust generation issue from this development will relate to the internal operations of the quarry which will be covered in a separate air quality impact report which will accompany this application.

In terms of road noise the operation of large haulage trucks can generate significant noise particularly when returning to the quarry empty. Similarly the internal operations of the quarry can also generate noise issues for adjoining residents. Both these issues will be covered in a separate noise impact report which will accompany this application.

It should also be noted that the traffic volumes on the local road network are within the environmental road noise threshold levels of 200 vph to 300 vph for local roads and 300 vph to 500 vph for collector roads quoted within the *RTA's Guide to Traffic Generating Developments*.

Much of the road noise issues and residential amenity issues associated with heavy vehicle traffic can be controlled through the preparation and implementation of a Traffic Management Plan and Driver Code of Conduct for the quarry. This document would give the quarry the ability to enforce road noise minimisation practices as well as control the number of vehicles leaving the site at any one time. Such a requirement would be recommended in any approval issued for the construction of the proposed quarry.

10.3 Quarry Access Intersection

The proposal is to construct a channelised right turn (CHR) / auxiliary left turn quarry access intersection of The Bucketts Way approximately 850 metres north-east of Deep Creek Road as shown in the Northrop concept plans shown in **Attachment C**. This standard of rural intersection is warranted due to the high percentage of heavy vehicle traffic using the intersection. With traffic volumes on The Bucketts Way less than 500 vph and traffic volumes using the quarry access road less than 62 vph this intersection would operate with uninterrupted flow conditions and no further intersection analysis is required.

10.4 Road Safety

In terms of road safety the main issues that need to be considered are type of traffic, road geometry and intersection safety. An increase in traffic volumes increases the risk of traffic accidents and thus impacts on the standard of road geometry required for the road. The road geometry impacts on the safe travelling speed in a number of ways including horizontal alignment, vertical alignment and lane widths. Intersections represent the major traffic conflict points on a road network and thus are a location of increased accident risk.

Greg Baird & Associates undertook a Road Safety Audit (RSA) of The Bucketts Way from the extents of the proposed quarry access road to the Pacific Highway including the Pacific Highway / The Bucketts Way intersection. This audit was undertaken on the basis of the road network condition and layout as at the date of the audit and did not include some improvements undertaken at the intersection post audit date. The full RSA is provided in **Attachment E** however, a summary of the findings is listed below.

- ◆ The existing right turn lane on the Pacific Highway at The Bucketts Way intersection was only 110 metres long but needs to be 155 metres for comfortable deceleration.
- ◆ There is no acceleration lane for left turning vehicles out of The Bucketts Way onto the Pacific Highway.

- ◆ There is no hold line for the southbound highway right turn lane into The Bucketts Way to provide guidance on where to stop. Line marking at the seagull island is faded.
- ◆ On the day and night of the audit, the width marker (D4-3) signs on the Limeburner's Creek Bridge were observed to be rotated and not visible in the direction of travel. As well, no reflectors were observed delineating the older style bridge railing.
- ◆ The available safe intersection sight distance (SISD) to and from the north of the proposed quarry access intersection on The Bucketts Way appears to be about 195 m, suitable for a travel speed of about 85 km/h. However, the proposed intersection layout includes a CHR(S) right turn lane for vehicles waiting to enter the quarry access and a southbound acceleration lane for vehicles turning right to exit the quarry access. The right turn and acceleration lane remove potential conflict between southbound through traffic and traffic entering or leaving the proposed quarry access. Double barrier lines prohibit overtaking in the southbound approach to the proposed intersection. Sight distance to and from the south of the proposed quarry access is satisfactory.
- ◆ The drawings show a 370 m long acceleration lane for vehicles exiting the quarry access intersection southbound (turning right), including merge taper. Assuming a 3.1 m wide acceleration lane and a 3% downgrade (as shown on the drawings), Austroads guidelines indicated that the proposed acceleration lane length will allow a heavy vehicle to accelerate to between 70 km/h and 75 km/h by the start of the taper. As sight distance to and from the merge is satisfactory, a merging speed of 70 km/h to 80 km/h is considered acceptable.
- ◆ At the time of the audit the new central island in The Bucketts Way was not painted or delineated. Some edge lines on The Bucketts Way were also yet to be completed.
- ◆ An existing two cell pipe culvert crosses under The Bucketts Way, in the area requiring widening for the acceleration lane. While not directly affected by construction, the existing western side headwall is within the clear zone and opposite the proposed merge. Once the final merge geometry and headwall locations are determined, both headwalls should be assessed to determine whether safety barrier protection is required.

It is expected that the issues raised with respect to the Pacific Highway / The Bucketts Way intersection would be resolved as part of the current TfNSW works on the intersection. The other matters will be addressed at detailed design stage of the quarry access intersection with The Bucketts Way.

10.5 Pavement Construction

The haulage route appears to be constructed of a suitable pavement for use by heavy vehicles given the existing condition of the road network and its current use by heavy vehicles. A visual assessment of the road pavement along the haulage route indicated that there were no major failures or areas of deterioration except where minor shoulder drainage was causing problems. This may be more a result of irregular shoulder construction and maintenance practices rather than as a result of the heavy vehicle usage although it will be impacting on the extent of damage being caused.

It is therefore considered that the road pavements on the existing haulage route from the quarry to the arterial road network are satisfactory.

10.6 Construction Traffic

Construction traffic generated by the development will not be significant. The construction tasks associated with the proposal will involve:

- ◆ Construction of new access and access intersection at the Bucketts Way,
- ◆ Construction of new buildings at the operational section of the site,
- ◆ Construction of compound areas on the site,
- ◆ Construction of environmental controls on the site, and
- ◆ Construction of security fencing.

Traffic generated by the construction would involve contractor traffic and include some plant e.g. excavator, roller, grader, tip trucks as well as utility and employee traffic. With a maximum of 10 to

12 construction contractors on site at any one time peak hour traffic volumes associated with the construction work would be less than 10 vtpd with daily traffic movements unlikely to exceed 30 vtpd. Works would be short term as the construction period would be expected to last up to 6 months.

Initially some construction would be required to utilise Deep Creek Road to access the site until such stage as the new access is constructed to a suitable standard for construction vehicles. Deep Creek Road will need to be maintained to a suitable traversable standard during this time to minimise any impacts on neighbouring properties. Due to load limits on Deep Creek, some earth moving equipment may need to be floated into the property through the existing access off Forest Glen Road.

This level of construction traffic is considered minor and as a short term impact would not adversely impact on the local road network. Safety issues could be managed by a Construction Traffic Management Plan for the construction tasks that would include traffic control plans where required.

10.7 Alternative Transport Modes

As previously discussed in this report accessibility to alternate transport modes for the development site is considered poor. No specific bicycle or pedestrian infrastructure is provided to the site and the public transport service to the site is also not provided. The proposal does not increase the demand for alternate transport modes therefore it is considered that no new alternative transport mode infrastructure will be required resulting from the construction of the proposed quarry.

11.0 CONCLUSION

This traffic impact assessment for a proposed hard rock quarry on Lot 48 in DP 753178 and Lot 472 in DP 1162208 - 279 Deep Creek Road, Limeburners Creek has determined the following.

- ◆ The proposed quarry will have a production capacity cap of up to 500,000 tonnes per year.
- ◆ Traffic generated by sales from the quarry during major sale day's is expected to average 252 vtpd with an AM and PM peak of 62 vtpd.
- ◆ The main haulage route used for transporting the extracted material from the site will be south along The Bucketts Way to The Pacific Highway and then west along The Pacific Highway at Raymond Terrace.
- ◆ Current peak period traffic volumes around the site have been measured as:
 - The Pacific Highway west of the Bucketts Way – 1,493 vtpd
 - The Pacific Highway east of the Bucketts Way – 1,790 vtpd; and
 - The Bucketts Way south of the quarry – 347 vtpd.
- ◆ Heavy vehicle traffic on the local road network around the site was found to be in the order of 8% to 13 % of total traffic.
- ◆ The addition of the development traffic onto the network will not adversely impact on the two-way mid-block traffic volumes and levels of service experienced by motorists on the Pacific Highway and The Bucketts Way through to and beyond 2030. However by 2052 with likely traffic growth the mid-block capacity of the Pacific Highway may be reached requiring the provision of additional travel lanes. As this occurs with or without the development it is the responsibility of the road authority to address this matter albeit a nexus would exist for a fair and reasonable contribution to the future works being required of the quarry developer.
- ◆ Sidra Intersection modelling of The Pacific Highway / The Bucketts Way intersection has shown that it currently operates satisfactorily in the key AM and PM peak periods and would continue to do so through to and beyond 2030 with normal background traffic growth and with the additional traffic generated by the quarry. Modelling through to 2052 shows the intersection would be failing with or without the quarry traffic during the PM peaks and upgrading works to the intersection may be required. Again as this occurs without the development traffic it is the responsibility of the road authority to address this issues albeit a nexus exists for the quarry operator to provide a fair and reasonable contribution to the future upgrading works. These works may be as simple as physically prohibiting the right turn movement out of The Bucketts

Way and forcing southbound traffic to undertake a safe and convenient U-turn movement using the Karuah interchange on the Pacific Highway.

- ◆ The local and state road network therefore has sufficient spare capacity to cater for the proposed quarry through to at least 2030.
- ◆ Much of the road noise issues and residential amenity issues associated with heavy vehicle traffic can be controlled through the preparation and implementation of a Traffic Management Plan and Driver Code of Conduct for the quarry.
- ◆ The majority of the local and state road network servicing the site is in good condition and is considered suitable in terms of road geometry, speed zoning and pavement construction for use by traffic generated by the quarry.
- ◆ Construction traffic generated by the development is minor and unlikely to exceed 20 vtpd. Construction works would not be expected to last for longer than 6 months therefore is a short term impact. Construction traffic management plans prepared for the construction works would alleviate any concerns relating to the impacts of construction traffic, including the use of Deep Creek Road for access with the initial construction works and the initial floating of some heavy equipment into site via Forest Glen Road.
- ◆ Alternative transport modes available to the site are non-existent and would not provide any benefit to the proposal. Therefore no additional infrastructure requirements in regard to alternative transport modes would be required.

12.0 RECOMMENDATION

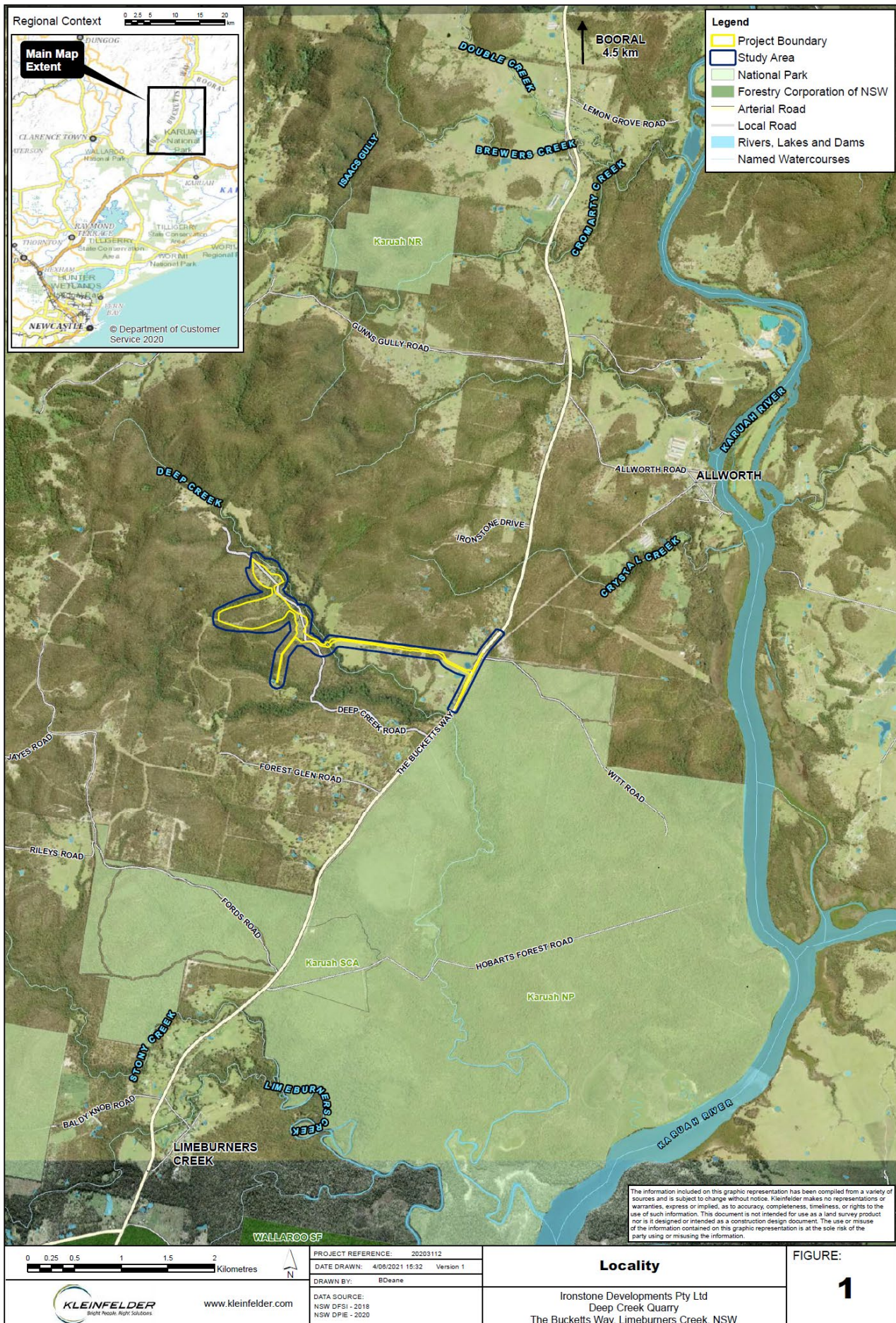
Having carried out this traffic impact assessment for a proposed new hard rock quarry on Lot 48 in DP 753178 and Lot 472 in DP 1162208 - 279 Deep Creek Road, Limeburners Creek can be supported as it will not have an adverse impact on the local and state road network in the vicinity of the site and complies with all requirements of MidCoast Council, Austroads and NSW Roads and Maritime Services (RMS).

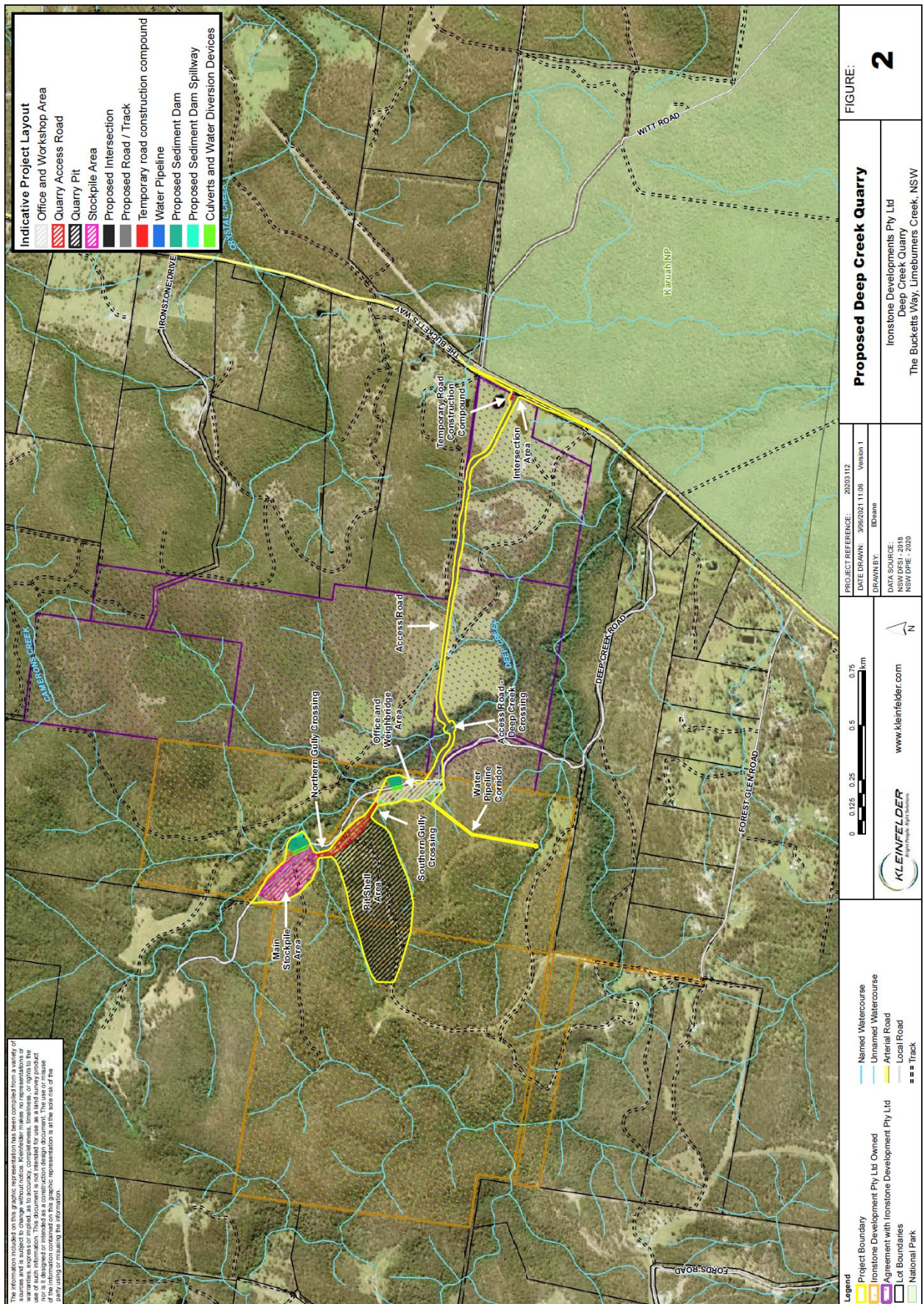


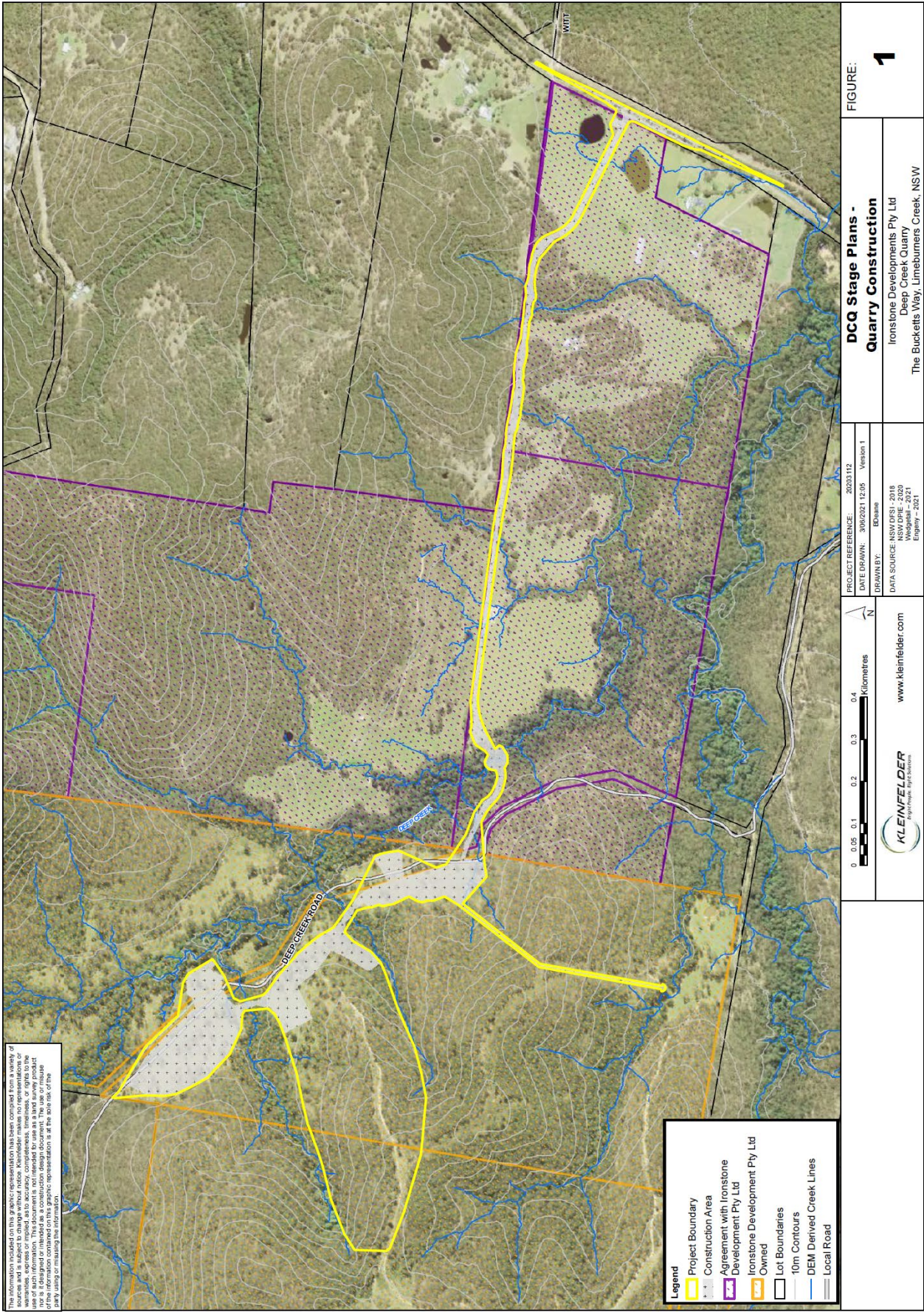
Jeff Garry BE, Masters of Traffic
Director
Intersect Traffic Pty Ltd

