APPENDIX J – TRAFFIC IMPACT ASSESSMENT

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Luddenham Advanced Resource Recovery Centre

Traffic impact assessment

Prepared for Coombes Property Group and KLF Holdings
August 2020



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Luddenham Quarry

DA 315-7-2003 MOD 5 Traffic impact assessment

Report Number

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Client

Coombes Property Group and KLF Holdings

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Executive Summary

Coombes Property Group (CPG) in partnership with KLF Holdings Pty Ltd (KLF) are seeking to reactivate quarrying operations of an existing clay/shale quarry at 275 Adams Road, Luddenham. The existing consent allows quarrying with a production rate of 300,000 tonnes per annum until 31 December 2024.

The consent includes quarry components that are on Commonwealth-owned land, which was leased by the previous operator, including the site access road, quarry support facilities and stockpiling areas. These quarry components on Commonwealth-owned land, including the approved site access off Elizabeth Drive, are no longer available for use by the quarry.

Adams Road currently has a 3 tonne load limit, restricting its use by heavy vehicles. The northern section of Adams Road, between the subject property access road and Elizabeth Drive, will be upgraded by the applicant so that the pavement is suitable for use by heavy vehicles, up to B-doubles, and so that the lane and shoulder widths meet Austroads Guidelines. This will allow the load limit to be lifted and the northern section of Adams Road to be used to access the site.

The scope of the proposed modification is summarised as follows:

- the use of the existing site access road from Adams Road by quarry vehicles;
- increase of daily truck movements from the approved 80 (in-and-out) movements to 100 movements;
- new stockpiling area, weighbridge and other site infrastructure;
- removal of activities adjacent to the eastern boundary of the site; and
- administrative modification of some other conditions of consent to align with current government policy and/or site conditions (ie reduced development footprint).

The proposed modification does not seek to increase the approved production rate or approved hours of operation.

This traffic impact assessment (TIA) has been prepared by EMM Consulting Pty Limited (EMM) to assess the potential traffic impacts associated with the proposed modification including the changes to approved site access arrangements. The assessment supports a Modification Report which will accompany an application to modify the SSD development consent. It has been prepared in accordance with the requirements of RTA *Guide to Traffic Generating Developments* (RTA 2002). This TIA includes:

- an assessment of the existing site access from Adams Road's capacity to accommodate proposed traffic movements;
- an assessment of the capacity and safety of Adams Road, the Elizabeth Drive/Adams Road and the Elizabeth Drive/Luddenham Road intersections to accommodate proposed traffic movements; and
- assessment of the adequacy of the revised internal road network to accommodate site traffic.

All heavy vehicles will enter and exit the site using the section of Adams Road north of the site access road. It is not proposed to use Adams Road south of the site access road.

The 2024 traffic is obtained by interpolating the 2020 surveyed traffic and the Transport for New South Wales (TfNSW) Strategic Travel Forecasting Model (STFM) for 2026. The STFM already covers historical traffic levels (ie including existing land uses such as the approved quarry) and the traffic levels forecast generated by the staged Western Sydney Airport and Aerotropolis development, therefore any other cumulative traffic impact assessment is considered unnecessary.

The outcomes of the assessment are as follows:

- the Elizabeth Drive/Adams Road and the Elizabeth Drive/Luddenham Road intersection are currently operating at LOS A or B with significant capacity to accommodate additional traffic. The development traffic will not deteriorate the operations of the intersections;

- by 2024, the Elizabeth Drive/Adams Road intersection will continue to operate at LOS A during peak periods, with or without the development traffic. The right turn movement Luddenham Road will operate at LOS B and D in the AM and PM peak hours respectively which is near capacity. However, the quarry traffic does not contribute significantly towards this performance;

- swept path analyses of the Adams Road site access intersection and the Elizabeth Drive/Adams Road intersection show these intersections can accommodate vehicles up to 19 m in length; and

- upgrades to the northern section of Adams Road will include upgrades to the Adams Road/site access road intersection and the Elizabeth Drive/Adams Road intersection so that it is suitable for B-doubles.

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1 Introduction

1.1 Background

CFT No 13 Pty Ltd, a member of Coombes Property Group (CPG), has recently acquired the property at 275 Adams Road, Luddenham NSW (Lot 3 in DP 623799, 'the site') within the Liverpool City Council municipality. The site is host to an existing shale/clay quarry.

CPG owns, develops, and manages a national portfolio of office, retail, entertainment, land, and other assets. The company's business model is to retain long-term ownership and control of all its assets. CPG has the following staged vision to the long-term development of the site:

- Stage 1 Quarry Reactivation: **Solving a problem**. CPG intends to responsibly avoid the sterilisation of the remaining natural resource by completing the extraction of shale which is important to the local construction industry as raw material used by brick manufacturers in Western Sydney. Following the completion of approved extraction activities, the void will be prepared for rehabilitation.

- Stage 2 Advanced Resource Recovery Centre and Quarry Rehabilitation: **A smart way to fill the void**: CPG in partnership with KLF Holdings Pty Ltd (KLF) and in collaboration between the circular economy industry and the material science research sector, intends to establish a technology-led approach to resource recovery, management, and reuse of Western Sydney's construction waste, and repurposing those materials that cannot be recovered for use to rehabilitate the void. This will provide a sustainable and economically viable method of rehabilitating the void for development.

- Stage 3 High Value Employment Generating Development: **Transform the land to deliver high value agribusiness jobs**. CPG intends to develop the rehabilitated site into a sustainable and high-tech agribusiness hub supporting food production, processing, freight transport, warehousing, and distribution, whilst continuing to invest in the resource recovery R&D initiatives. This will deliver the vision of a technology-led agribusiness precinct as part of the Aerotropolis that balances its valuable assets including proximity to the future Western Sydney Airport (WSA) and Outer Sydney Orbital.

This report relates to a modification application relating to the delivery of Stage 1 above.

1.2 Project description

Coombes Property Group (CPG) in partnership with KLF Holdings Pty Ltd (KLF) are seeking to reactivate quarrying operations of an existing clay/shale quarry at 275 Adams Road, Luddenham (the site) through a modification of the existing State significant development (SSD) consent SSD DA 315-7-2003 (the proposed modification). CPG/KLF have no relationship to the previous site owners/operators.

The existing consent has been modified three times (MOD1 to MOD3). A fourth modification application (MOD4) was withdrawn. The consent allows quarrying with a production rate of 300,000 tonnes per annum until 31 December 2024. The approved hours of operation are limited to between 7.00 am and 6.00 pm Monday to Friday with maintenance activities allowed between 7.00 am and 1.00 pm on Saturdays.

The consent includes quarry components that are on Commonwealth-owned land, which was leased by the previous operator, including the site access road, quarry support facilities and stockpiling areas. These quarry components on Commonwealth-owned land, including the approved site access off Elizabeth Drive, are no longer available for use by the quarry.

Figure 1.1 presents the location of the site in the regional context.

1.3 Proposed modification

Quarry reactivation will require an approved modification (MOD5) to SSD DA 317-7-2003. The scope of the proposed modification is described in detail in Chapter 2 of the Modification Report (EMM Consulting 2020) and is summarised as follows:

- the use of the existing site access road from Adams Road by quarry vehicles;
- increase of daily truck movements from the approved 80 (in-and-out) movements to 100 movements;
- new stockpiling area, weighbridge and other site infrastructure within Lot 3 DP 623799;
- removal of activities on Lot 1 DP 838361 (adjacent to the eastern boundary of the site); and
- administrative modification of some other conditions of consent to align with current government policy and/or site conditions (ie reduced development footprint).

The proposed modification does not seek to increase the approved production rate or approved hours of operation.

All heavy vehicles associated with the haulage of quarry product will turn right onto Adams Road from the site towards the Elizabeth Drive/Adams Road intersection. The proposed modification seeks approval for up to 26 metres (m) B doubles to access the site access. Swept path analysis carried out as part of this TIA, indicate intersection improvements will be required prior to vehicles larger than 19 m in length accessing the site. It is proposed to upgrade this intersection as part of the proposed modification.

The northern section of Adams Road, between the subject property access road and Elizabeth Drive, will be upgraded by the applicant as part of the proposed development so that the pavement is suitable for use by larger trucks, up to B-doubles, and so that the lane and shoulder widths meet Austroads Guidelines.

An overview of the proposed modification site layout is provided in Figure 1.1.

1.4 Report objectives

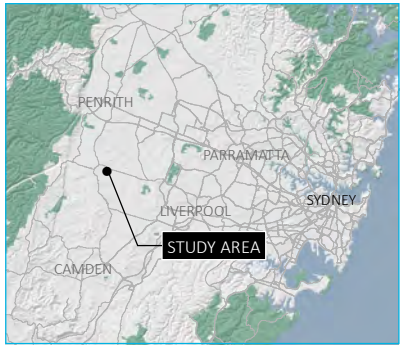
This traffic impact assessment (TIA) has been prepared by EMM Consulting Pty Limited (EMM) to assess the potential traffic impacts associated with the proposed modification including the changes to approved site access arrangements. The assessment supports a Modification Report which will accompany an application to modify the SSD development consent. It has been prepared in accordance with the requirements of RTA *Guide to Traffic Generating Developments* (RTA 2002). This TIA includes:

- an assessment of the existing site access from Adams Road's capacity to accommodate proposed traffic movements;
- an assessment of the capacity and safety of Adams Road, the Elizabeth Drive/Adams Road and the Elizabeth Drive/Luddenham Road intersections to accommodate proposed traffic movements; and
- assessment of the adequacy of the revised internal road network to accommodate site traffic.

The Transport for New South Wales (TfNSW) Strategic Travel Forecasting Model (STFM) for 2029 already covers historical traffic levels (ie including existing land uses such as the approved quarry) and the traffic levels forecast generated by the staged Western Sydney Airport and Aerotropolis development, therefore any other cumulative traffic impact assessment is considered unnecessary.

The TIA has also considered the *Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis* (Austroads 2016).

This TIA has been prepared in consultation with the relevant government authorities. A meeting with TfNSW was held on 4 February 2020 to confirm the assessment scope (refer meeting minutes contained in Appendix A). Meetings were also held with Liverpool Council on 18 February 2020 and 17 June 2020 regarding the heavy vehicle load restriction on Adams Road, which will need to be removed prior to quarry operations recommencing. The Council has stated that the northern section of Adams Road will need to be upgraded before the load limit is lifted and this section of road is used by quarry heavy vehicles. Consultation with Council is continuing regarding the required road upgrades and the removal of the load restriction.