ATTACHMENT A

Operational Area Concept Plans







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ATTACHMENT B

Traffic Count Data

22/2/2019 - PACIFIC HWY / BUCKETTS WAY, KARUAH

9:00 <<< HOUR ENDING

Friday

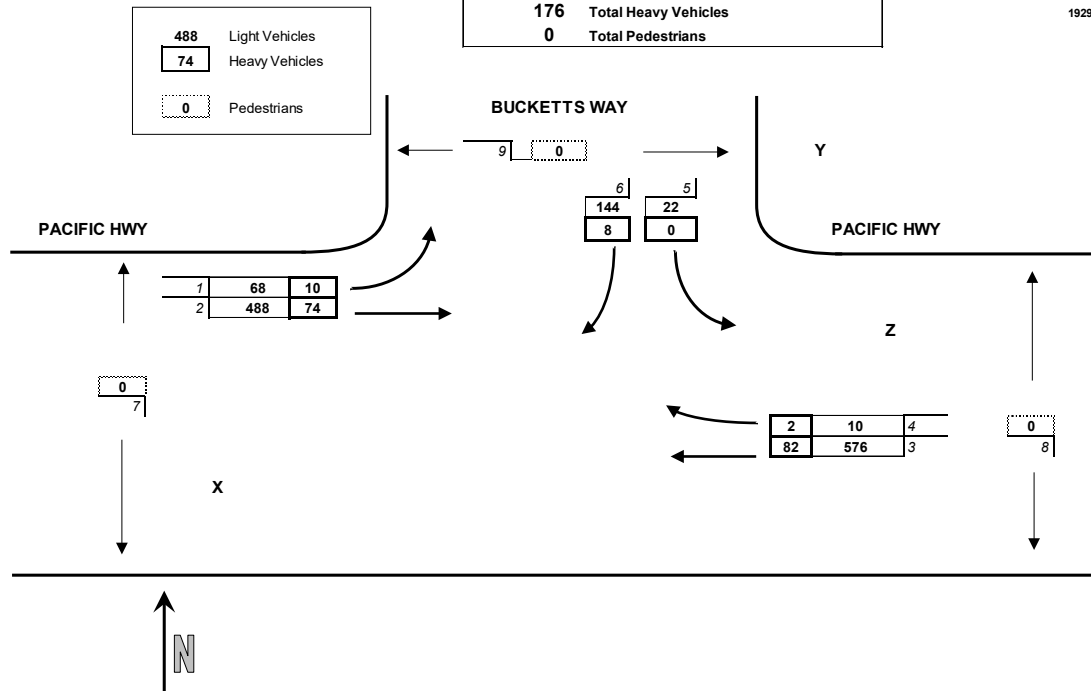
Summary:

PACIFIC HWY / BUCKETTS WAY

1308 Total Light Vehicles
176 Total Heavy Vehicles
0 Total Pedestrians



Quality Surveys
192950



22/2/2019 - PACIFIC HWY / BUCKETTS WAY, KARUAH

Light Vehicles								Total Vehicles			Pedestrians		
1	2	3	4	5	6	15 MIN HOUR		7	8	9	7	8	9
06:15	15	58	60	1	3	26	163	0	0	0	0	0	0
06:30	12	61	83	5	4	28	193	0	0	0	0	0	0
06:45	18	68	67	0	2	38	193	0	0	0	0	0	0
07:00	7	89	69	0	3	35	203	0	0	0	0	0	0
07:15	21	84	98	1	1	32	237	0	0	0	0	0	0
07:30	16	110	98	1	1	32	258	0	0	0	0	0	0
07:45	14	108	109	3	2	37	273	0	0	0	0	0	0
08:00	13	108	127	0	2	24	274	0	0	0	0	0	0
08:15	15	114	128	2	4	43	306	0	0	0	0	0	0
08:30	15	129	151	3	2	35	335	0	0	0	0	0	0
08:45	20	119	149	4	9	40	341	0	0	0	0	0	0
09:00	18 <	126 <	148 <	1 <	7 <	26 <	326	0	0	0	0	0	0

Heavy Vehicles								Total Vehicles			Pedestrians		
1	2	3	4	5	6	15 MIN HOUR		7	8	9	7	8	9
06:15	1	16	17	1	0	2	37	0	0	0	0	0	0
06:30	2	26	33	1	1	1	64	0	0	0	0	0	0
06:45	4	19	20	2	1	3	49	0	0	0	0	0	0
07:00	2	16	10	0 <	0	6	34	0	0	0	0	0	0
07:15	2	23 <	26	0	1 <	2	54	0	0	0	0	0	0
07:30	2	16	22	0	0	2 <	42	0	0	0	0	0	0
07:45	2	15	26	1	0	1	45	0	0	0	0	0	0
08:00	5	7	29 <	1	0	0	42	0	0	0	0	0	0
08:15	2	19	22	0	0	2	45	0	0	0	0	0	0
08:30	3	13	15	0	0	2	33	0	0	0	0	0	0
08:45	3 <	25	19	1	0	3	51	0	0	0	0	0	0
09:00	2	17	26	1	0	1	47	0	0	0	0	0	0

All Vehicles								Total Vehicles			Pedestrians		
1	2	3	4	5	6	15 MIN HOUR		7	8	9	7	8	9
06:15	16	74	77	2	3	28	200	0	0	0	0	0	0
06:30	14	87	116	6	5	29	257	0	0	0	0	0	0
06:45	22	87	87	2	3	41	242	0	0	0	0	0	0
07:00	9	105	79	0	3	41	237	0	0	0	0	0	0
07:15	23	107	124	1	2	34	291	0	0	0	0	0	0
07:30	18	126	120	1	1	34	300	0	0	0	0	0	0
07:45	16	123	135	4	2	38	318	0	0	0	0	0	0
08:00	18	115	156	1	2	24	316	0	0	0	0	0	0
08:15	17	133	150	2	4	45	351	0	0	0	0	0	0
08:30	18	142	166	3	2	37	368	0	0	0	0	0	0
08:45	23	144	168	5	9	43	392	0	0	0	0	0	0
09:00	20 <	143 <	174 <	2 <	7 <	27 <	373	0	0	0	0	0	0

Note : Arrows "<" indicate the end time for the peak hour for each turning movement.

21/2/2019 - PACIFIC HWY / BUCKETTS WAY, KARUAH

16:45 <<< HOUR ENDING

Thursday

Summary:

PACIFIC HWY / BUCKETTS WAY

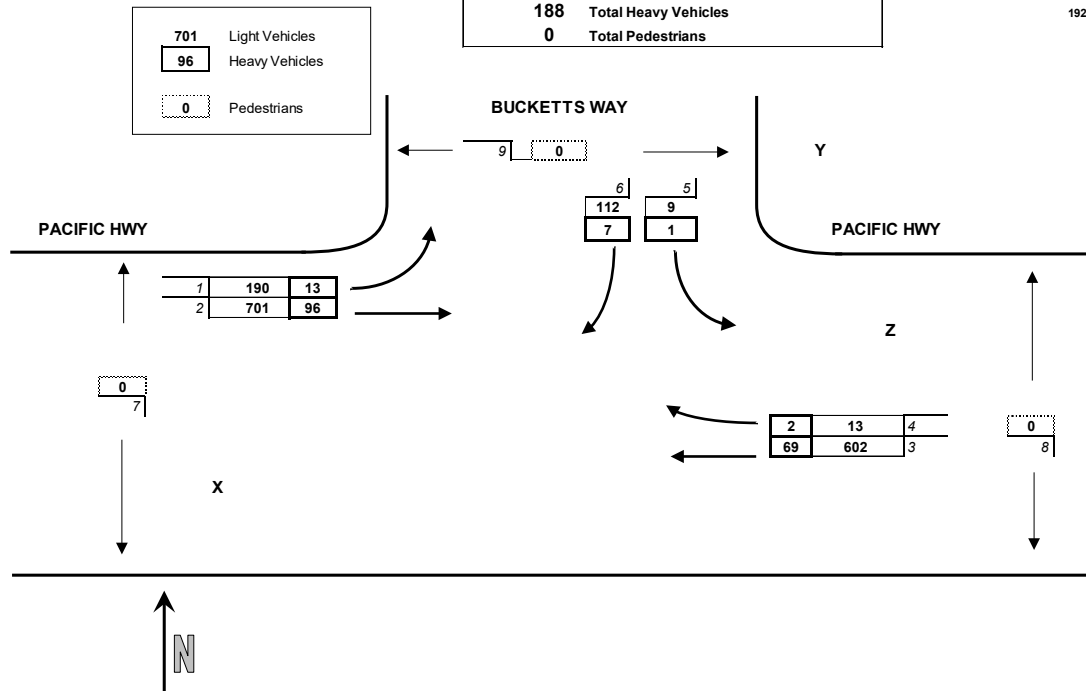
1627 Total Light Vehicles

188 Total Heavy Vehicles

0 Total Pedestrians



Quality Surveys
192950



21/2/2019 - PACIFIC HWY / BUCKETTS WAY, KARUAH

Light Vehicles								Total Vehicles			Pedestrians		
1	2	3	4	5	6	15 MIN HOUR		7	8	9			
14:15	26	158	168	5	5	11	373	0	0	0			
14:30	13	160	167	6	2	36	384	0	0	0			
14:45	33	156	161	4	5	21	380	0	0	0			
15:00	21	157	170 <	1	3 <	24	376 1513	0	0	0			
15:15	28	154	163	7 <	1	28	381 1521	0	0	0			
15:30	38	177	159	3	5	28	410 1547	0	0	0			
15:45	44	167	143	4	2	31	391 1558	0	0	0			
16:00	46	190	155	2	1	20	414 1596	0	0	0			
16:15	34	184 <	146	3	1	36 <	404 1619	0	0	0			
16:30	57	163	140	4	3	22	389 1598	0	0	0			
16:45	53	164	161	4	4	34	420 1627 <	0	0	0			
17:00	49 <	157	141	3	2	23 <	375 1588	0	0	0			

Heavy Vehicles								Total Vehicles			Pedestrians		
1	2	3	4	5	6	15 MIN HOUR		7	8	9			
14:15	4	29	23	0	0	2	58						
14:30	4	27	13	1	1	4	50						
14:45	4	30	19	1	0	2	56						
15:00	2 <	30 <	16	0	0 <	2 <	50 214 <						
15:15	2	28	20	0	0 <	2 <	52 208						
15:30	3	17	17 <	0	0	1	38 196						
15:45	2	31	18	1	0	1	53 193						
16:00	3	25	17 <	0	0	2	47 190						
16:15	1	21	15	1	0	4	42 180						
16:30	6	26	19	1 <	1 <	0	53 195						
16:45	3	24	18	0	0 <	1	46 188						
17:00	2	23	20 <	0	0 <	2	47 188						

All Vehicles								Total Vehicles			Pedestrians		
1	2	3	4	5	6	15 MIN HOUR		7	8	9			
14:15	30	187	191	5	5	13	431						
14:30	17	187	180	7	3	40	434						
14:45	37	186	180	5	5	23	436						
15:00	23	187	186 <	1	3 <	26	426 1727						
15:15	30	182	183	7 <	1	30	433 1729						
15:30	41	194	176	3	5	29	448 1743						
15:45	46	198	161	5	2	32	444 1751						
16:00	49	215	172	2	1	22	461 1786						
16:15	35	205 <	161	4	1	40 <	446 1799						
16:30	63	189	159	5	4	22	442 1793						
16:45	56	188	179	4	4	35	466 1815 <						
17:00	51 <	180	161	3	2	25	422 1776						

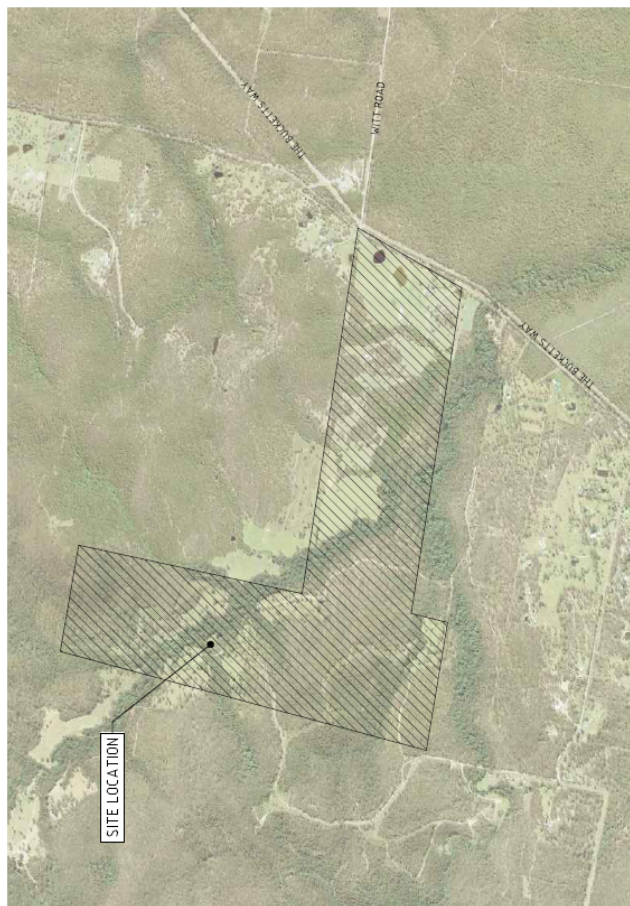
Note: Arrows "<" indicate the end time for the peak hour for each turning movement.

ATTACHMENT C

Quarry Access Concept Plans

DEEP CREEK QUARRY

**THE BUCKETTS WAY, LIMBURNERS CREEK
CIVIL ENGINEERING PACKAGE**



LOCALITY PLAN

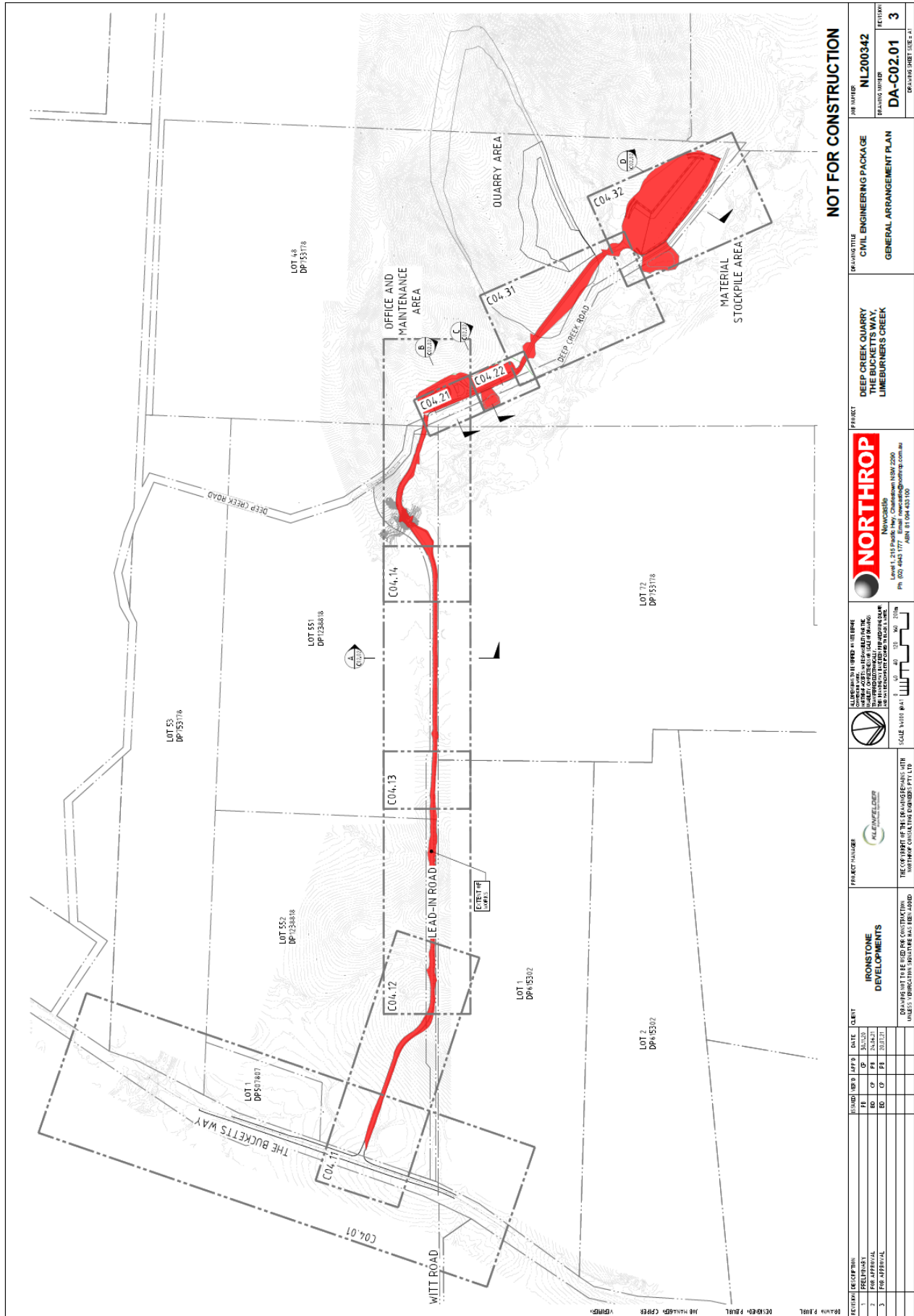
STEF SCHNEIDER, FARMER

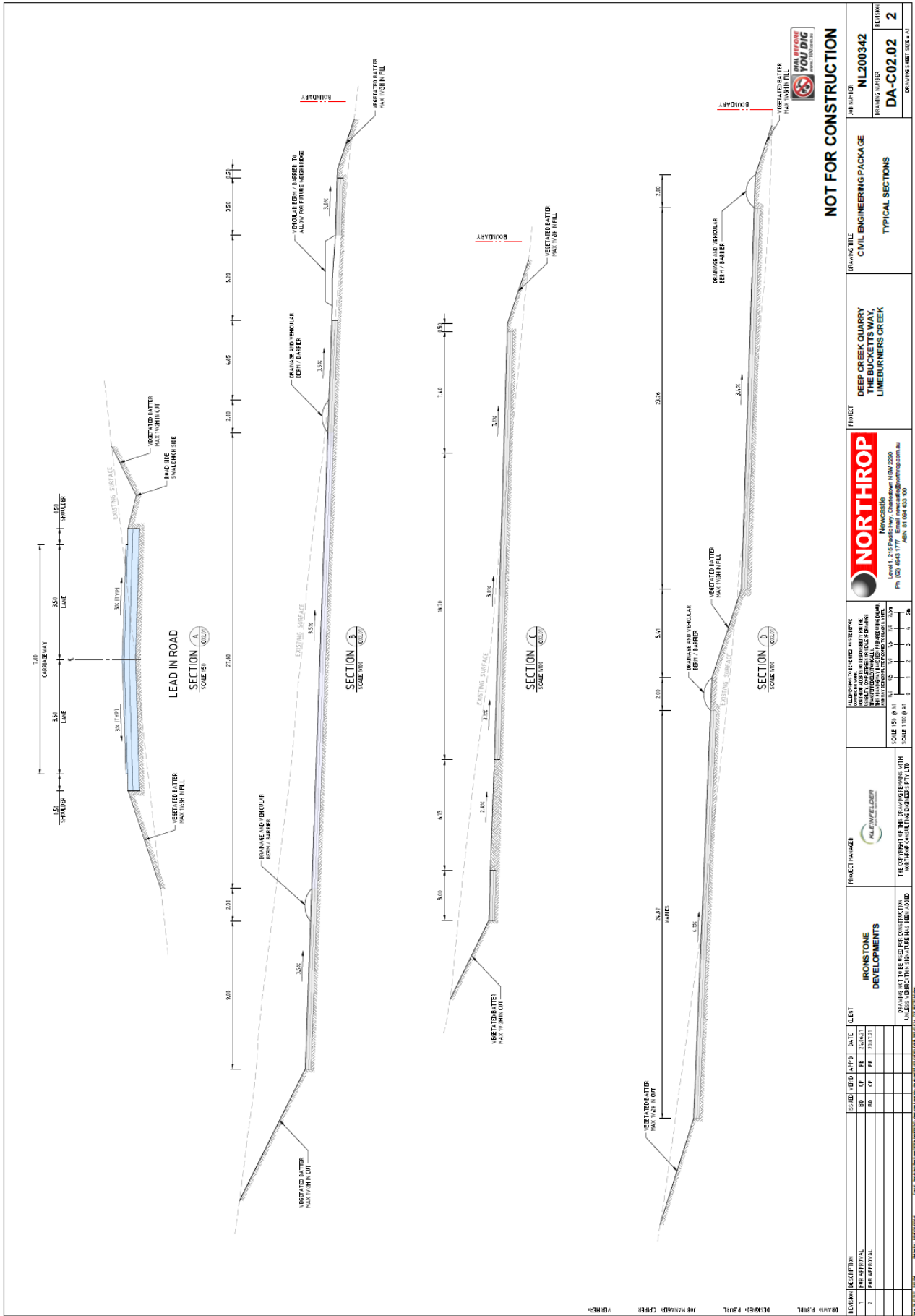
DRAWING LIST

DWG NO.	DRAWING TITLE
WA-C0-01	GENERAL SHEET, DRAWING LIST AND LOCALITY PLAN
WA-C0-01	OVER ARRANGEMENT PLAN
WA-C0-02	TYPICAL SECTIONS
WA-C0-02	BULK EARTHWORKS PLAN - SHEET 1
WA-C0-02	BULK EARTHWORKS PLAN - SHEET 2
WA-C0-02	CIVIL WORKS PLAN - INTERSECTION - SHEET 1
WA-C0-11	CIVIL WORKS PLAN - LEAD-IN ROAD - SHEET 1
WA-C0-12	CIVIL WORKS PLAN - LEAD-IN ROAD - SHEET 2
WA-C0-13	CIVIL WORKS PLAN - LEAD-IN ROAD - SHEET 3
WA-C0-14	CIVIL WORKS PLAN - LEAD-IN ROAD - SHEET 4
WA-C0-21	CIVIL WORKS PLAN - OFFICE - SHEET 1
WA-C0-31	CIVIL WORKS PLAN - STOOPIDE AREA - SHEET 1
WA-C0-32	CIVIL WORKS PLAN - STOOPIDE AREA - SHEET 2
WA-C0-41	CIVIL WORKS PLAN - CULVERT CROSSING - SHEET 1
WA-C0-42	CIVIL WORKS PLAN - CULVERT CROSSING - SHEET 2
WA-C0-43	CIVIL WORKS PLAN - CULVERT CROSSING - SHEET 3
WA-C0-01	CIVIL DETAILS

[illegible]

NOT FOR CONSTRUCTION



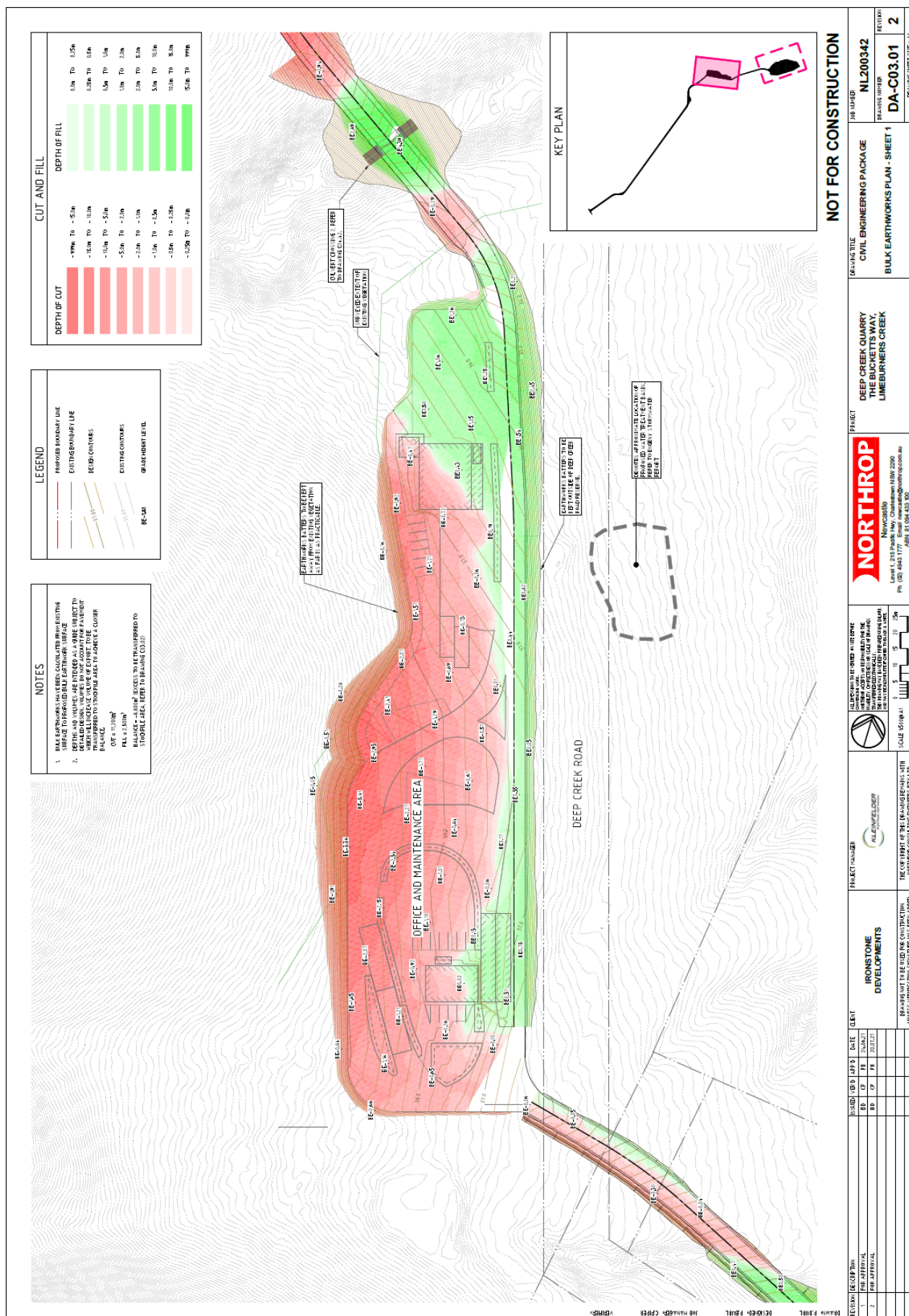


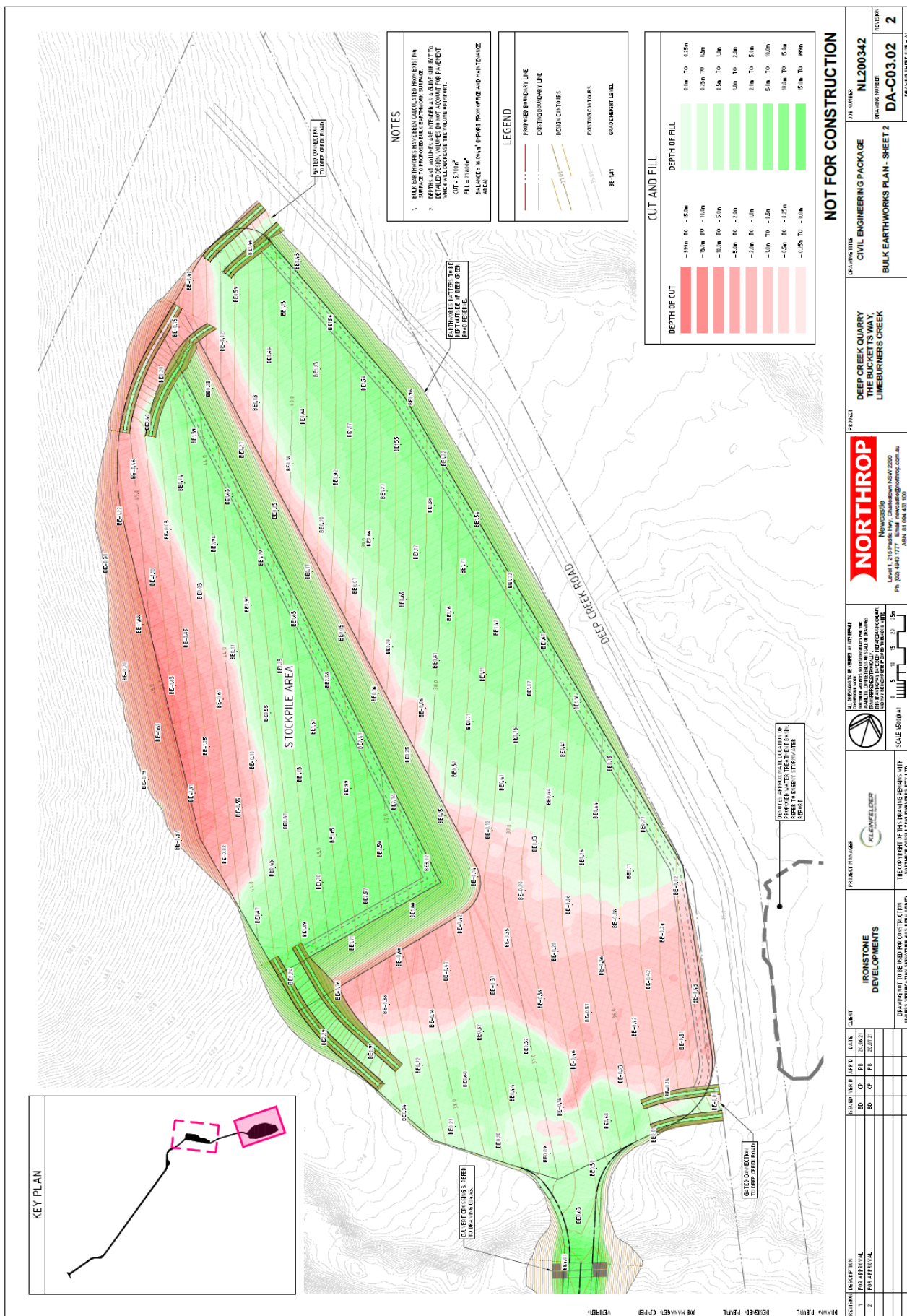
REVISIONS		DATE	BY	CHKD	DATE
1	FOR APPROVAL	20/06/20	PH	PH	20/06/20
2	FOR APPROVAL	20/06/20	PH	PH	20/06/20

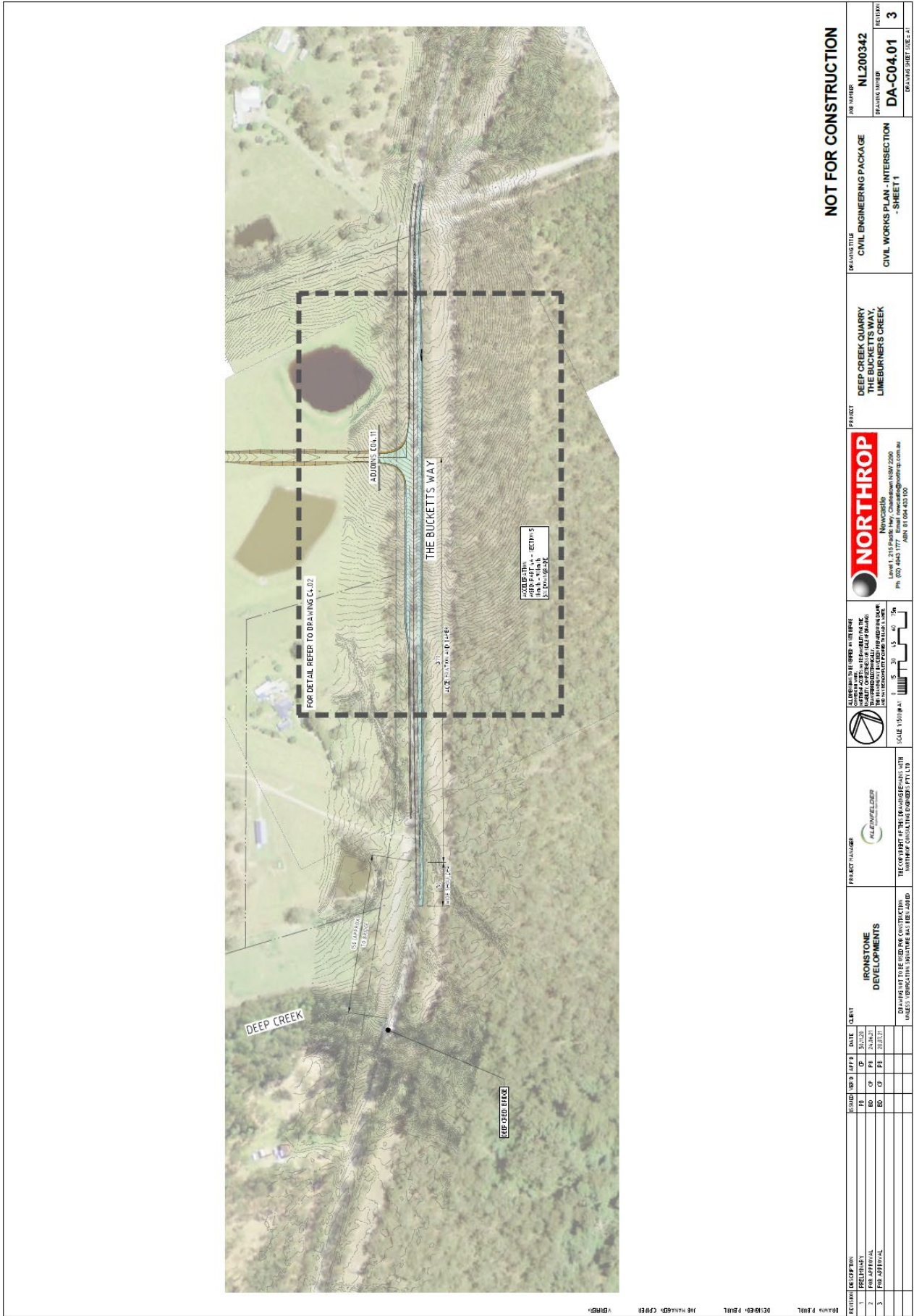
PROJECT NAME	IRONSTONE DEVELOPMENTS
PROJECT MANAGER	ALLENWELDER
CLIENT	IRONSTONE DEVELOPMENTS
DESIGNED BY	IRONSTONE DEVELOPMENTS
DRAWN BY	IRONSTONE DEVELOPMENTS
CHECKED BY	IRONSTONE DEVELOPMENTS
APPROVED BY	IRONSTONE DEVELOPMENTS

PROJECT	DEEP CREEK QUARRY THE BUCKETS WAY, LINEBURNERS CREEK
DRAWING TITLE	CIVIL ENGINEERING PACKAGE TYPICAL SECTIONS
JOB NUMBER	NL200342
DRAWING NUMBER	DA-C02.02
REVISION	2
DRAWING SHEET SIZE	A1

NORTHROP
Level 1, 210 Pacific Hwy, Chateauview NSW 2200
PH: (02) 4960 7777 FAX: (02) 4960 7778
www.northrop.com.au
ABN 81 004 432 800