KEY

- Study area
- Western Sydney Airport
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- NPWS reserve (see inset)
- State forest (see inset)

Source: EMM (2020); DFSI (2017); ASGC (2006); Nearmap (2020)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

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Regional context

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Traffic Impact Assessment
Figure 1.1

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KEY

- Study area
- Cadastral boundary

Proposed site modifications

- Approved extraction footprint
- Existing noise bunds
- Existing stockpiling area
- Extended stockpiling area
- Internal road
- Site entry infrastructure (incl. offices, amenities, weighbridge)
- Equipment laydown area

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Source: EMM (2020); DFSI (2017); GA (2011); Nearmap (2020)

0 50 100 m

GDA 1994 MGA Zone 56

N

Proposed modification

Luddenham Quarry - Modification 5
Traffic Impact Assessment
Figure 1.2

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2 Existing conditions

2.1 Site location and access

The site is located at 275 Adams Road, Luddenham NSW (described as Lot 3 in DP 623799) in Liverpool City Council local government area. The site is approximately 19 hectares (ha). The site is adjacent to the Western Sydney International Airport site. Construction of the airport (including road infrastructure upgrades) has commenced. Commonwealth owned land which will form part of the Western Sydney Airport, bounds the eastern and southern boundary of the site. The area surrounding the site is sparsely populated, with the closest densely populated area being the Sydney suburb of Luddenham approximately 2.2 kilometres (km) south-west and site. The closest occupied residence is about 70 m east of the site access road. Hubertus Country Club and pistol range is immediately west of the site.

The site has a narrow frontage on Adams Road with a narrow strip connecting the bulk of the site to Adams Road (Figure 1.2). Adams Road is a local road that intersects with Elizabeth Drive about 500 m north of the site and The Northern Road about 2.5 km south of the site. Elizabeth Drive and The Northern Road are the closest state roads to the site. The proposed access road is unsealed and there is no constructed intersection on Adams Road as shown in Plate 2.1.

Plate 2.1 Existing site access off Adams Road

2.2 Road network

The NSW administrative road hierarchy comprises the following road classifications, which align with the generic road hierarchy as follows:

- state roads – freeways and primary arterials (TfNSW managed);
- regional roads – secondary or sub arterials (council managed and part funded by the State); and
- local roads – collector and local access roads (council managed).

A snapshot of each of the key roads is provided in the following tables.

Table 2.1 Adams Road

Road classification and connectivity	Local road between Elizabeth Drive (northeast) and The Northern Road (southwest)
Alignment	North-east – south-west between Elizabeth Drive, Luddenham and The Northern Road, Luddenham
Number of lanes	One lane each way
Carriageway type	Sealed road without road shoulder
Carriageway width	Generally 7 m with travel lane approximately 3.5 m
Posted speed limit	70 km/h currently which may change in the future
Heavy vehicle access	Prohibited for vehicles over 3 tonnes (t). This restriction will need to be lifted to allow heavy vehicle site access
Traffic function	Predominantly carries local traffic at present

Plate 2.2 Adams Road looking southwest

Table 2.2 Elizabeth Drive

Road classification and connectivity	State road between The Northern Road (west) and Hume Highway (east)
Alignment	Generally east–west between The Northern Road, Luddenham and M7, Cecil Park
Number of lanes	Travel lane various, however, close to Adams Road it has one lane each way
Carriageway type	Sealed road with road shoulder
Carriageway width	Varies between 7 m to 10 m. General travel lane approximately 3.5 m with 1 m shoulder on each side where road width is compliant
Posted speed limit	80 km/h in the vicinity of the site
Heavy vehicle access	TfNSW approved 25/26 m B-double route between The Northern Road and Hume Highway
Traffic function	Provides east-west arterial connection

Source: GoogleEarth

Plate 2.3 Elizabeth Drive looking west

Table 2.3 Luddenham Road

Road classification and connectivity	Regional road between Mamre Road (north) and Elizabeth Drive (south)
Alignment	Generally north – south between Mamre Road, St Clair and Elizabeth Drive, Luddenham
Number of lanes	One lane each way
Carriageway type	Sealed road with road shoulder
Carriageway width	Generally 7 m wide with travel lane approximately 3.5 m with 1 m shoulder on each side where road width is compliant
Posted speed limit	80 km/h
Heavy vehicle access	Prohibited for vehicles over 5 t
Traffic function	Carries local and regional traffic

Plate 2.4 Luddenham Road looking north

2.3 Key intersections

It is expected that all quarry truck traffic will access the site via Elizabeth Drive and the northern end of Adams Road. Therefore, the major road intersections that will be affected are the Elizabeth Drive/Adams Road and the Elizabeth Drive/Luddenham Road intersections. The other potential impacts (ie employee traffic) using other routes (eg The Northern Road/ Adams Road intersection) is anticipated to be relatively minor and has been approved under the existing consent and is therefore omitted from this assessment.

2.4 Existing traffic volumes

2.4.1 Intersection counts

An intersection survey has been undertaken between 6.00 am and 9.00 am, as well as between 3.00 pm to 6.00 pm, on 27 November 2019 at the identified intersections, as presented in Appendix B.