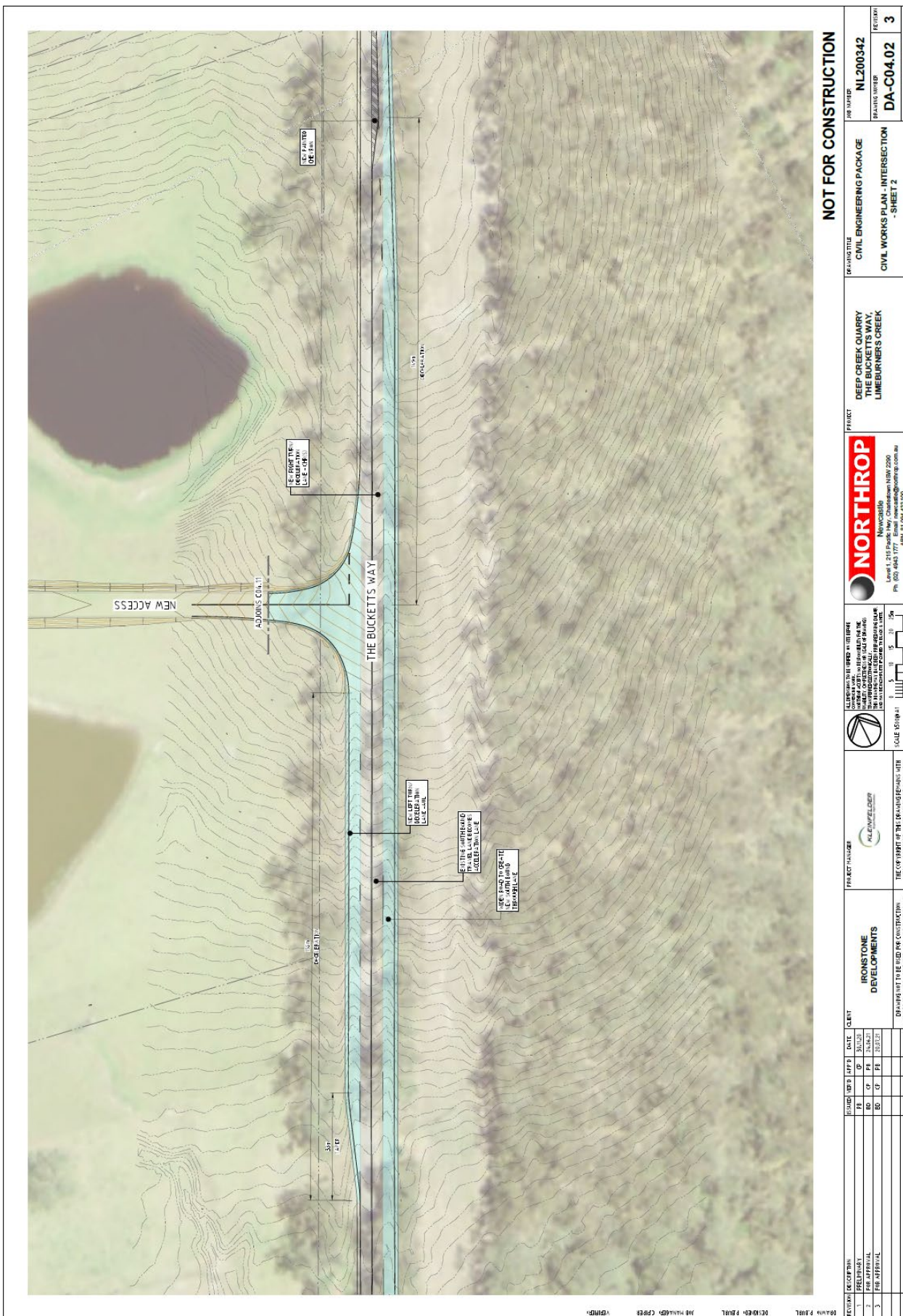


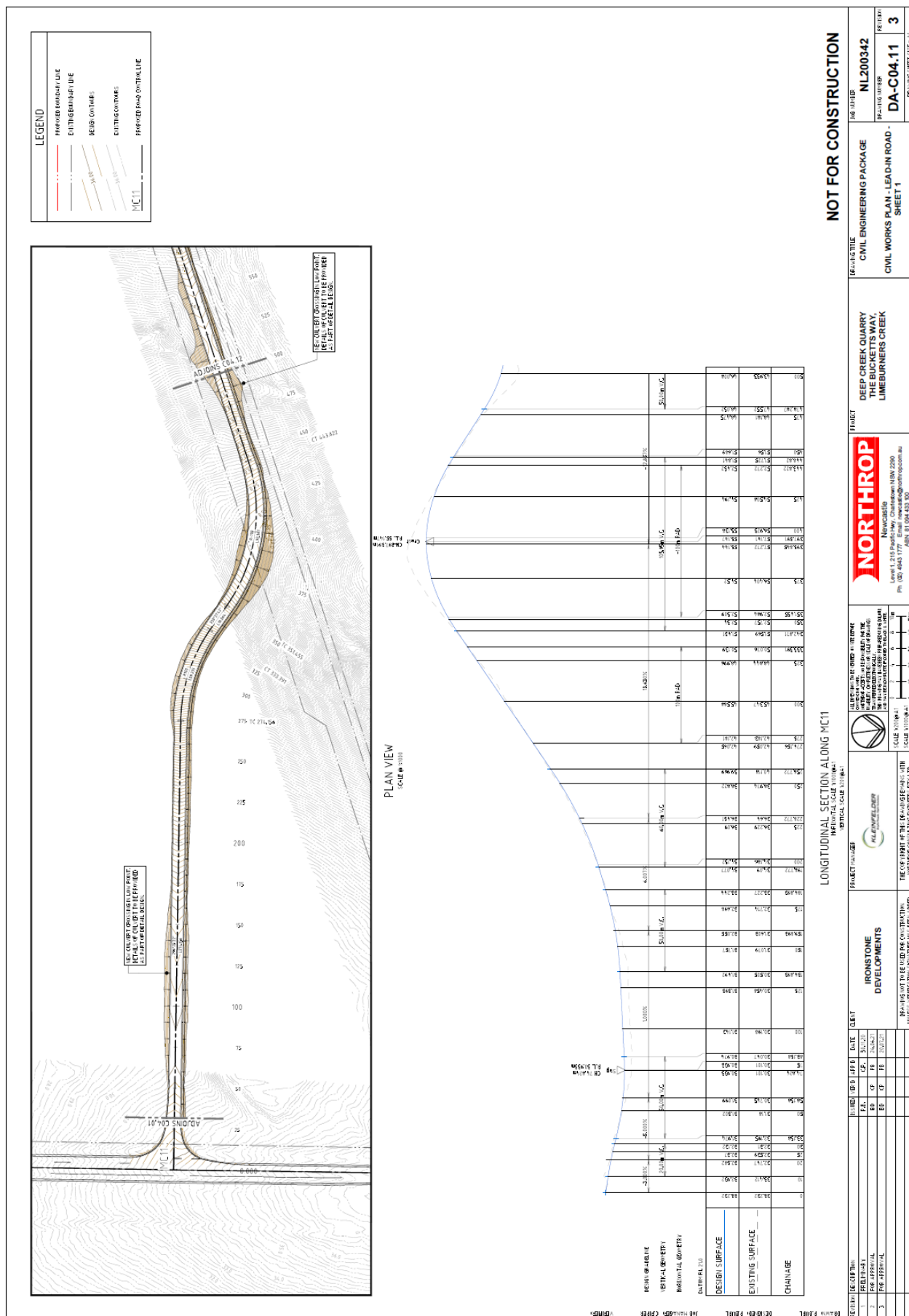


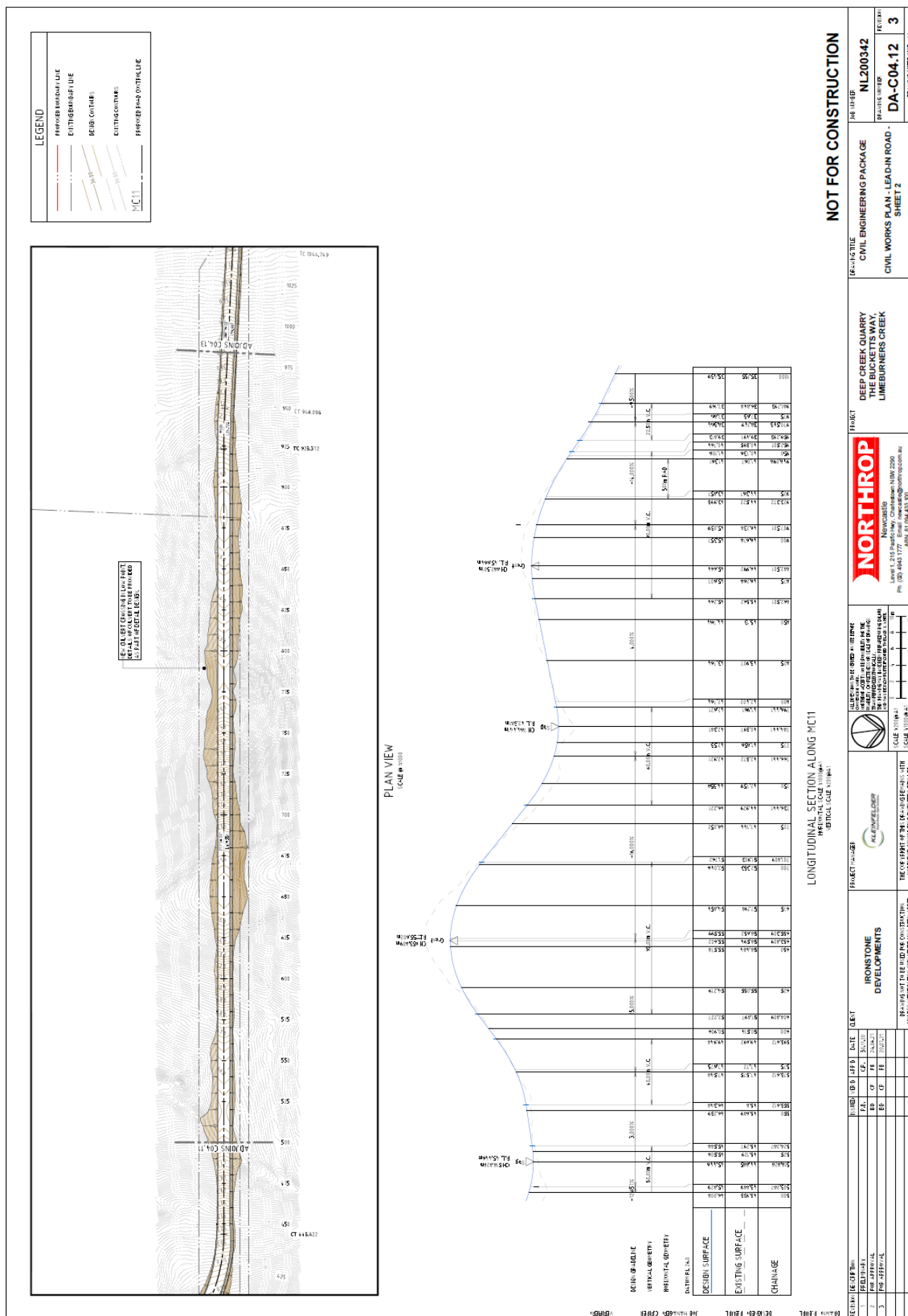
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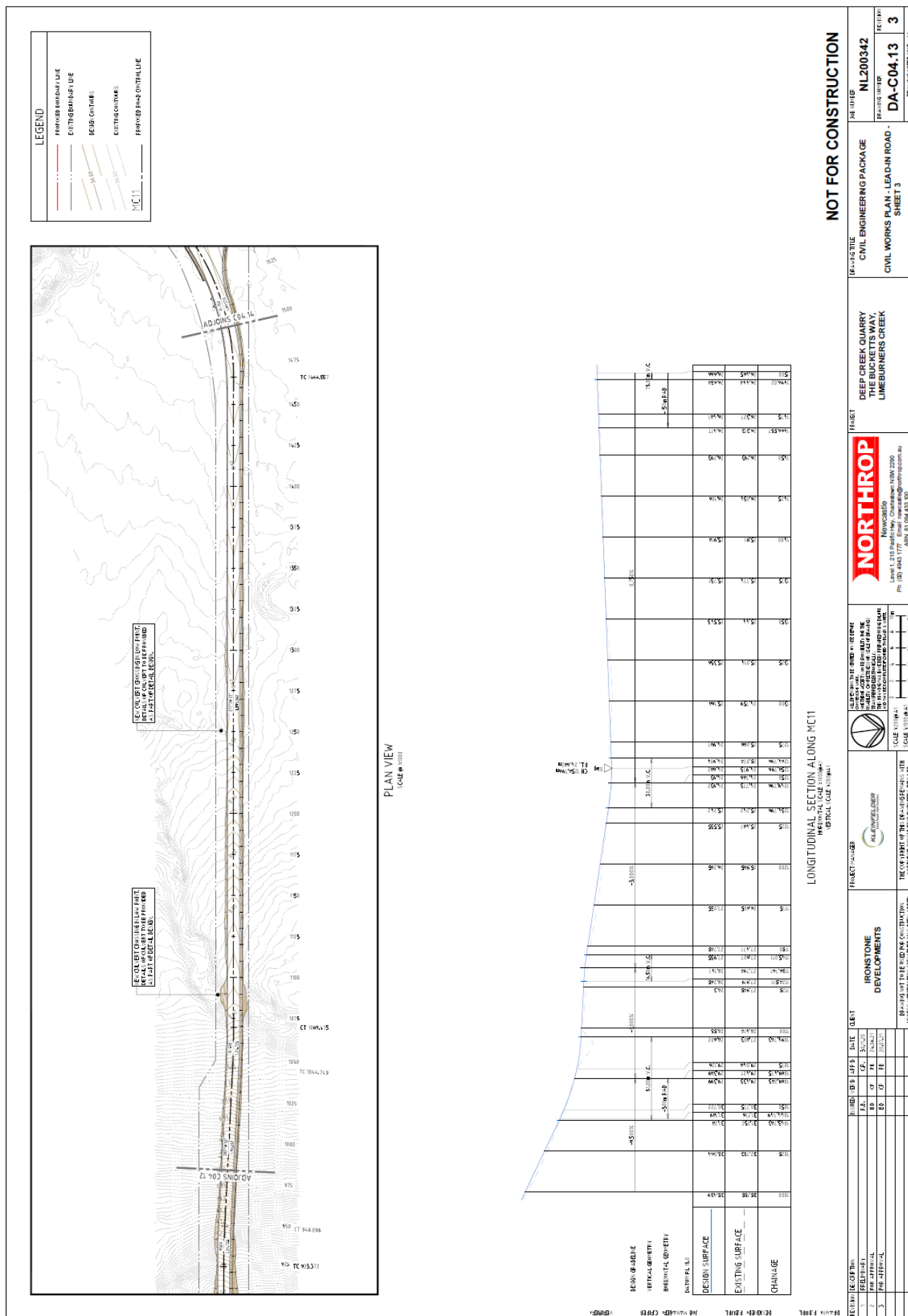
REVISION				CLIENT			
NO.	DESCRIPTION	DATE	BY	NO.	DATE	BY	DATE
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2	FOR APPROVAL	20/02/21	PE	2	20/02/21	PE	20/02/21
3	FOR APPROVAL	20/02/21	PE	3	20/02/21	PE	20/02/21

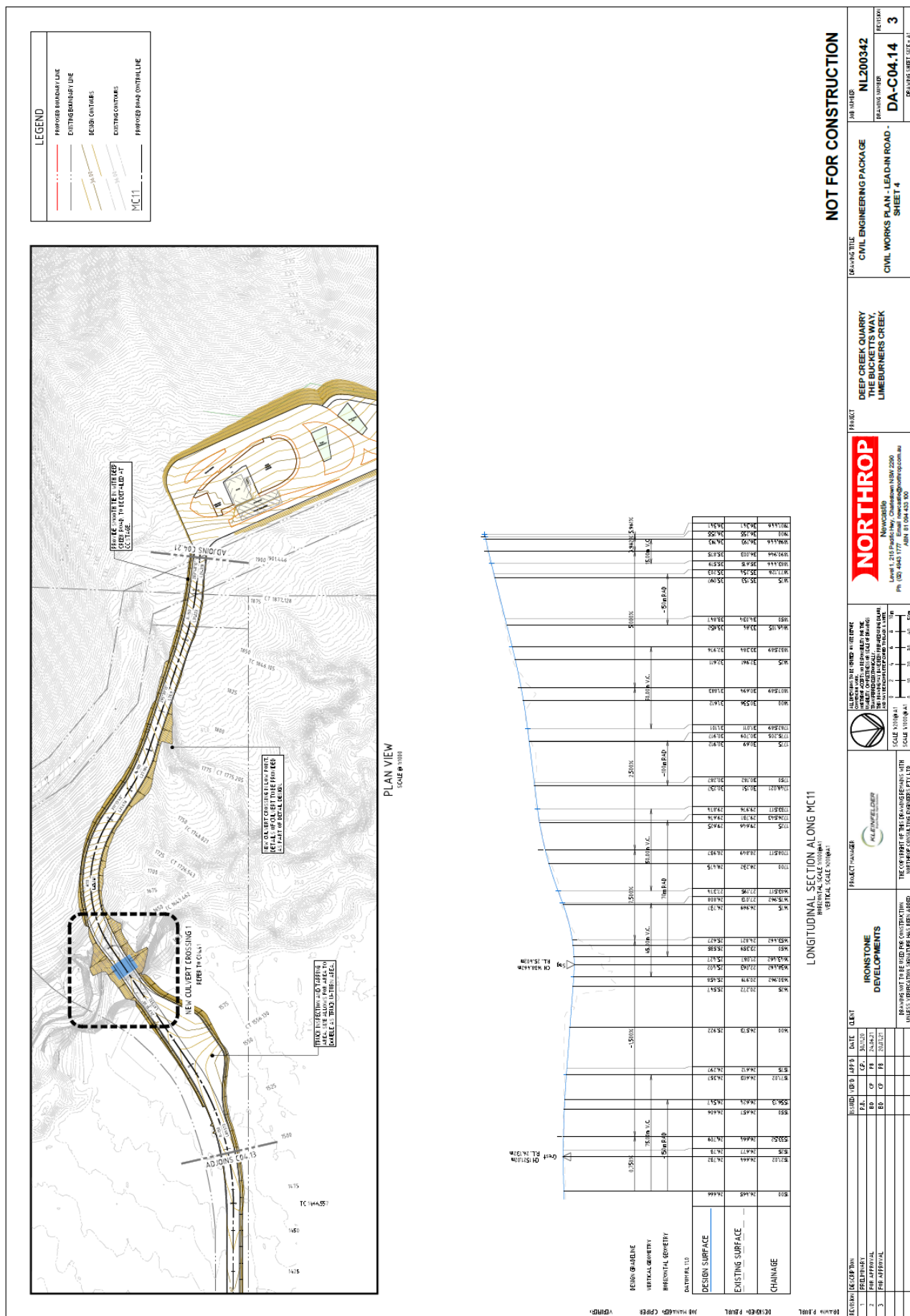
PROJECT NAME	IRONSTONE DEVELOPMENTS
PROJECT LOCATION	THE BUCKETTS WAY, LINEBURNERS CREEK
PROJECT OWNER	DEEP CREEK QUARRY
PROJECT ENGINEERING PACKAGE	CIVIL ENGINEERING PACKAGE
PROJECT SHEET TITLE	CIVIL WORKS PLAN - INTERSECTION - SHEET 1
PROJECT SHEET NO.	DA-C04.01
PROJECT SHEET TOTAL	3

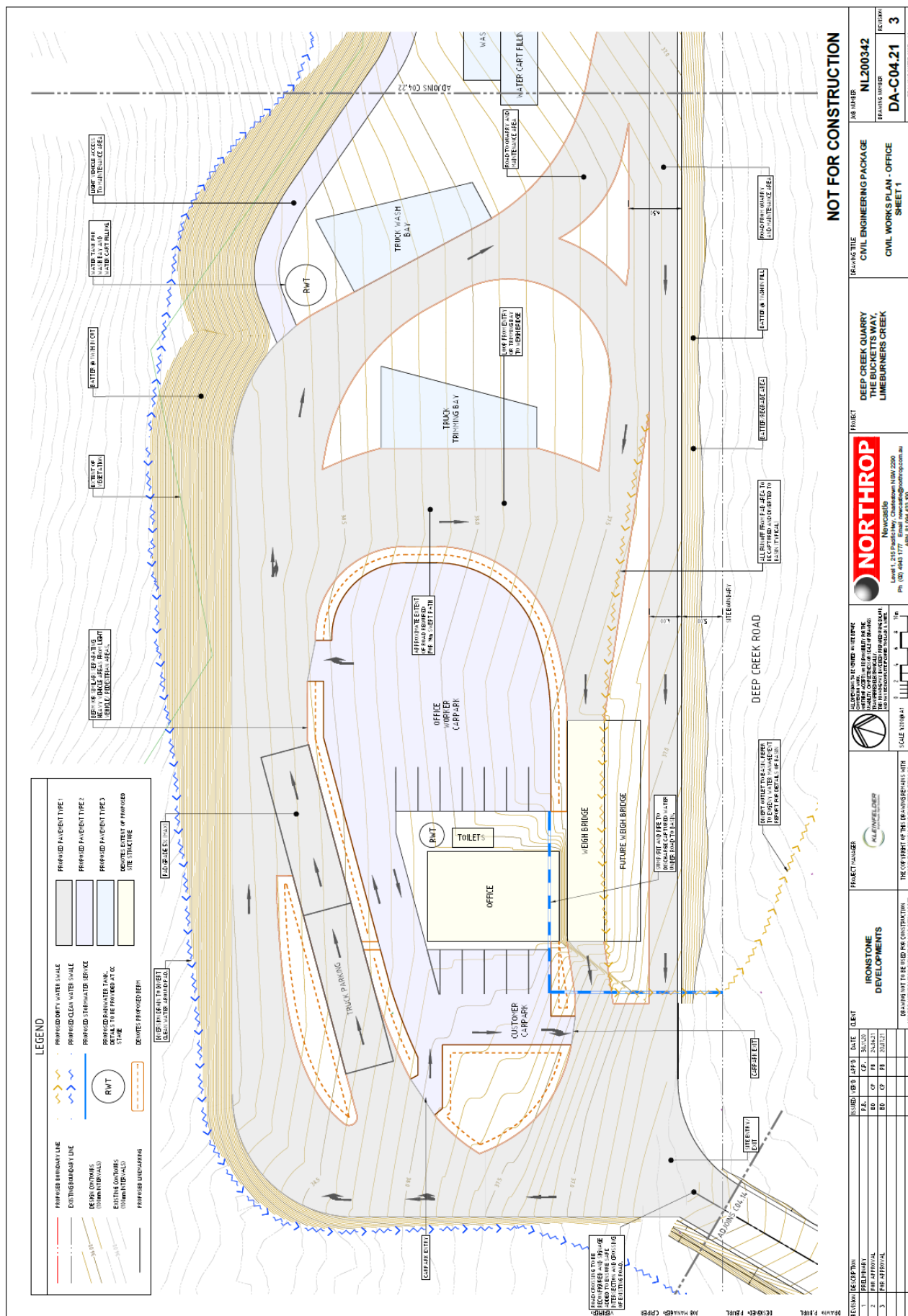


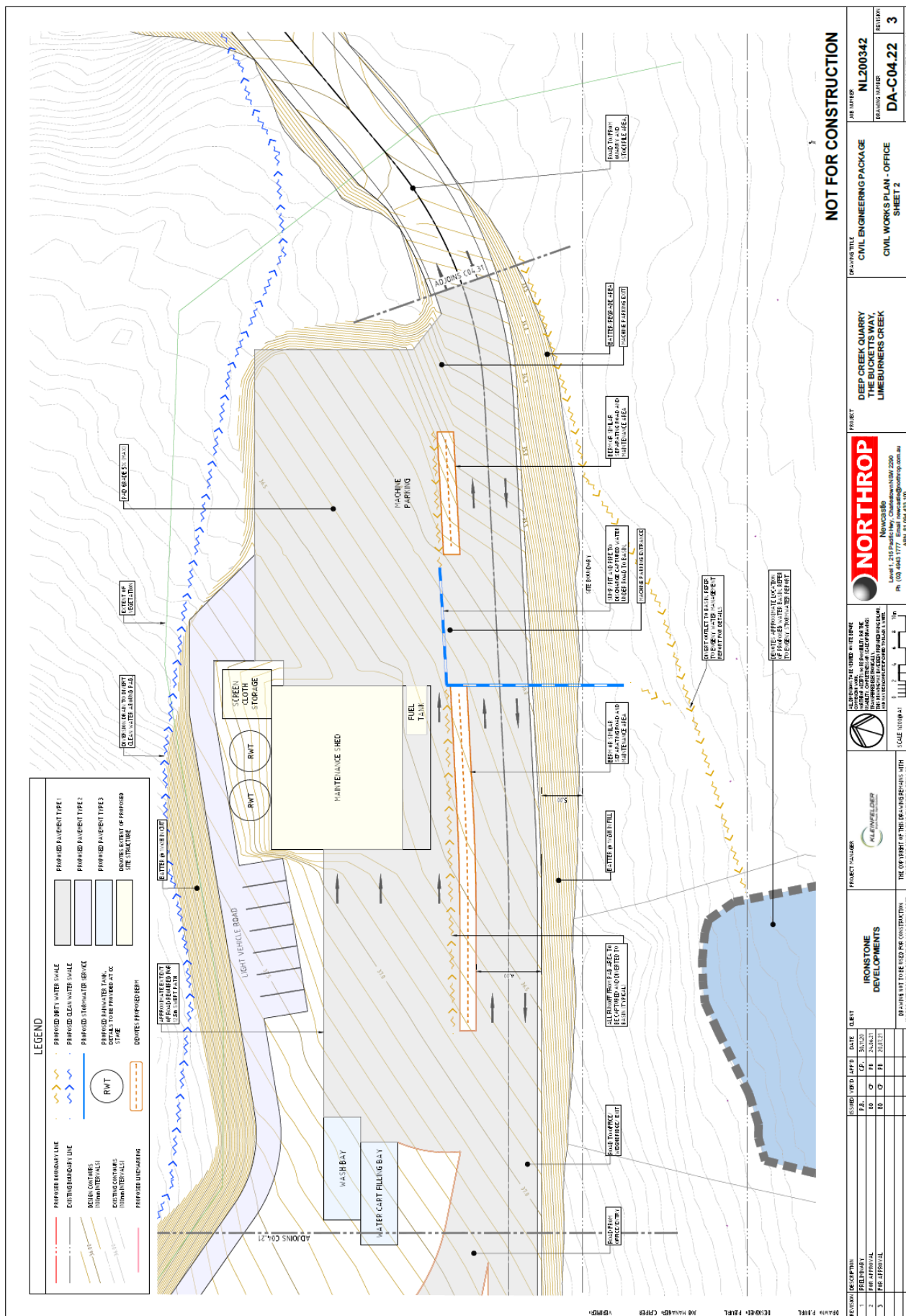


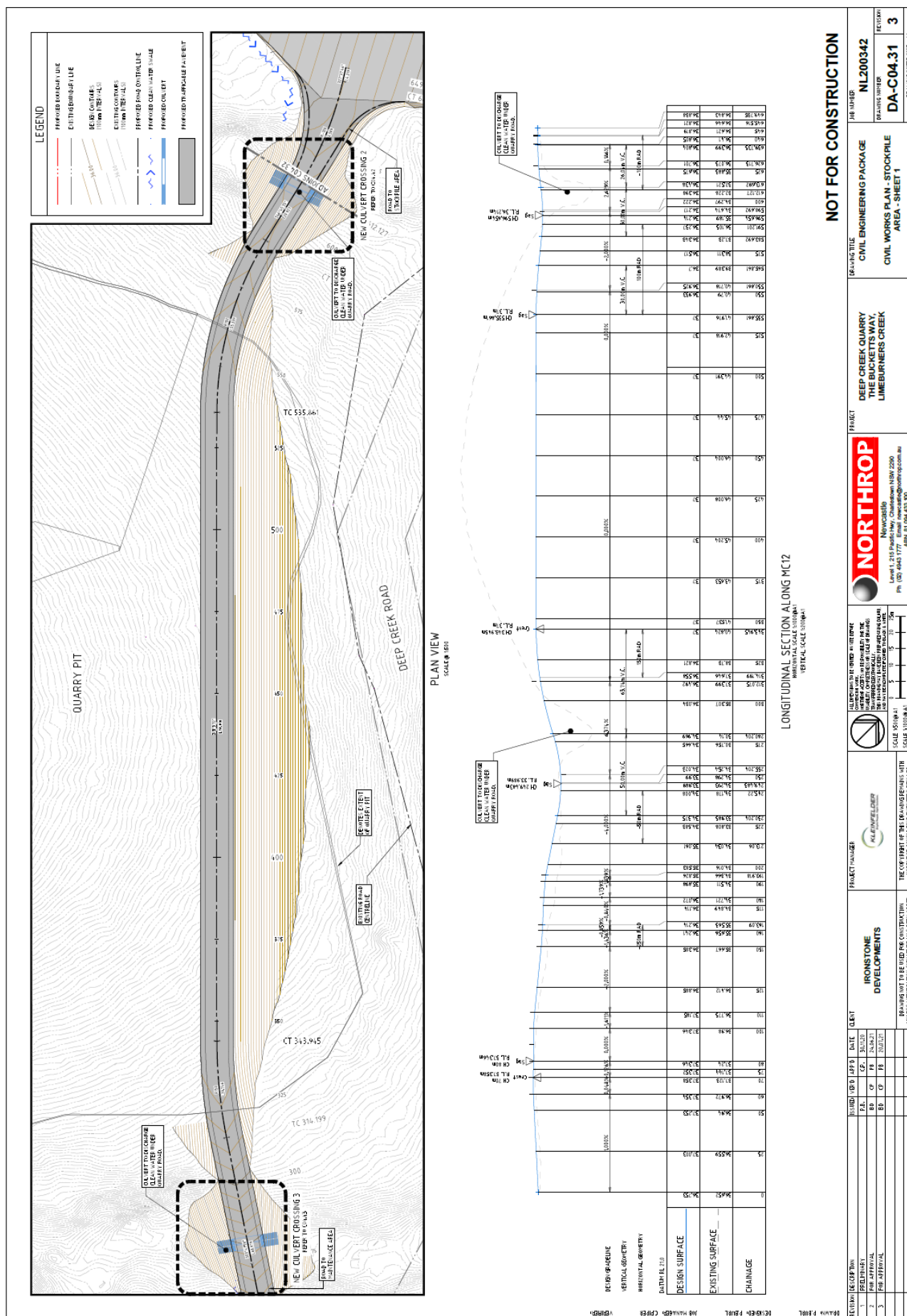


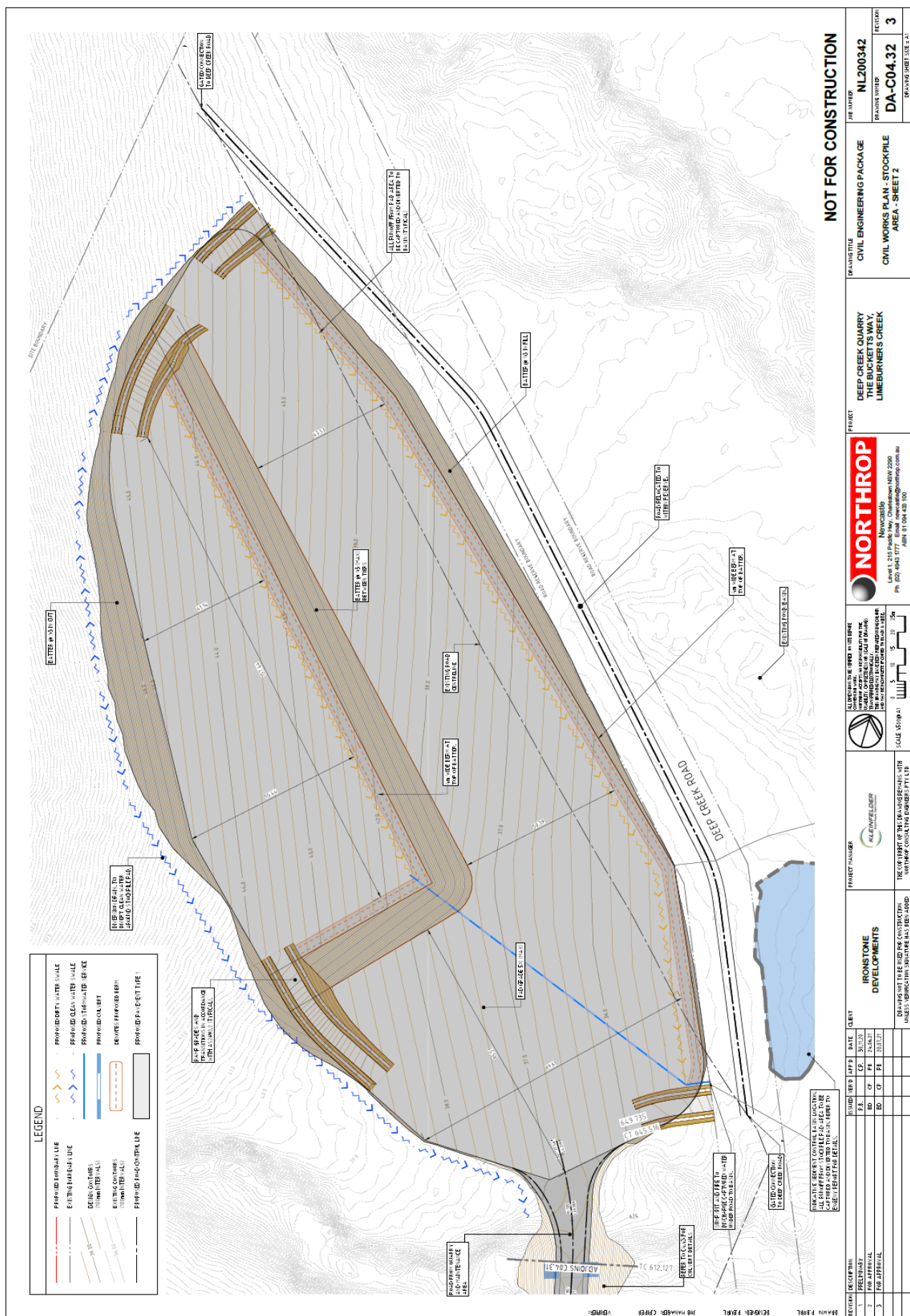


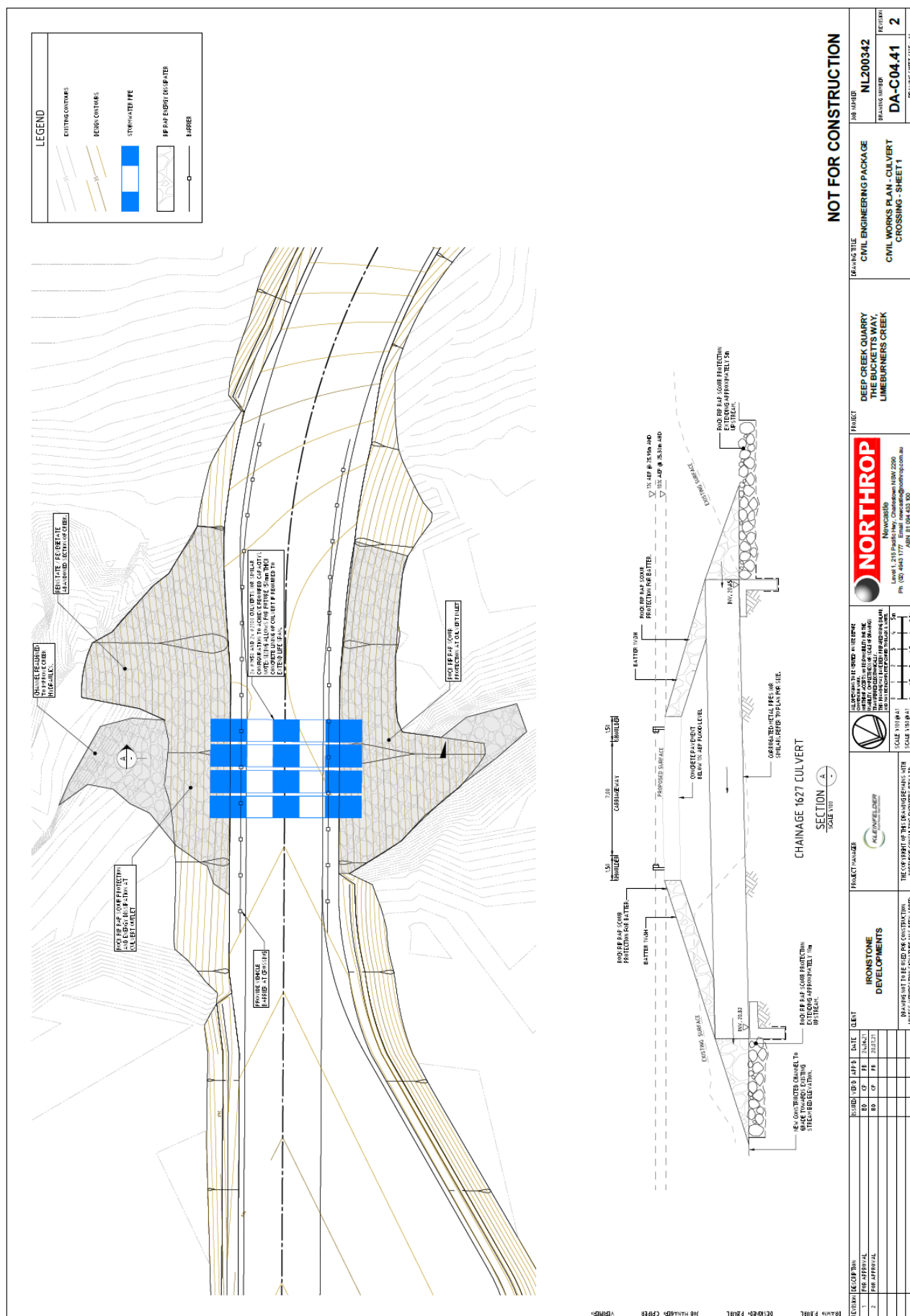


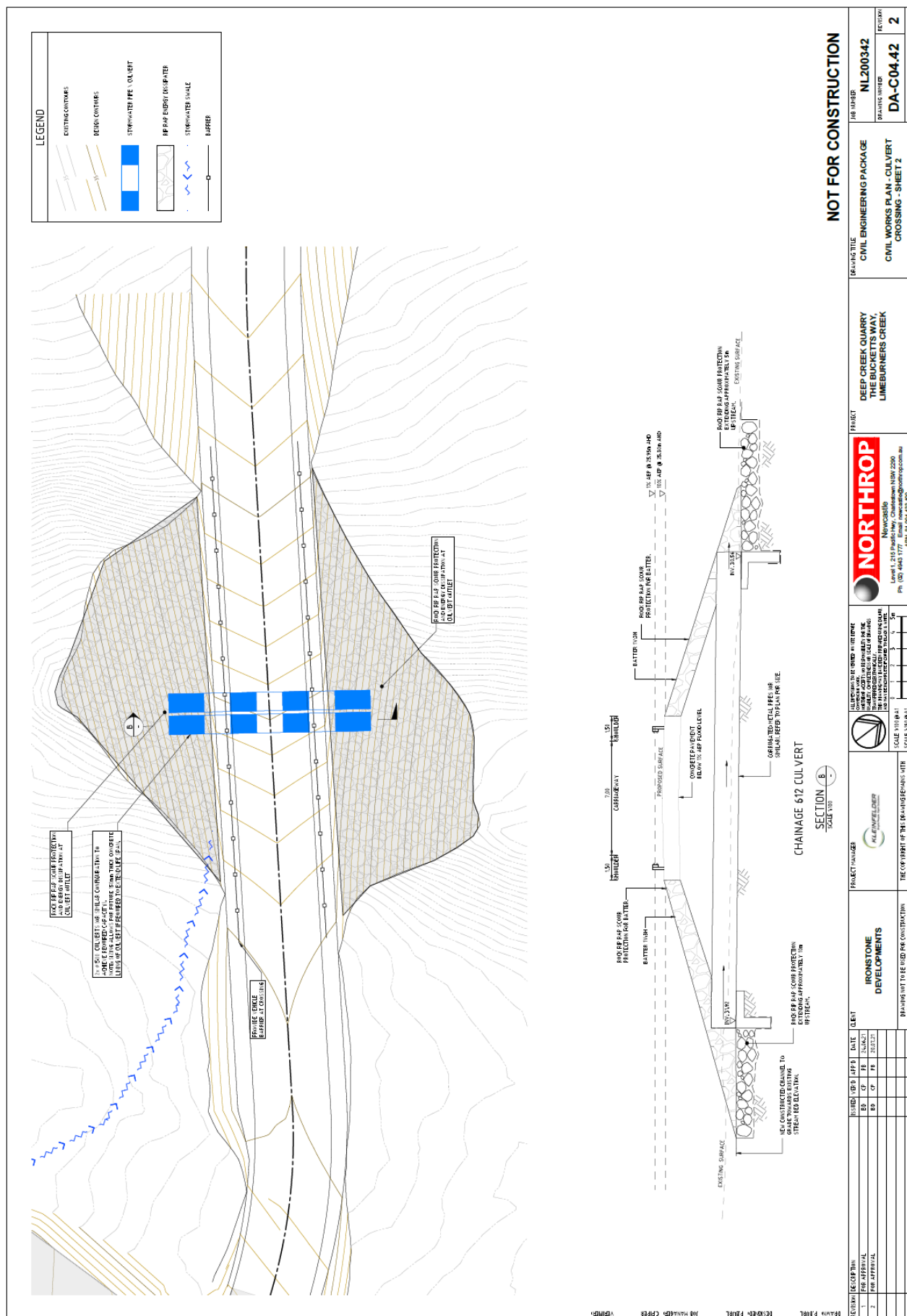


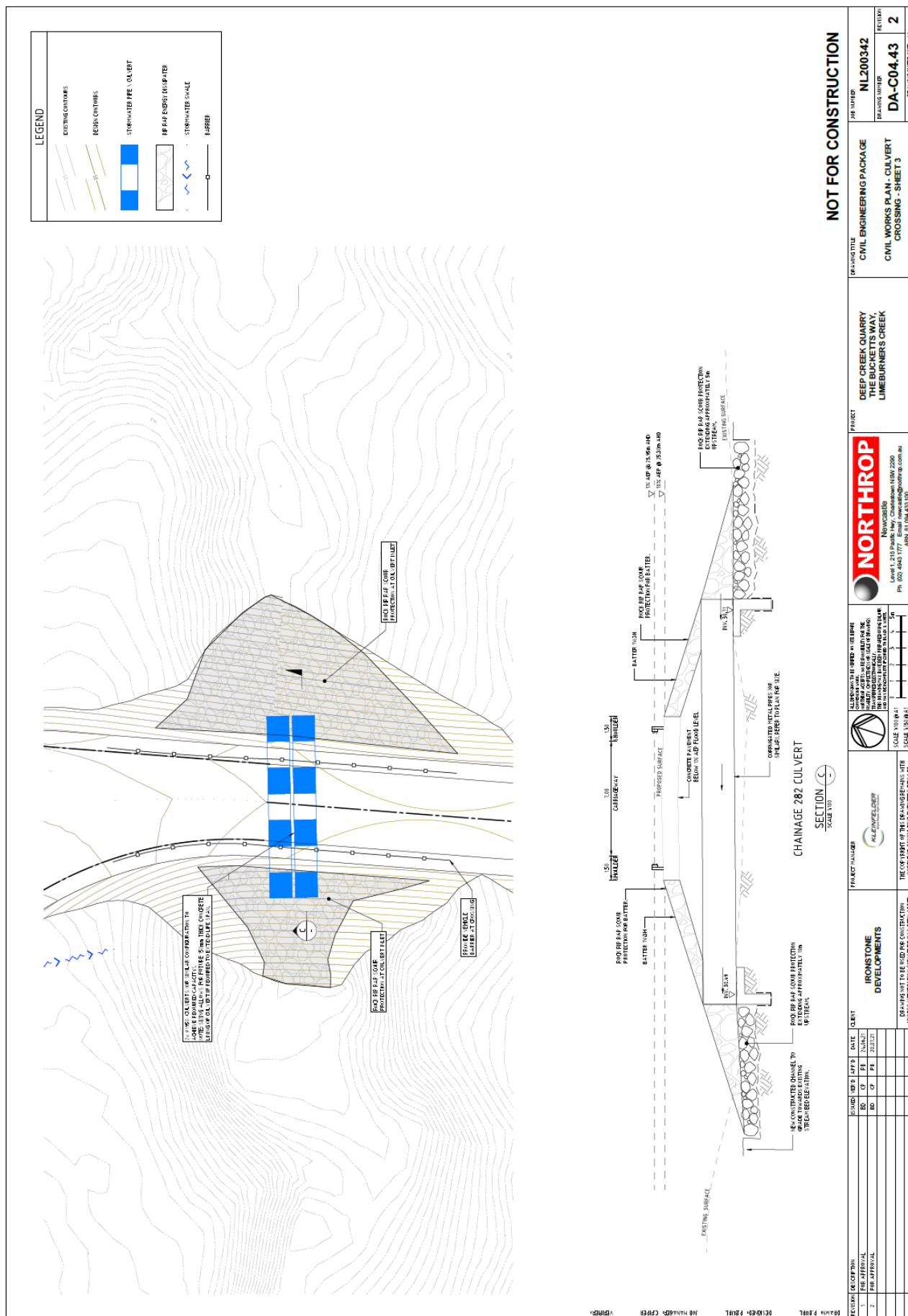


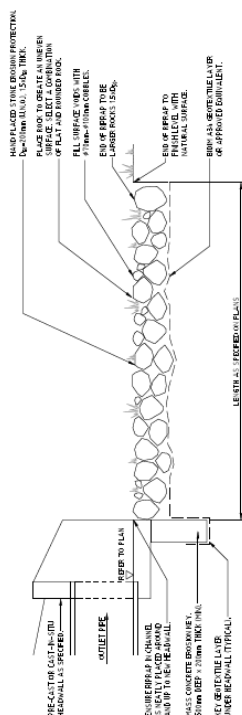












OUTLET HEADWALL RIPRAP SECTION



RIPRAP DETAIL

- [illegible]

NOT FOR CONSTRUCTION

[illegible]

ATTACHMENT D

SIDRA Movement Summary Tables –

MOVEMENT SUMMARY

▼ Site: 101 [2020 AM - 6 am - 7 am (Site Folder: General)]

■ Network: N101 [2020 AM - 6 am - 7 am (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist m				km/h
East: Pacific Motorway														
6	R2	11	40.0	11	40.0	0.014	7.1	LOS A	0.0	0.2	0.47	0.64	0.47	50.7
Approach		11	40.0	11	40.0	0.014	7.1	NA	0.0	0.2	0.47	0.64	0.47	50.7
North: The Bucketts Way														
7	L2	15	14.3	15	14.3	0.012	8.9	LOS A	0.0	0.1	0.29	0.61	0.29	59.1
8	T1	146	8.6	146	8.6	0.177	10.4	LOS A	0.3	2.6	0.57	0.76	0.57	64.5
Approach		161	9.2	161	9.2	0.177	10.2	LOS A	0.3	2.6	0.55	0.74	0.55	63.9
West: Pacific Motorway														
10	L2	64	14.8	64	14.8	0.043	9.2	LOS A	0.1	0.6	0.06	0.63	0.06	71.0
11	T1	372	21.8	372	21.8	0.109	1.0	LOS A	0.0	0.0	0.00	0.13	0.00	104.0
Approach		436	20.8	436	20.8	0.109	2.2	LOS A	0.1	0.6	0.01	0.21	0.01	94.1
All Vehicles		607	18.0	607	18.0	0.177	4.4	NA	0.3	2.6	0.16	0.36	0.16	84.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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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\Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

Site: 101 [2020 AM - 8 am - 9 am (Site Folder: General)]

Network: N101 [2020AM 8 am - 9am (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total HV] veh/h	%	v/c	sec		[Veh. veh	Dist] m				km/h
East: Pacific Motorway														
6	R2	13	16.7	13	16.7	0.020	8.2	LOS A	0.0	0.2	0.55	0.71	0.55	53.5
Approach		13	16.7	13	16.7	0.020	8.2	NA	0.0	0.2	0.55	0.71	0.55	53.5
North: The Bucketts Way														
7	L2	23	0.0	23	0.0	0.019	8.8	LOS A	0.0	0.2	0.36	0.63	0.36	61.3
8	T1	160	5.3	160	5.3	0.259	13.0	LOS A	0.5	3.7	0.68	0.89	0.73	59.0
Approach		183	4.6	183	4.6	0.259	12.4	LOS A	0.5	3.7	0.64	0.86	0.68	59.3
West: Pacific Motorway														
10	L2	82	12.8	82	12.8	0.054	9.1	LOS A	0.1	0.7	0.06	0.63	0.06	71.6
11	T1	592	13.2	592	13.2	0.165	1.0	LOS A	0.0	0.0	0.00	0.14	0.00	104.0
Approach		674	13.1	674	13.1	0.165	1.9	LOS A	0.1	0.7	0.01	0.20	0.01	95.8
All Vehicles		869	11.4	869	11.4	0.259	4.2	NA	0.5	3.7	0.15	0.34	0.16	85.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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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\Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

Site: 101 [2020 PM - 2 pm - 3 pm (Site Folder: General)]

Network: N101 [2020 PM - 2 pm - 3 pm (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total HV] veh/h	%	v/c	sec		[Veh. veh	Dist] m				km/h
East: Pacific Motorway														
6	R2	19	11.1	19	11.1	0.038	10.3	LOS A	0.1	0.4	0.65	0.82	0.65	51.9
Approach		19	11.1	19	11.1	0.038	10.3	NA	0.1	0.4	0.65	0.82	0.65	51.9
North: The Bucketts Way														
7	L2	17	6.3	17	6.3	0.016	9.6	LOS A	0.0	0.2	0.43	0.65	0.43	58.5
8	T1	107	9.8	107	9.8	0.263	17.5	LOS B	0.5	3.6	0.77	0.94	0.87	51.7
Approach		124	9.3	124	9.3	0.263	16.4	LOS B	0.5	3.6	0.73	0.90	0.81	52.7
West: Pacific Motorway														
10	L2	113	13.1	113	13.1	0.075	9.1	LOS A	0.1	1.0	0.08	0.62	0.08	71.4
11	T1	786	15.5	786	15.5	0.222	1.0	LOS A	0.0	0.0	0.00	0.14	0.00	104.0
Approach		899	15.2	899	15.2	0.222	2.0	LOS A	0.1	1.0	0.01	0.20	0.01	95.5
All Vehicles		1042	14.4	1042	14.4	0.263	3.9	NA	0.5	3.6	0.11	0.29	0.12	87.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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

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

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\Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

Site: 101 [2020 PM - 3.45 pm - 4.45 pm (Site Folder: General)] Network: N101 [2020PM 3.45 pm - 4.45 pm (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist] m				km/h
East: Pacific Motorway														
6	R2	16	13.3	16	13.3	0.035	11.0	LOSA	0.0	0.4	0.67	0.83	0.67	50.6
Approach		16	13.3	16	13.3	0.035	11.0	NA	0.0	0.4	0.67	0.83	0.67	50.6
North: The Bucketts Way														
7	L2	11	10.0	11	10.0	0.011	9.8	LOSA	0.0	0.1	0.45	0.65	0.45	58.3
8	T1	125	5.9	125	5.9	0.336	19.8	LOS B	0.6	4.7	0.81	0.97	1.01	48.4
Approach		136	6.2	136	6.2	0.336	19.0	LOS B	0.6	4.7	0.79	0.94	0.96	49.2
West: Pacific Motorway														
10	L2	214	6.4	214	6.4	0.137	9.0	LOSA	0.2	1.8	0.07	0.62	0.07	73.6
11	T1	839	12.0	839	12.0	0.232	1.0	LOSA	0.0	0.0	0.00	0.14	0.00	104.0
Approach		1053	10.9	1053	10.9	0.232	2.6	LOSA	0.2	1.8	0.01	0.24	0.01	92.5
All Vehicles		1204	10.4	1204	10.4	0.336	4.5	NA	0.6	4.7	0.11	0.32	0.13	85.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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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\Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

Site: 101 [2030 AM - 8 am - 9 am - 30 min peak (Site Folder: General)]

Network: N101 [2030AM 8 am - 9 am (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist] m				km/h
East: Pacific Motorway														
6	R2	15	16.7	15	16.7	0.029	9.7	LOS A	0.0	0.3	0.61	0.77	0.61	51.6
Approach		15	16.7	15	16.7	0.029	9.7	NA	0.0	0.3	0.61	0.77	0.61	51.6
North: The Bucketts Way														
7	L2	28	0.0	28	0.0	0.025	9.1	LOS A	0.0	0.3	0.41	0.65	0.41	61.0
8	T1	195	5.3	195	5.3	0.395	17.0	LOS B	0.9	6.4	0.76	0.97	1.03	52.2
Approach		223	4.6	223	4.6	0.395	16.0	LOS B	0.9	6.4	0.72	0.93	0.95	53.4
West: Pacific Motorway														
10	L2	100	12.8	100	12.8	0.066	9.1	LOS A	0.1	0.9	0.07	0.62	0.07	71.5
11	T1	721	13.2	721	13.2	0.201	1.0	LOS A	0.0	0.0	0.00	0.14	0.00	104.0
Approach		821	13.1	821	13.1	0.201	2.0	LOS A	0.1	0.9	0.01	0.20	0.01	95.7
All Vehicles		1060	11.4	1060	11.4	0.395	5.0	NA	0.9	6.4	0.17	0.36	0.22	83.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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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\Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

▼ Site: 101 [2030 AM - 6 am - 7 am + development (Site Folder: General)]

■ Network: N101 [2030 AM - 6 am - 7 am + development (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
East: Pacific Motorway														
6	R2	20	47.4	20	47.4	0.032	8.1	LOS A	0.0	0.5	0.52	0.70	0.52	48.4
Approach		20	47.4	20	47.4	0.032	8.1	NA	0.0	0.5	0.52	0.70	0.52	48.4
North: The Bucketts Way														
7	L2	23	27.3	23	27.3	0.021	9.5	LOS A	0.0	0.3	0.34	0.62	0.34	58.2
8	T1	196	14.5	196	14.5	0.370	14.8	LOS B	0.8	6.4	0.68	0.93	0.87	56.1
Approach		219	15.9	219	15.9	0.370	14.2	LOS A	0.8	6.4	0.64	0.89	0.81	56.3