The survey results indicate that the peak hours are as follows:

- AM peak hour: 6.30 am to 7.30 am; and
- PM peak hour: 4.15 pm to 5.15 pm.

The surveyed traffic volumes during the AM and PM peak hours are summarised in Figure 2.1.

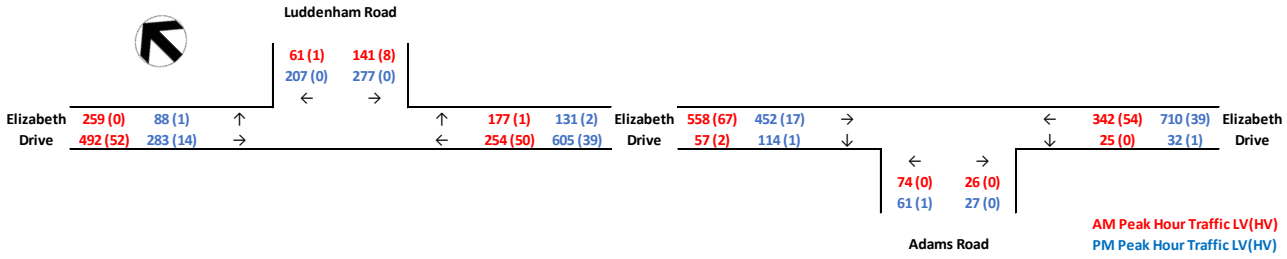


Figure 2.1 2020 AM & PM peak baseline traffic volume

2.4.2 Tube counts

A tube count has been undertaken on Adams Road north of Anton Road for a 7-day period between 27 November 2019 and 3 December 2019 where the Annual Average Daily Traffic (AADT), weekly 85th percentile speed, and heavy vehicle percentage were recorded. The results of the tube count are summarised in Table 2.4.

The traffic data show that Adams Road carried about 2,100 vehicles per day with an average 7% heavy vehicles. Given the rural nature of the road, the higher heavy vehicle proportion is considered acceptable. However, the average speed of this road was well above the posted speed limit.

There is an existing heavy vehicle load restriction on Adams Road (3 t and over). Consultation is in progress with Liverpool City Council regarding lifting the load limit restriction. The Council has stated that the section of Adams Road used by quarry heavy vehicles will need to be upgraded before the load limit is lifted. In this process, a formal review of the speed in this road is likely to take place.

Table 2.4 Summary of tube count results – Adams Road

	5-day AADT	Heavy vehicle percentage (%)	Weekly 85th percentile speed (km/h)
North-eastbound	1,089	7.4	81
South-westbound	1,009	6.9	82
Combined	2,099	7.2	81

2.5 Crash analysis

Crash data from TfNSW Centre for Road Safety interactive history database between 2014 and 2018 has been studied in the vicinity of the site. The crashes are categorised based on the severity of the crashes as follows:

- fatal;
- serious injury;
- moderate injury;
- minor/other injury; or
- non-casualty (eg towaway).

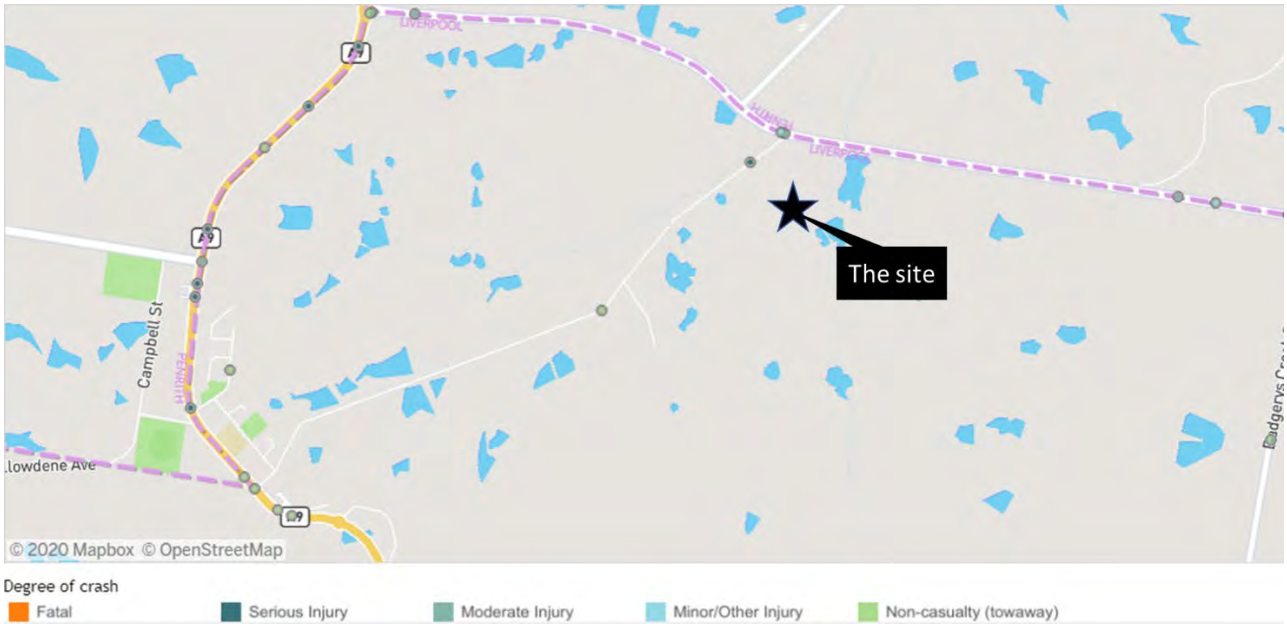


Figure 2.2 Crash data between 2014 and 2018

Overall, there were five crashes on Adams Road including at its intersections with Elizabeth Drive and The Northern Road. These crashes involved the following severity:

- one serious injury;
- one moderate injury;
- one minor/other injury; and
- two non-casualty (towaway).