West: Pacific Motorway														
10	L2	107	22.5	107	22.5	0.075	9.4	LOS A	0.1	1.1	0.09	0.62	0.09	68.4
11	T1	446	18.2	446	18.2	0.128	1.0	LOS A	0.0	0.0	0.00	0.13	0.00	104.0
Approach		554	19.0	554	19.0	0.128	2.6	LOS A	0.1	1.1	0.02	0.23	0.02	90.4
All Vehicles		793	18.9	793	18.9	0.370	6.0	NA	0.8	6.4	0.20	0.42	0.25	78.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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:\Work Documents\Projects\2020.018 - Deep Creek Quarry - Bucketts Way Limeburners Creek\Sidra\Final report modelling

\Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

Site: 101 [2030 PM - 2 pm - 3 pm - 30 minute peak (Site Folder: General)]

Network: N101 [2030 PM - 2pm - 3pm (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] m				km/h
East: Pacific Motorway														
6	R2	22	11.1	22	11.1	0.054	12.3	LOS A	0.1	0.6	0.72	0.89	0.72	49.5
Approach		22	11.1	22	11.1	0.054	12.3	NA	0.1	0.6	0.72	0.89	0.72	49.5
North: The Bucketts Way														
7	L2	20	6.3	20	6.3	0.020	9.9	LOS A	0.0	0.2	0.47	0.68	0.47	58.3
8	T1	124	9.8	124	9.8	0.390	23.3	LOS B	0.7	5.7	0.85	1.00	1.11	44.5
Approach		144	9.3	144	9.3	0.390	21.5	LOS B	0.7	5.7	0.80	0.95	1.03	46.2
West: Pacific Motorway														
10	L2	130	13.1	130	13.1	0.087	9.2	LOS A	0.1	1.1	0.09	0.62	0.09	71.3
11	T1	911	15.5	911	15.5	0.257	1.0	LOS A	0.0	0.0	0.00	0.14	0.00	104.0
Approach		1041	15.2	1041	15.2	0.257	2.0	LOS A	0.1	1.1	0.01	0.20	0.01	95.5
All Vehicles		1207	14.4	1207	14.4	0.390	4.5	NA	0.7	5.7	0.12	0.30	0.14	85.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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:\Work Documents\Projects\2020.018 - Deep Creek Quarry - Bucketts Way Limeburners Creek\Sidra\Final report modelling

\Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

Site: 101 [2030 PM - 3.45 pm - 4.45 pm (Site Folder: General)]

Network: N101 [2030 PM
3.45pm - 4.45 pm (Network
Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist] m				km/h
East: Pacific Motorway														
6	R2	19	13.3	19	13.3	0.058	14.4	LOS A	0.1	0.6	0.76	0.91	0.76	47.0
Approach		19	13.3	19	13.3	0.058	14.4	NA	0.1	0.6	0.76	0.91	0.76	47.0
North: The Bucketts Way														
7	L2	13	10.0	13	10.0	0.015	10.4	LOS A	0.0	0.2	0.50	0.69	0.50	57.5
8	T1	153	5.9	153	5.9	0.601	34.1	LOS C	1.3	9.5	0.92	1.08	1.51	35.2
Approach		166	6.2	166	6.2	0.601	32.3	LOS C	1.3	9.5	0.89	1.05	1.43	36.5
West: Pacific Motorway														
10	L2	260	6.4	260	6.4	0.167	9.0	LOS A	0.3	2.3	0.08	0.62	0.08	73.6
11	T1	1023	12.0	1023	12.0	0.283	1.0	LOS A	0.0	0.0	0.00	0.14	0.00	104.0
Approach		1283	10.9	1283	10.9	0.283	2.6	LOS A	0.3	2.3	0.02	0.23	0.02	92.5
All Vehicles		1468	10.4	1468	10.4	0.601	6.1	NA	1.3	9.5	0.13	0.34	0.19	80.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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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\Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

Site: 101 [2052 AM - 6 am - 7 am - 30 minute peak (Site Folder: General)]

Network: N101 [2052 6 am - 7 am (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

Design Life Analysis (Final Year): Results for 32 years

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist] m				km/h
East: Pacific Motorway														
6	R2	17	40.0	17	40.0	0.035	10.0	LOS A	0.1	0.5	0.59	0.77	0.59	47.5
Approach		17	40.0	17	40.0	0.035	10.0	NA	0.1	0.5	0.59	0.77	0.59	47.5
North: The Bucketts Way														
7	L2	24	14.3	24	14.3	0.022	9.5	LOS A	0.0	0.3	0.39	0.64	0.39	58.4
8	T1	240	8.6	240	8.6	0.441	16.5	LOS B	1.1	8.2	0.75	0.98	1.07	53.1
Approach		264	9.2	264	9.2	0.441	15.9	LOS B	1.1	8.2	0.71	0.95	1.01	53.6
West: Pacific Motorway														
10	L2	105	14.8	105	14.8	0.070	9.2	LOS A	0.1	0.9	0.08	0.62	0.08	70.8
11	T1	609	21.8	609	21.8	0.178	1.0	LOS A	0.0	0.0	0.00	0.13	0.00	104.0
Approach		715	20.8	715	20.8	0.178	2.2	LOS A	0.1	0.9	0.01	0.20	0.01	94.0
All Vehicles		996	18.0	996	18.0	0.441	6.0	NA	1.1	8.2	0.21	0.41	0.29	79.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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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\Pacific_The Bucketts.slp9

MOVEMENT SUMMARY

Site: 101 [2052 AM - 8 am - 9 am - 30 min peak (Site Folder: General)]

Network: N101 [2052 AM 8 am - 9 am (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

Design Life Analysis (Final Year): Results for 32 years

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
East: Pacific Motorway														
6	R2	21	16.7	21	16.7	0.059	13.8	LOS A	0.1	0.6	0.75	0.90	0.75	47.0
Approach		21	16.7	21	16.7	0.059	13.8	NA	0.1	0.6	0.75	0.90	0.75	47.0
North: The Bucketts Way														
7	L2	38	0.0	38	0.0	0.039	9.8	LOS A	0.1	0.4	0.48	0.71	0.48	60.4
8	T1	262	5.3	262	5.3	0.855	48.1	LOS D ¹¹	3.2	23.5	0.96	1.35	2.86	27.8
Approach		300	4.6	300	4.6	0.855	43.3	LOS D ¹¹	3.2	23.5	0.90	1.26	2.56	30.2
West: Pacific Motorway														
10	L2	135	12.8	135	12.8	0.089	9.2	LOS A	0.2	1.2	0.08	0.62	0.08	71.4
11	T1	970	13.2	970	13.2	0.270	1.0	LOS A	0.0	0.0	0.00	0.14	0.00	104.0
Approach		1105	13.1	1105	13.1	0.270	2.0	LOS A	0.2	1.2	0.01	0.20	0.01	95.7
All Vehicles		1426	11.4	1426	11.4	0.855	10.8	NA	3.2	23.5	0.21	0.43	0.56	68.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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

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

¹¹ Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

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Project: C:\Work Documents\Projects\2020.018 - Deep Creek Quarry - Bucketts Way Limeburners Creek\Sidra\Final report modelling Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

▼ Site: 101 [2052 PM - 2 pm - 3 pm - 30 minute peak (Site Folder: General)]

■ Network: N101 [2052 PM - 2pm - 3pm (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

Design Life Analysis (Final Year): Results for 32 years

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist m				
East: Pacific Motorway														
6	R2	30	11.1	30	11.1	0.133	20.5	LOS B	0.2	1.3	0.86	0.94	0.86	41.8
Approach		30	11.1	30	11.1	0.133	20.5	NA	0.2	1.3	0.86	0.94	0.86	41.8
North: The Bucketts Way														
7	L2	26	6.3	26	6.3	0.034	11.1	LOS A	0.0	0.4	0.55	0.76	0.55	56.5
8	T1	167	9.8	167	9.8	1.061	163.7	LOS F ¹¹	6.1	46.1	1.00	1.70	5.03	10.1
Approach		194	9.3	194	9.3	1.061	143.0	LOS F ¹¹	6.1	46.1	0.94	1.58	4.42	11.5
West: Pacific Motorway														
10	L2	175	13.1	175	13.1	0.117	9.2	LOS A	0.2	1.6	0.11	0.61	0.11	71.2
11	T1	1225	15.5	1225	15.5	0.346	1.0	LOS A	0.0	0.0	0.00	0.13	0.00	104.0
Approach		1401	15.2	1401	15.2	0.346	2.0	LOS A	0.2	1.6	0.01	0.20	0.01	95.4
All Vehicles		1624	14.4	1624	14.4	1.061	19.1	NA	6.1	46.1	0.14	0.37	0.55	55.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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

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

¹¹ Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

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\Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

Site: 101 [2052 PM - 3.45 pm - 4.45 pm (Site Folder: General)]

Network: N101 [2052 PM
3.45pm - 4.45 pm (Network
Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

Design Life Analysis (Final Year): Results for 32 years

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist m				
East: Pacific Motorway														
6	R2	26	13.3	26	13.3	0.159	26.9	LOS B	0.2	1.6	0.90	0.96	0.90	37.0
Approach		26	13.3	26	13.3	0.159	26.9	NA	0.2	1.6	0.90	0.96	0.90	37.0
North: The Bucketts Way														
7	L2	17	10.0	17	10.0	0.025	11.9	LOS A	0.0	0.3	0.57	0.77	0.57	55.3
8	T1	205	5.9	205	5.9	1.887	853.0	LOS F ¹¹	27.2	199.8	1.00	2.91	12.50	2.1
Approach		223	6.2	223	6.2	1.887	787.8	LOS F ¹¹	27.2	199.8	0.97	2.74	11.58	2.3
West: Pacific Motorway														
10	L2	350	6.4	350	6.4	0.226	9.0	LOS A	0.4	3.3	0.11	0.61	0.11	73.4
11	T1	1376	12.0	1376	12.0	0.380	1.0	LOS A	0.0	0.0	0.00	0.14	0.00	104.0
Approach		1726	10.9	1726	10.9	0.380	2.6	LOS A	0.4	3.3	0.02	0.23	0.02	92.4
All Vehicles		1975	10.4	1975	10.4	1.887	91.5	NA	27.2	199.8	0.14	0.53	1.34	20.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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

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

¹¹ Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

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Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

Site: 101 [2020 AM - 6 am - 7 am + development (Site Folder: General)]

Network: N101 [2020 AM 6 am - 7 am + development (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
East: Pacific Motorway														
6	R2	19	50.0	19	50.0	0.028	7.4	LOS A	0.0	0.4	0.48	0.66	0.48	48.7
Approach		19	50.0	19	50.0	0.028	7.4	NA	0.0	0.4	0.48	0.66	0.48	48.7
North: The Bucketts Way														
7	L2	21	30.0	21	30.0	0.018	9.4	LOS A	0.0	0.3	0.31	0.61	0.31	58.2
8	T1	171	16.7	171	16.7	0.229	11.3	LOS A	0.4	3.6	0.61	0.80	0.61	62.9
Approach		192	18.1	192	18.1	0.229	11.1	LOS A	0.4	3.6	0.58	0.78	0.58	62.3
West: Pacific Motorway														
10	L2	100	24.2	100	24.2	0.070	9.5	LOS A	0.1	1.0	0.09	0.62	0.09	67.9
11	T1	372	21.8	372	21.8	0.109	1.0	LOS A	0.0	0.0	0.00	0.13	0.00	104.0
Approach		472	22.3	472	22.3	0.109	2.8	LOS A	0.1	1.0	0.02	0.24	0.02	89.2
All Vehicles		682	21.9	682	21.9	0.229	5.2	NA	0.4	3.6	0.19	0.40	0.19	79.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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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\Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

Site: 101 [2020 AM - 8 am - 9 am + development (Site Folder: General)] Network: N101 [2020 AM - 8 am - 9 am + development (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] m				km/h
East: Pacific Motorway														
6	R2	19	38.9	19	38.9	0.035	9.3	LOS A	0.1	0.5	0.57	0.75	0.57	48.3
Approach		19	38.9	19	38.9	0.035	9.3	NA	0.1	0.5	0.57	0.75	0.57	48.3
North: The Bucketts Way														
7	L2	27	11.5	27	11.5	0.024	9.3	LOS A	0.0	0.3	0.37	0.64	0.37	58.7
8	T1	178	14.2	178	14.2	0.322	14.9	LOS B	0.7	5.4	0.71	0.93	0.85	56.0
Approach		205	13.8	205	13.8	0.322	14.1	LOS A	0.7	5.4	0.66	0.89	0.79	56.4
West: Pacific Motorway														
10	L2	99	27.7	99	27.7	0.070	9.6	LOS A	0.1	1.0	0.09	0.62	0.09	66.9
11	T1	592	13.2	592	13.2	0.165	1.0	LOS A	0.0	0.0	0.00	0.14	0.00	104.0
Approach		691	15.2	691	15.2	0.165	2.2	LOS A	0.1	1.0	0.01	0.21	0.01	92.7
All Vehicles		915	15.4	915	15.4	0.322	5.0	NA	0.7	5.4	0.17	0.37	0.20	81.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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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Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

Site: 101 [2020 PM - 2 pm - 3 pm + development (Site Folder: General)] Network: N101 [2020PM - 2 pm - 3 pm + development (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
East: Pacific Motorway														
6	R2	24	26.1	24	26.1	0.056	11.6	LOSA	0.1	0.7	0.68	0.86	0.68	48.0
Approach		24	26.1	24	26.1	0.056	11.6	NA	0.1	0.7	0.68	0.86	0.68	48.0
North: The Bucketts Way														
7	L2	24	26.1	24	26.1	0.026	10.5	LOSA	0.0	0.3	0.45	0.68	0.45	57.3
8	T1	137	18.5	137	18.5	0.381	21.3	LOS B	0.8	6.2	0.82	0.99	1.07	46.9
Approach		161	19.6	161	19.6	0.381	19.7	LOS B	0.8	6.2	0.77	0.94	0.98	48.4
West: Pacific Motorway														
10	L2	133	23.0	133	23.0	0.093	9.5	LOSA	0.2	1.3	0.10	0.61	0.10	68.2
11	T1	786	15.5	786	15.5	0.222	1.0	LOSA	0.0	0.0	0.00	0.14	0.00	104.0
Approach		919	16.6	919	16.6	0.222	2.2	LOSA	0.2	1.3	0.01	0.20	0.01	93.1
All Vehicles		1104	17.3	1104	17.3	0.381	4.9	NA	0.8	6.2	0.14	0.33	0.17	82.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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 [2020 PM - 3.45 pm - 4.45 pm + development (Site Folder: General)]

Network: N101 [2020 PM 3.45pm - 4.45 pm + development (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
East: Pacific Motorway														
6	R2	21	10.0	21	10.0	0.045	10.8	LOS A	0.1	0.5	0.67	0.84	0.67	51.5
Approach		21	10.0	21	10.0	0.045	10.8	NA	0.1	0.5	0.67	0.84	0.67	51.5
North: The Bucketts Way														
7	L2	18	5.9	18	5.9	0.017	9.7	LOS A	0.0	0.2	0.44	0.66	0.44	58.5
8	T1	156	4.7	156	4.7	0.422	21.4	LOS B	0.9	6.3	0.84	1.00	1.15	46.4
Approach		174	4.8	174	4.8	0.422	20.2	LOS B	0.9	6.3	0.80	0.97	1.08	47.6
West: Pacific Motorway														
10	L2	234	5.9	234	5.9	0.150	9.0	LOS A	0.3	2.0	0.09	0.62	0.09	73.7
11	T1	839	12.0	839	12.0	0.232	1.0	LOS A	0.0	0.0	0.00	0.14	0.00	104.0
Approach		1073	10.7	1073	10.7	0.232	2.7	LOS A	0.3	2.0	0.02	0.24	0.02	91.9
All Vehicles		1267	9.9	1267	9.9	0.422	5.2	NA	0.9	6.3	0.14	0.35	0.17	82.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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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\Pacific_The Bucketts.sip9

MOVEMENT SUMMARY

▼ Site: 101 [2030 AM - 6 am - 7 am + development (Site Folder: General)]

 ■■ Network: N101 [2030 AM - 6 am - 7 am + development (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist] m				km/h
East: Pacific Motorway														
6	R2	20	47.4	20	47.4	0.032	8.1	LOSA	0.0	0.5	0.52	0.70	0.52	48.4
Approach		20	47.4	20	47.4	0.032	8.1	NA	0.0	0.5	0.52	0.70	0.52	48.4
North: The Bucketts Way														
7	L2	23	27.3	23	27.3	0.021	9.5	LOSA	0.0	0.3	0.34	0.62	0.34	58.2
8	T1	196	14.5	196	14.5	0.290	12.5	LOSA	0.6	4.8	0.66	0.88	0.72	60.3
Approach		219	15.9	219	15.9	0.290	12.2	LOSA	0.6	4.8	0.63	0.85	0.68	60.0
West: Pacific Motorway														
10	L2	107	22.5	107	22.5	0.075	9.4	LOSA	0.1	1.1	0.09	0.62	0.09	68.4
11	T1	446	18.2	446	18.2	0.128	1.0	LOSA	0.0	0.0	0.00	0.13	0.00	104.0
Approach		554	19.0	554	19.0	0.128	2.6	LOSA	0.1	1.1	0.02	0.23	0.02	90.4
All Vehicles		793	18.9	793	18.9	0.290	5.4	NA	0.6	4.8	0.20	0.41	0.21	79.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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 [2030 AM - 8 am - 9 am + development (Site Folder: General)]

■ Network: N101 [2030 AM - 8 am - 9 am + development (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
East: Pacific Motorway														
6	R2	27	30.8	27	30.8	0.057	10.5	LOS A	0.1	0.7	0.63	0.82	0.63	48.4
Approach		27	30.8	27	30.8	0.057	10.5	NA	0.1	0.7	0.63	0.82	0.63	48.4
North: The Bucketts Way														
7	L2	33	12.9	33	12.9	0.031	9.6	LOS A	0.0	0.4	0.41	0.66	0.41	58.3
8	T1	213	11.9	213	11.9	0.469	19.4	LOS B	1.1	8.6	0.80	1.01	1.19	49.2
Approach		245	12.0	245	12.0	0.469	18.1	LOS B	1.1	8.6	0.75	0.96	1.08	50.4
West: Pacific Motorway														
10	L2	128	21.3	128	21.3	0.089	9.4	LOS A	0.2	1.3	0.11	0.61	0.11	68.7
11	T1	709	11.0	709	11.0	0.195	0.9	LOS A	0.0	0.0	0.00	0.14	0.00	104.1
Approach		838	12.6	838	12.6	0.195	2.2	LOS A	0.2	1.3	0.02	0.21	0.02	92.8
All Vehicles		1111	12.9	1111	12.9	0.469	5.9	NA	1.1	8.6	0.19	0.39	0.27	78.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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 [2030 PM - 2 pm - 3 pm + development (Site Folder: General)] Network: N101 [2030PM - 2 pm - 3 pm + development (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist] m				km/h
East: Pacific Motorway														
6	R2	28	22.2	28	22.2	0.082	14.0	LOS A	0.1	0.9	0.75	0.90	0.75	46.0
Approach		28	22.2	28	22.2	0.082	14.0	NA	0.1	0.9	0.75	0.90	0.75	46.0
North: The Bucketts Way														
7	L2	25	25.0	25	25.0	0.030	11.0	LOS A	0.0	0.4	0.50	0.71	0.50	56.6
8	T1	158	16.0	158	16.0	0.579	31.7	LOS C	1.3	10.1	0.91	1.08	1.47	37.1
Approach		183	17.2	183	17.2	0.579	28.9	LOS C	1.3	10.1	0.85	1.03	1.34	39.2
West: Pacific Motorway														
10	L2	155	19.7	155	19.7	0.107	9.4	LOS A	0.2	1.5	0.11	0.61	0.11	69.1
11	T1	943	12.9	943	12.9	0.262	1.0	LOS A	0.0	0.0	0.00	0.14	0.00	104.0
Approach		1098	13.9	1098	13.9	0.262	2.1	LOS A	0.2	1.5	0.02	0.20	0.02	93.7
All Vehicles		1309	14.5	1309	14.5	0.579	6.1	NA	1.3	10.1	0.15	0.33	0.22	79.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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

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

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MOVEMENT SUMMARY

▼ Site: 101 [2030 PM - 3.45 pm - 4.45 pm + development (Site Folder: General)]

■ Network: N101 [2030 PM - 3.45pm - 4.45pm + dev (Network Folder: General)]

Pacific Motorway / The Bucketts Way intersection, Karuah.

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %	v/c	sec		[Veh. veh	Dist] m				km/h
East: Pacific Motorway														
6	R2	24	8.7	24	8.7	0.068	13.6	LOS A	0.1	0.7	0.75	0.90	0.75	48.4
Approach		24	8.7	24	8.7	0.068	13.6	NA	0.1	0.7	0.75	0.90	0.75	48.4
North: The Bucketts Way														
7	L2	20	5.3	20	5.3	0.022	10.2	LOS A	0.0	0.2	0.49	0.70	0.49	57.9
8	T1	183	4.0	183	4.0	0.704	38.8	LOS C	1.7	12.5	0.94	1.14	1.83	32.3
Approach		203	4.1	203	4.1	0.704	36.0	LOS C	1.7	12.5	0.90	1.10	1.70	34.0
West: Pacific Motorway														
10	L2	280	4.9	280	4.9	0.179	8.9	LOS A	0.3	2.4	0.10	0.62	0.10	74.0
11	T1	1023	9.9	1023	9.9	0.279	0.9	LOS A	0.0	0.0	0.00	0.14	0.00	104.0
Approach		1303	8.8	1303	8.8	0.279	2.7	LOS A	0.3	2.4	0.02	0.24	0.02	92.2
All Vehicles		1531	8.2	1531	8.2	0.704	7.3	NA	1.7	12.5	0.15	0.37	0.26	77.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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).

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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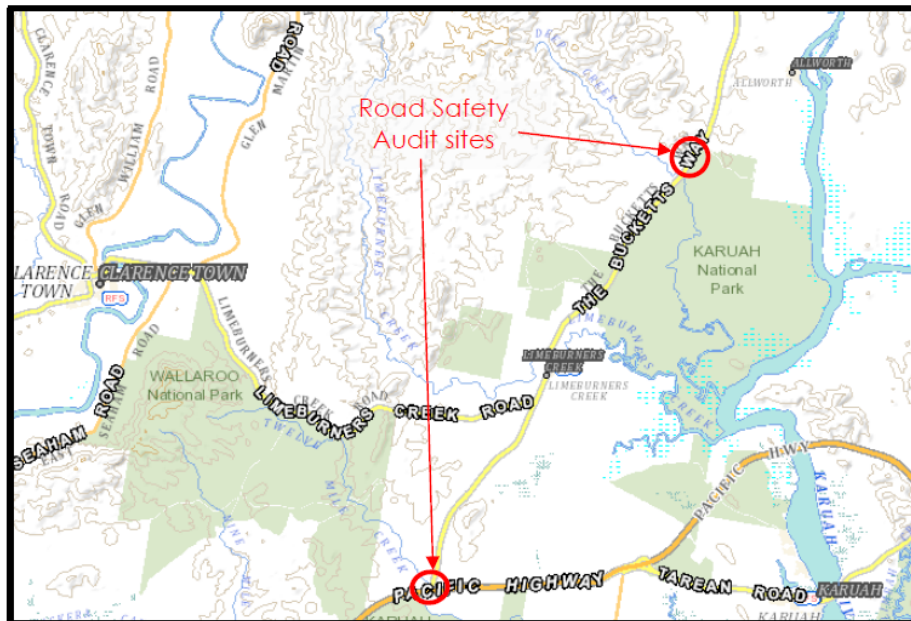
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\Pacific_The Bucketts.sip9

ATTACHMENT E

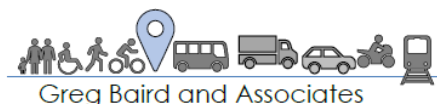
Road Safety Audit – Greg Baird & Associates

Road Safety Audit



Proposed Deep Creek Quarry intersection with The Bucketts Way. Existing The Bucketts Way / Pacific Highway intersection.

Report Issue Date: 16 April 2021



Contact information

Greg Baird and Associates

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Newcastle NSW 2300

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greg@gregbaird.com.au

Document information

Prepared for: Ironstone Developments Pty Ltd

Project name: Deep Creek Quarry Limeburners Creek

Document control

Document Number: GBA-RSA-DCQ

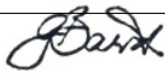
Audit type: Concept design and existing intersection Road Safety Audit

Author(s): Greg Baird, Graeme Robinson

Client: Ironstone Developments Pty Ltd

Client contact: Rob Townsend

Senior Environmental Advisor, Kleinfelder

Ed 1 Rev 1	16 April 2021	Final	
Ed 1 Rev 0	12 April 2021	Draft report	Greg Baird
Issue	Date	Revision Description	Authorised by

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1. Client details

Client:	Ironstone Developments Pty Ltd
Client address:	C/o Kleinfelder, Suite 3, 240-244 Pacific Highway, Charlestown, NSW 2290
Project Manager / Sponsor:	Rob Townsend
Phone	0408 829 936

2. Audit statement

We, the undersigned, declare that we have reviewed the material and data listed in this report and identified the risks to road safety listed in Section 5. Reasons are given to explain why an identified item is considered a risk to road safety including crash type. The auditors listed are independent to the project.

It should be noted that while every effort has been made to identify potential risks to road safety, no guarantee can be made that every problem or deficiency has been identified. Design or construction deficiencies that do not cause a safety problem are not listed.

It is recommended that identified risks to road safety be investigated and corrective actions implemented.

Name	Role	Auditor level and number	Signature	Date
Graeme Robinson	Lead road safety auditor	Level 3, RSA-02-122		16/04/21
Greg Baird	Road safety auditor	Level 2, RSA-02-117		16/04/21

Table 1: Audit team statement

3. Audit details

3.1. Description of project

Ironstone Developments Pty Ltd propose to develop the Deep Creek Quarry hard rock quarry with access from The Bucketts Way at Limeburners Creek/Allworth, New South Wales.

- The quarry will produce up to 500,000 tonnes per annum of hard rock aggregate products.
- During quarrying operations, loading and dispatch of trucks would be between 6:00 am to 6:00 pm Monday to Friday and 6:00 am to 1:00 pm Saturday.
- There would be a maximum of 25 laden trucks per hour with an average of 55 laden trucks per day.
- Most quarry traffic would turn right onto The Bucketts Way and then right again onto the Pacific Highway.
- Up to 10 vehicles of employees would be expected to arrive and depart within 1 hour of quarry opening and closing times.

Pacific Highway upgrading work

At the time of the audit, the intersection of The Bucketts Way and the Pacific Highway was being upgraded with the addition of a channelised left-turn lane on the Pacific Highway.

3.2. Scope of audit

This report deals with the strategic design road safety audit of the proposed new Deep Creek Quarry / The Bucketts Way intersection, Limeburners Creek and the existing Pacific Highway / The Bucketts Way intersection, Twelve Mile Creek. The road safety audit was undertaken to identify potential existing and future safety issues, taking the proposed operation of the quarry into account.

The Road Safety Audit was conducted following the principles detailed in *Guide to Road Safety Part 6A: Implementing Road Safety Audits* (Austroads, 2019) and *Guidelines for Road Safety Audit Practices* (TfNSW Centre for Road Safety, 2011).

3.3. Exclusions

The design for the proposed Deep Creek Quarry access/The Bucketts Way intersection is at the strategic stage. No linemarking or signposting details were available at the time of the audit.

3.4. Audit programme

Activity	Date
Commencement meeting	1 st April 2021
Day site inspection	6 th April 2021
Night site inspection	6 th April 2021
Draft report issued	12 th April 2021
Completion meeting	16 th April 2021
Final report issued	16 th April 2021

Table 2: Audit programme

3.5. Commencement meeting

A commencement meeting was held by videoconference on 1st April 2021. Present were Jonathan Berry (Wedgetail), Rob Townsend (Kleinfelder), Jeff Garry (Intersect Traffic) and Chris Piper (Northrop Consulting Engineers) and Greg Baird (Greg Baird and Associates). The audit team was briefed about the site location, the features of the project and the extent of the area to be audited.