There were no fatal incidents. The overall crash rate is considered low over the 5-year period. However, due to the development of the Western Sydney Airport, the future land uses and road network in the locality are expected to change significantly with significant growth of traffic, which will likely generate different statistics.

2.6 Public transport

There are currently no public transport services accessible to the site.

The Western Sydney Airport Environmental Impact Statement (Department of Infrastructure and Regional Development 2016) noted that bus routes 789 and 801 will be altered in consultation with the bus operator and TfNSW. The altered bus stops may be accessible to/from the site with more frequent services in the future. These bus routes currently service the following areas:

- Bus route 789 – Luddenham to Penrith (one service in the morning and one in the afternoon in weekdays only).
- Bus route 801 – Badgerys Creek to Liverpool (three services towards Badgerys Creek in the afternoon and two services towards Liverpool in the morning).

In terms of rail transport, the federal and NSW state governments have undertaken a scoping study for Western Sydney rail needs. In future, the Western Sydney Airport will be supported by direct rail links to Schofields, Parramatta, Macarthur, and Leppington.

2.7 Active transport

Pedestrian and cycling infrastructure in the area is currently limited, reflecting the predominantly rural character of the area.

As the Western Sydney Priority Growth Area and South West Priority Growth Area develop, additional cycleway links will be provided and integrated within the Liverpool cycleway network.