3.6. Information supplied

The following design drawings and information were provided for the audit:

- Deep Creek TIA 20_028 080520 v5 (Intersect Traffic May 2020)
- Deep Creek Quarry Scoping Report Nov 2020 (Kleinfelder, November 2020)
- The Bucketts Way traffic classifier counts

3.6.1 Background data

Traffic volume data

As discussed in the Traffic Impact Assessment report (Deep Creek TIA 20_028 080520 v5), manual traffic counts at the Pacific Highway / The Bucketts Way intersection were undertaken on 21 February 2019 between 8.00 am – 9.00 am and 3.45 pm – 4.45 pm.

2020 two-way mid-block traffic volumes extracted from these counts were:

Location	AM Vehicular Traffic Per Hour	PM Vehicular Traffic Per Hour
The Pacific Highway east of The Bucketts Way	1,254	1,450
The Pacific Highway west of The Bucketts Way	1,450	1,790
The Bucketts Way north of the Pacific Highway	264	423

The 2020 and 2030 mid-block peak hour traffic volumes were calculated as:

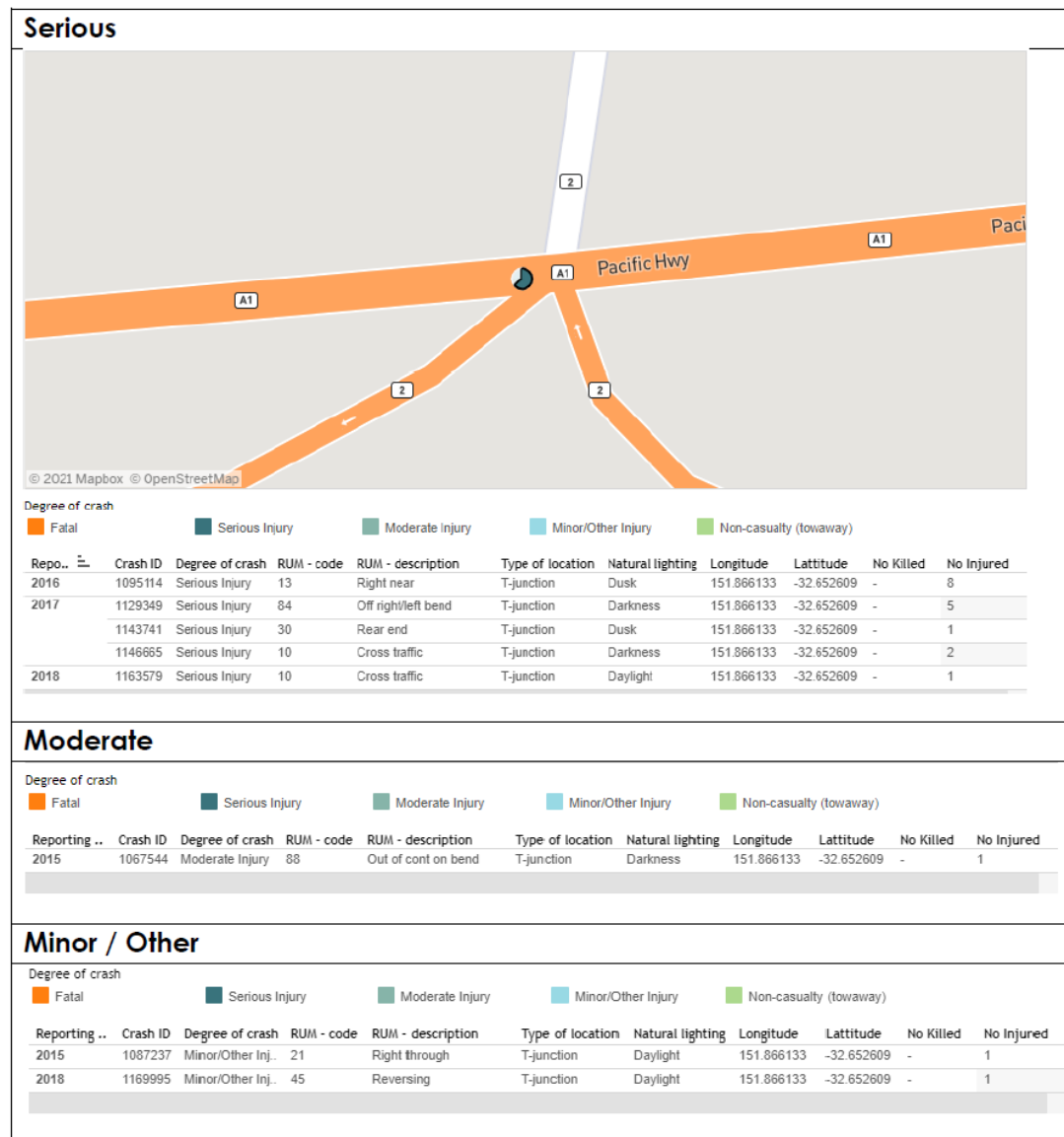
Road	Section	2020 AM peak vtph	2020 PM peak vtph	2030 AM peak vtph	2030 PM peak vtph
Pacific Highway	East of The Bucketts Way	1254	1450	1529	1820
Pacific Highway	West of The Bucketts Way	1450	1790	1768	2182
The Bucketts Way	North of the Pacific Highway	264	423	322	423

The existing heavy vehicle traffic is approximately 8% on The Bucketts Way and up to 13% on the Pacific Highway.

Crash data

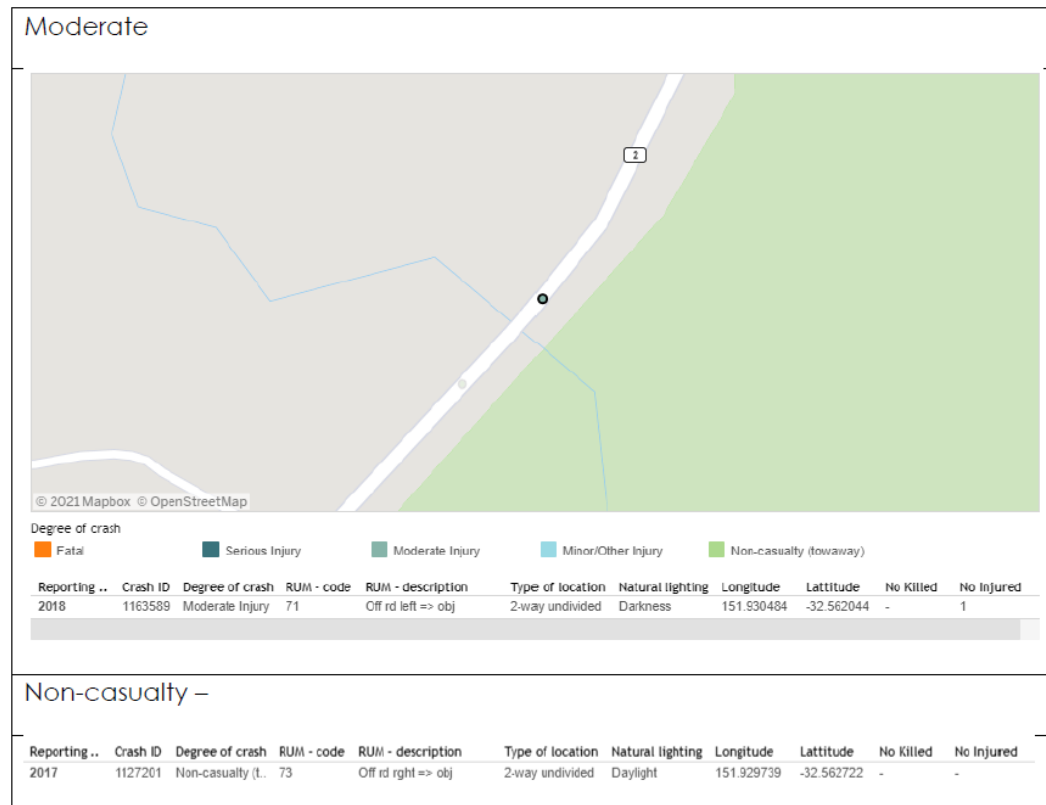
Pacific Highway / The Bucketts Way

Crash data from the *NSW Centre for Road Safety Crash and casualty statistics maps* (2015-2019) shows 5 Serious, 1 Moderate and 2 Minor crashes at the intersection between 2015 and 2019.



The Bucketts Way near the proposed Deep Creek Quarry road intersection

Crash data from the *NSW Centre for Road Safety Crash and casualty statistics maps* (2015-2019) shows 1 Moderate crash (off road to left, hit object, in darkness) between Deep Creek and the proposed intersection and 1 non-casualty crash (off road to right, hit object, in daylight) between Deep Creek and Deep Creek Road between 2015 and 2019.



3.7. Site inspections

A daytime and nighttime site inspection were carried out by the road safety audit team on Tuesday 6th April 2021. Weather conditions were clear for both the day and night audits. All road safety issues that were identified are recorded in section 5 of this report.

3.8. Completion meeting

A completion meeting was held on the 16th of April 2021 by videoconference. Present were Rob Townsend (Kleinfelder), Jonathan Berry (Wedgetail), Greg Baird and Graeme Robinson (Greg Baird and Associates). Review of the draft report identified some editorial changes and descriptions requiring clarification. The report was updated and the findings were discussed, agreed, and finalised.

4. Risk assessment

Risk matrix

Severity	Minor or property damage	Moderate	Serious	Fatal
	A person who suffers no injury or only requires minor first aid treatment.	A person who attends an emergency department on the same day or on the day after a crash but was not killed or subsequently admitted to hospital.	A person who is admitted to hospital on the same day or the day after a crash and did not die within 30 days of the crash.	A person who dies within 30 days from injuries received in a road traffic crash.
Probability				
Weekly Is expected to occur in most circumstances.	Medium	High	Extreme	Extreme
Monthly Will probably occur.	Medium	Medium	High	Extreme
6 Monthly Might occur at some time.	Low	Medium	High	Extreme
Yearly Might occur but doubtful.	Negligible	Low	Medium	High
Every 5 years or less May occur but only in exceptional circumstances.	Negligible	Negligible	Medium	High

Level of prioritisation based on risk rating

Risk Rating	Level of prioritisation
Extreme	Should be corrected immediately
High	Should be corrected in the very near future, even if costs are high. Temporary mitigation measures should be considered until final correction action taken.
Medium	Should be corrected in the near future, even if costs are moderate. Any delay to correction should be justified. Temporary mitigation measures should be considered until final correction action taken.
Low	Should be corrected at a suitable time if cost is low.
Negligible	Should be corrected at a suitable time if cost is low.

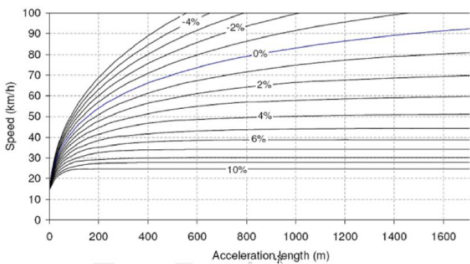
5. Road safety risks

The Road Safety Audit findings are documented in the table below which provides details of the risks to road safety identified by the audit team in relation to both the supplied auditable material and the site inspections.

The identified risks are assigned road safety categories to assist in the management of corrective actions. Each risk is assessed with a rating as Extreme, High, Medium, Low or Negligible, derived as a function of Probability and Severity, as outlined in the tables of Section 4.

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue)	Road Safety Audit Category	Probability	Severity	Risk Rating
1 – Length of southbound right-turn lane	 Figure 1-1: Length of southbound highway right-turn lane.	The signposted speed zone for the southbound highway lanes is 100 km/h. The existing southbound right turn lane to The Bucketts Way is approx. 110 m long (including taper). The required length for comfortable deceleration for a 100 km/h speed zone, including taper, is 155 m. The existing length provides for the maximum 3.5 m/s² deceleration length for 100 km/h or comfortable 2.5 m/s² deceleration length for 80 km/h. There is a risk that a vehicle entering the right turn lane at 100 km/h may not have sufficient length to decelerate to zero, causing them to overshoot into the northbound fast lane. This may increase the risk of head-on and side-swipe crashes.	Auxiliary Lanes	Every 5 years or less	Serious	Medium

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2 – Lack of left-turn acceleration	 Figure 2-1: No left turn acceleration lane.  Source: Department of Main Roads (2002b)¹. Figure 2-2: Acceleration of a 19 m semi-trailer (42.5 t) diesel carrying a maximum load (7.5 kW/t)¹	No left-turn acceleration lane is provided for heavy vehicles turning left from The Bucketts Way onto the Pacific Highway. Austroads¹ (see Figure 2-2 adjacent) indicates that a laden semi-trailer would require 800 m on a level grade to reach 80 km/h (20 km/h below the posted speed). There is an increased likelihood that a northbound Pacific Highway vehicle, travelling at 100 km/h, would encounter a slow-moving heavy vehicle. The speed differential may not be apparent at a distance, especially in adverse weather or darkness. This may increase the risk of rear-end or sideswipe crashes.	Auxiliary Lanes	Yearly	Serious	Medium
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¹ Guide to Road Design Part 3: Geometric Design (Austroads April 2020)

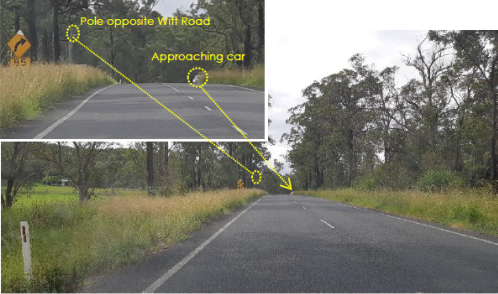
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3 – Lack of hold line	 Figure 3-1: Lack of hold line and faded seagull island linemarking	There is no hold line for the southbound highway right turn lane into The Bucketts Way to provide guidance on where to stop. Linemarking at the seagull island is faded. Insufficient delineation may lead to a stopped vehicle overhanging into the right-turn lane from The Bucketts Way or into the northbound highway fast lane. This would increase the risk of sideswipe and T-bone crashes.	Delineation	Every 5 years or less	Serious	Medium
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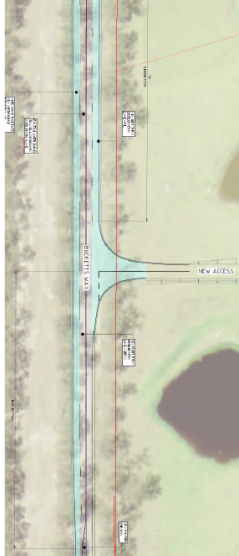
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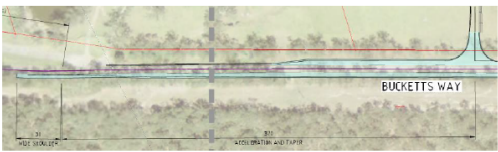
4 – Delineation at Limeburners Creek Bridge	 Figure 4-1: Limeburners Creek Bridge looking north.	Lime Burners Creek Bridge is approximately 6.5 km north of the Pacific Highway / The Bucketts Way intersection, mid-way between the highway and the proposed quarry access. It is a short bridge with a deck about 30 m long. Lane widths are narrowed slightly due to the kerbing at the base of the bridge rail. There are no shoulders. Approaching the bridge from the south, The Bucketts way is relatively straight, and signage indicates a narrow bridge. Approaching from the north, the bridge is on a left-hand curve, with approach sight partially obscured by vegetation. As well as a "Narrow Bridge" sign, a "Reduce Speed" and "No Passing on Bridge" sign provide additional warning. However, on the day and night of the audit, the Width marker (D4-3) signs were observed to be rotated and not visible in the direction of travel. As well, no reflectors were observed delineating the older style bridge railing. Insufficient delineation reduces the visibility of the bridge and railing and may increase the risk of run-off-road crashes colliding with the older style bridge railing.	Delineation	Yearly	Serious	Medium
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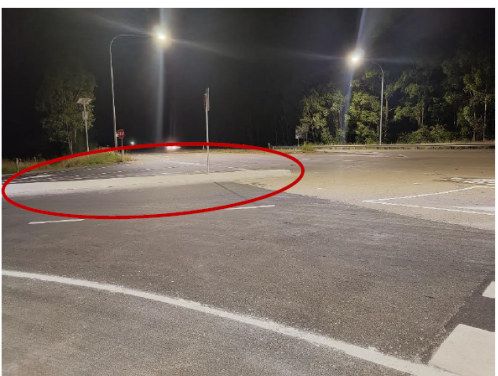
5 -Note 1 – Safe Intersection Sight Distance	 Figure 5-1: View looking north from the centre of the proposed intersection towards Witt Road at approximate eye height 1.25 m. An approaching vehicle can be seen rounding the bend at Witt Road about 195 m away.	The Austroads² guidelines recommend a Safe Intersection Sight Distance (SISD) of about 220 m for a 2.0 second reaction time and design speed of 90 km/h on a downgrade. As shown in Figures 5-1 and 5-2, by field inspection, the available SISD to and from the north appears to be about 195 m, suitable for a travel speed of about 85 km/h. However, the proposed intersection layout includes a CHR(S) right turn lane for vehicles waiting to enter the quarry access and a southbound acceleration lane for vehicles turning right to exit the quarry access. Refer to Figure 5-3. The right turn and acceleration lane remove potential conflict between southbound through traffic and traffic entering or leaving the proposed quarry access. Double barrier lines prohibit overtaking in the southbound approach to the proposed intersection. Sight distance to and from the south of the proposed quarry access is satisfactory.	Road alignment and cross section	Note
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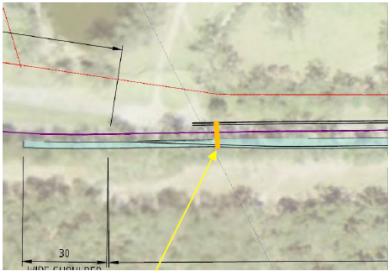
² Guide to Road Design Part 4A: Unsignalised and Signalised Intersections

	 Figure 5-2: Looking south from opposite Witt Road towards the proposed quarry access approximately 195 m away. Sight distance improves from the crest. A car and caravan can be seen south of the proposed quarry access.	 Figure 5-3: The proposed intersection layout includes a CHR(S) right turn lane and a southbound acceleration lane for vehicles turning right from the quarry access.		
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6 - Note 2 – Acceleration Lane Length	 Figure 6-1: Extract from the Strategic Design drawings showing the proposed acceleration lane and taper.	The drawings show a 370 m long acceleration lane, including merge taper, for vehicles turning right from the proposed access quarry. Assuming a 3.1 m wide acceleration lane and a 3% downgrade (as shown on the drawings), Austroads guidelines³ indicated that the proposed acceleration lane length will allow a heavy vehicle to accelerate to between 70 km/h and 75 km/h by the start of the taper. As sight distance to and from the merge is satisfactory, a merging speed of 70 km/h to 80 km/h is considered acceptable.		Note
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³ Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2017), Table 5.7

7 - Note 3 – Incomplete painting and linemarking	 Figure 7-1: Looking north along the Pacific Highway at the new median island on The Bucketts Way.	At the time of the audit the new central island in The Bucketts Way was not painted or delineated. Some edge lines on The Bucketts Way were also yet to be completed.	Delineation	Note
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8 – Note 4 – Culvert		An existing two cell pipe culvert crosses under The Bucketts Way, in the area requiring widening for the acceleration lane. While not directly affected by construction, the existing western side headwall is within the clear zone and opposite the proposed merge. Once the final merge geometry and headwall locations are determined, both headwalls should be assessed to determine whether safety barrier protection is required.	Roadside hazards	Note
				

6. Recording the audit

It should be noted that this audit will be recorded on the NSW Register of Road Safety Auditors and the project manager should expect email notification from the register to confirm the audit has been carried out.

7. Disclaimer

This report contains findings and recommendations based on examination of the site and/or relevant documentation. Observations from the site visit are based on the conditions viewed on the day(s) of inspection and are relevant at the time of production of the report. Information and data contained within this report is prepared with due care by the road safety audit team. While the road safety audit team seeks to ensure accuracy of the data, it cannot guarantee its accuracy. Readers should not solely rely on the contents of this report or draw inferences to other sites. Users must seek appropriate expert advice in relation to their own circumstances.

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