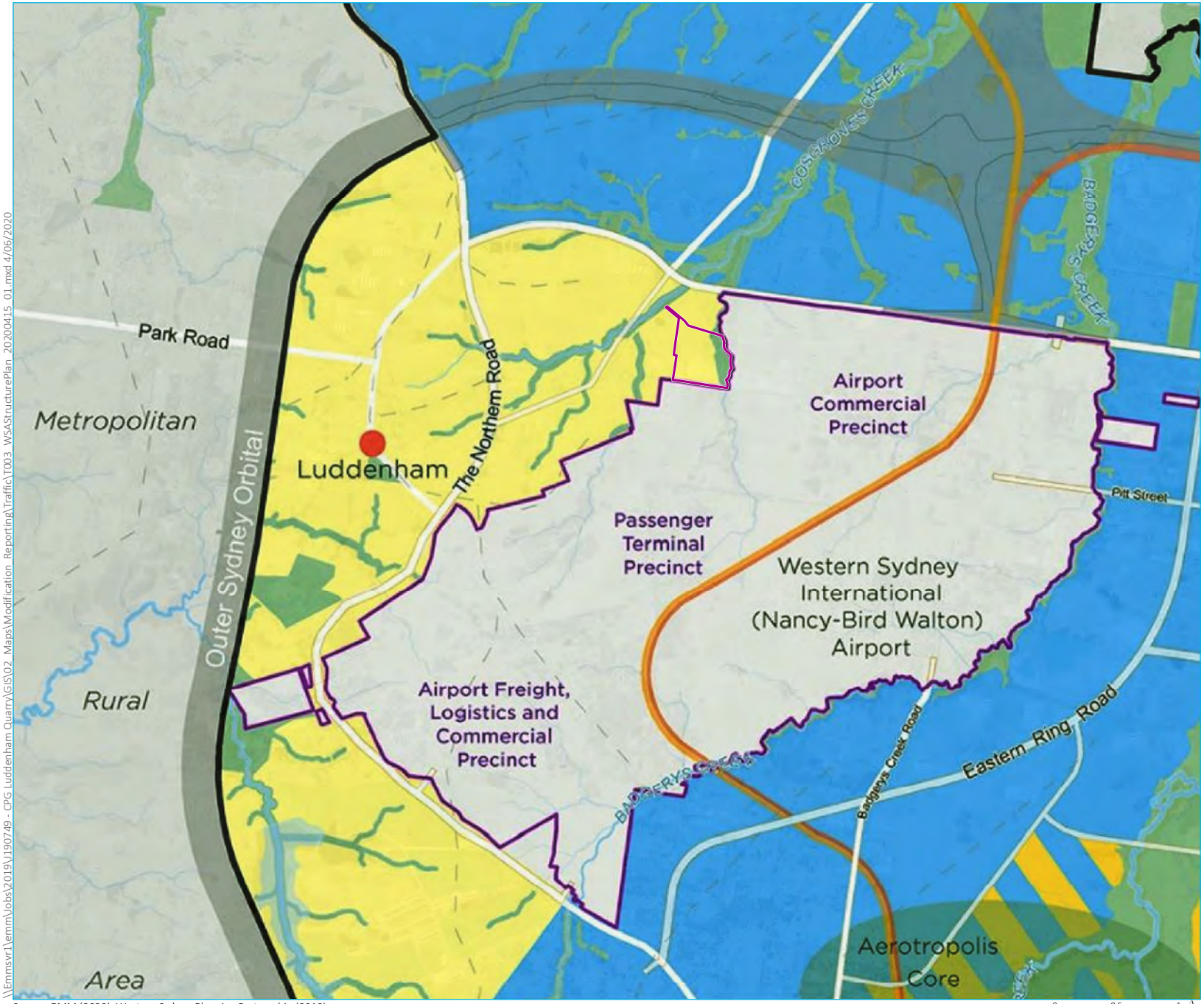
2.8 Future road improvements

The *Western Sydney Infrastructure Plan* (Department of Infrastructure, Transport, Regional Development and Communications 2019) has outlined the upcoming infrastructure upgrade works to accommodate the expected traffic generated from the Western Sydney Airport. The following upgrades are relevant to the locality of Adams Road:

- The Northern Road upgrade – the realigned The Northern Road will intersect Adams Road at a location closer to the site and will have a four-way intersection instead of the current T-intersection.
- M12 Motorway – The new motorway will provide a direct access from the M7 Motorway to the Western Sydney Airport as well as to The Northern Road. As a result, Elizabeth Drive will be partly relieved from regional traffic.

A review of *The Northern Road Upgrade – Glenmore Park to Bringelly MOD 1 - Adams Road Signalised Intersection* (SSI-7127-Mod-1) (Roads and Maritime Services 2018) indicates that Adams Road west of The Northern Road will have a reduced speed limit from 70 km/h to 60 km/h while east of The Northern Road, Adams Road will retain its existing speed limit at 70 km/h.

Also, the *Draft Western Sydney Aerotropolis Plan* (Western Sydney Planning Partnership 2019) provides a structure plan for the land uses surrounding the proposed Western Sydney Airport (Figure 2.3), shows that in the longer term Adams Road will be realigned at its northern end to connect directly into Luddenham Road at a new four way intersection which will replace the existing Elizabeth Drive/Adams Road intersection.



KEY

- Study area
- Structure plan
- Centre
- Western Sydney International (Nancy-Bird Walton) Airport
- Proposed transport corridor
- Agribusiness
- Environment and recreation
- Flexible employment
- Mixed flexible emplyment & urban land

Source: EMM (2020); Western Sydney Planning Partnership (2019)

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Western Sydney Aerotropolis Structure Plan

Luddenham Quarry - Modification 5
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Figure 2.3

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2.9 Future traffic volumes

The future baseline traffic volumes in the locality incorporating the traffic generation associated with the Western Sydney Airport have been provided by TfNSW in the form of their Strategic Travel Forecasting Model (STFM) outputs for the years 2026, 2031 and 2036. Due to the lack of more detailed information, the future intersection turn movements have been factored from the existing intersection count data.

The 2020 surveyed intersection traffic volumes and 2026 STFM outputs have been interpolated to yield the 2024 volumes (the model year), the projected 2024 traffic volumes have therefore considered the traffic growth in the vicinity of the Western Sydney Airport and other associated infrastructure. Figure 2.4 presents the 2024 baseline traffic volumes at the key intersections.

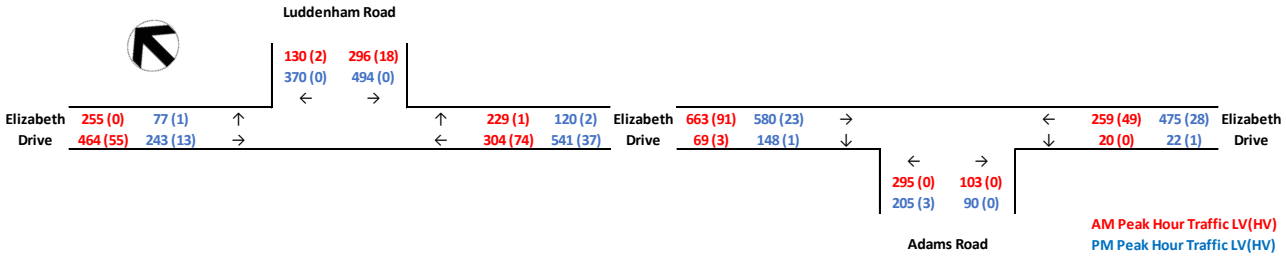

Figure 2.4 2024 baseline traffic volume (light vehicle unbracketed and heavy vehicle bracketed)

3 Proposed modification

3.1 Site layout

The proposed modification will seek approval for the use of the existing site access road from Adams Road by quarry vehicles. The proposed modification will also include:

- the establishment of site access infrastructure area (including a weighbridge and site offices);
- upgrades to the internal road network on the site, including sealing of the site access road between Adams Road and the proposed weighbridge;
- an equipment laydown area;
- an extension of the approved stockpiling area on the site; and
- new stockpiling area, weighbridge and other site infrastructure within Lot 3 DP 623799.

A site layout showing the components of the proposed modifications is provided in Figure 1.2.

3.2 Traffic generation

The quarry is approved to generate approximately 80 daily truck movements. However, traffic generation associated with quarrying operations is generally sporadic in nature with dispatch of product driven by weather conditions as well as product sales. The modification proposes to increase the in-and-out daily truck movements to 100 movements within the approved operating hours of 7.00 am to 6.00 pm to formalise maximum traffic movements and not overly restrain operations in times of peak demand. It is assumed that peak hour traffic represents 10% of the daily traffic, which equates to 10 movements in the peak hours. These trucks will be accessing and exiting the site via the northern section of Adams Road between the site access road and Elizabeth Drive.

In terms of car trips, there will be a maximum of 15 staff members on site at any given time. It is noted that staff arrivals may align with the AM network peak hour. Some staff car arrivals will be included in the AM peak hour traffic forecasts.

3.3 Traffic distribution

In terms of traffic distribution, EMM has been advised that all truck traffic will travel to and from the site via Elizabeth Drive with 80% travelling to and from the east and 20% travelling to the west[1]. Furthermore, it is assumed future staff car trips will follow the turn movement proportions of the existing road network. Thus, the future site car and truck traffic movements at the key intersection are presented in Figure 3.1.

[1] Traffic routes and distribution were advised by Mulgoa Quarries

Figure 3.1 Quarry-related traffic volume

3.4 Development traffic

The post modification traffic at the key intersection has been recalculated based on the baseline traffic (obtained from TfNSW) and site generated traffic. Thus, the post development traffic for the years 2020 and 2024 are as follows:

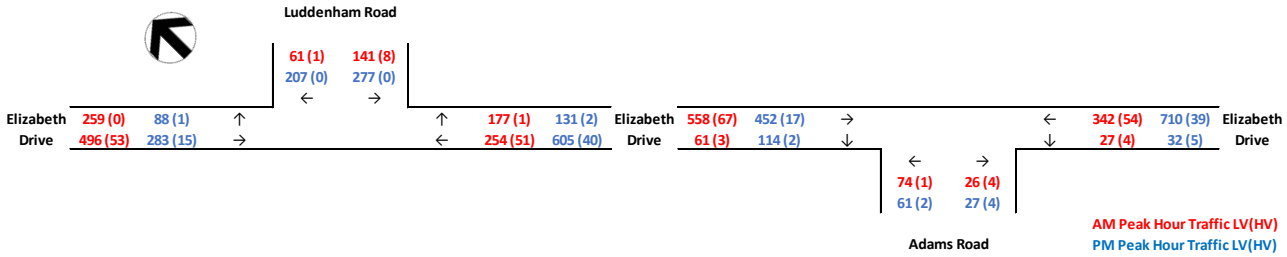

Figure 3.2 2020 development traffic volume (light vehicle unbracketed & heavy vehicle bracketed)

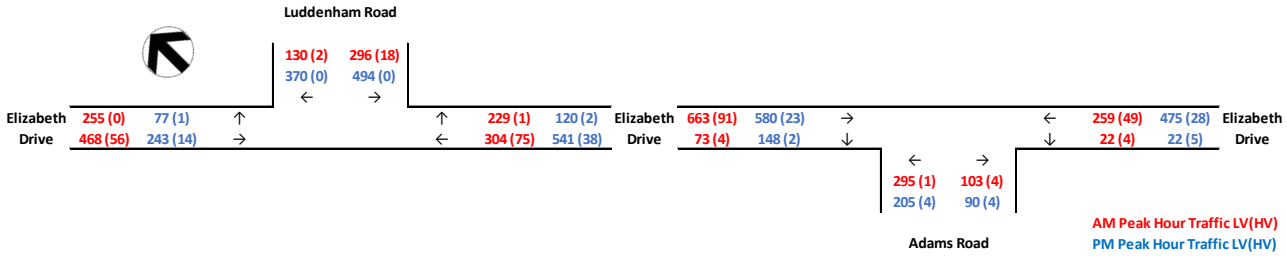

Figure 3.3 2024 development traffic volume (light vehicle unbracketed and heavy vehicle bracketed)

3.5 Car parking

Car and truck parking demand will be met within the site entry infrastructure area as shown in Figure 1.2.

3.6 Road upgrade work

Swept path assessment has been undertaken to ensure adequacy of the proposed internal road network and the relevant intersections, being:

- Elizabeth Drive with Adams Road; and
- Adams Road with site access.

The swept path assessment (Appendix D) indicates that the Elizabeth Drive/Adams Road and The Northern Road/Adams Road intersections can currently accommodate 19-m-long truck and dog turning movements. Upgrades to the northern section of Adams Road will include upgrades to this intersection so that it is suitable for B-doubles.

The swept path assessment (Appendix D) indicates that minor splaying at the site access is required to accommodate the left turn of a 19-m-long truck and dog into the site. This will be within the existing access road corridor. It will be upgraded prior to B-doubles accessing the site.

4 Impact assessment

4.1 Intersection performance

The Elizabeth Drive/Adams Road and the Elizabeth Drive/Luddenham Road intersections has been modelled with SIDRA Intersection 8.0 software, a micro-analytical tool for individual intersections and whole-network modelling. The modelling is based on the traffic survey data detailed in Section 2.4.1 as well as on the STFM outputs discussed in Section 3.4. SIDRA provides a number of performance indicators which are outlined below:

- Degree of saturation (DOS) – the total usage of the intersection expressed as a factor of 1 with 1 representing 100% use/saturation (eg 0.8 = 80% saturation).
- Average delay (DEL) – the average delay in seconds encountered by all vehicles passing through the intersection. It is often important to review the average delay of each approach as a side road could have a long delay time, while the large free flowing major traffic will provide an overall low average delay.
- Level of service (LOS) – this is a categorization of average delay, intended for simple reference.
- 95% queue lengths (Q95) – is defined to be the queue length in metres that has only a 5% probability of being exceeded during the analysed time period. It transforms the average delay into measurable distance units.

LOS is a good indicator of overall performance for individual intersections, with each level summarised in Table 4.1.

Table 4.1 Intersection LOS standards

Level of service	Average delay (seconds per vehicle)	Traffic signals, roundabout	Priority intersection ('Stop' and 'Give Way')
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity. At traffic signals, incidents will cause extensive delays. Roundabouts require other control mode.	At capacity; required other control mode
F	>71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing; required other control mode

Source: RTA Guide to Traffic Generating Developments

A swept path analysis of the Adams Road/site access intersection has been undertaken to confirm its feasibility for the proposed truck access, but no SIDRA modelling has been carried out.

The following SIDRA results for the Elizabeth Drive/Adams Road and the Elizabeth Drive/Luddenham Road intersections are presented in Table 4.2 and Table 4.3. The tables present the maximum average delay of any particular movement for a priority-controlled intersection (usually the longest delay occurs for the right turn movement from the minor road).

Table 4.2 SIDRA results for 2020 traffic

Intersection	Peak hour	DOS		LOS		DEL (seconds)		Q95 (metres)	
		baseline	modification	baseline	modification	baseline	modification	baseline	modification
Elizabeth Drive/ Adams Road	AM	0.389	0.392	A	A	9.3	10.1	6.2	6.7
	PM	0.422	0.426	A	A	10.6	11.8	16.6	17.2
Elizabeth Drive/ Luddenham Road	AM	0.301	0.303	A	A	18.2	18.3	8.6	8.6
	PM	0.661	0.664	B	B	24.2	24.4	22.4	22.6

These results show the Elizabeth Drive/Adams Road and the Elizabeth Drive/Luddenham Road intersections are currently operating at LOS A or B with significant capacity to accommodate additional traffic. The quarry traffic will not deteriorate the operations of the intersections.

Table 4.3 SIDRA results for 2024 traffic

Intersection	Peak hour	DOS		LOS		DEL (seconds)		Q95 (metres)	
		baseline	modification	baseline	modification	baseline	modification	baseline	modification
Elizabeth Drive/ Adams Road	AM	0.469	0.471	A	A	10.2	10.6	8.3	9.0
	PM	0.436	0.439	A	A	10.4	10.8	17.2	17.7
Elizabeth Drive/ Luddenham Road	AM	0.523	0.528	B	B	25.0	25.2	14.9	15.0
	PM	0.974	0.978	D	D	51.9	53.6	99.4	102.4

With the additional forecast TfNSW locality growth by 2024, the two intersections will continue to operate at LOS A or B, with the exception of the Elizabeth Drive/Luddenham Road in the PM peak hour, where a LOS D will be experienced.

The average delay for the right turning vehicles of the Elizabeth Drive/Adams Road intersection would be approximately 11 seconds which is considered acceptable. The maximum queuing will be about two to three vehicles. There is effectively no major difference in parameters between the baseline (2020) and modification (2024) scenarios.

On the other hand, the Elizabeth Drive/Luddenham Road intersection will continue to operate at a satisfactory level (LOS B) in both baseline and modification scenarios during the AM peak hour. The intersection will still have about half of the spare capacity to accommodate additional traffic. However, during the PM peak hour, the intersection

will operate near the capacity (both existing and modification scenarios). The right turn movements from Luddenham Road will experience the maximum delay, however, it should be noted that the net impact due to the development traffic would be minor.

In summary, the quarry traffic will not have any major impact at these two intersections.

4.2 Car and truck parking provision

There will be maximum 15 staff members on site at any given time and there may be up to two visitors. Therefore, 17 marked parking spaces will be provided within the proposed site entry infrastructure area. The car parking spaces will be designed in accordance with relevant Australian Standard (AS 2890.1:2004) and there will be at least one will be an accessible parking space.

4.3 Road safety assessment at the site entrance on Adams Road

The access to the site on Adams Road is located at a straight section, hence there is no sight distance or safety issues for entering or existing vehicles to/from the site. In accordance with *Austroads Guide to Road Design Part 4A (Unsignalised and Signalised Intersections)* (Austroads 2017), for a 70 km/h road, the minimum safe intersection sight distance (SISD) required for a general minimum 2 second driver reaction time is 151 m.

The sight distances on Adams Road at the quarry access road have been estimated based on the line of sight and observation, as shown in Plate 4.1. Based on the sight distance analysis, the sight distances to the left and right meets the minimum requirement (151 m) as stipulated in the Austroads Guide to Road Design.

Sight distance to the left (216 m)

Sight distance to the right (158 m)

Plate 4.1 Sight distance from quarry access

4.4 Impact on road safety

All vehicle access to the site will be via Adams Road. As discussed in Section 2.5, the crash history along Adams Road is negligible. The current baseline traffic volumes (from the recent tube count) and forecast future baseline traffic volumes (extracted from data provided by TfNSW) are provided in Table 4.4. The forecast future baseline traffic volumes have considered the cumulative traffic growth associated with Western Sydney Airport and other associated infrastructure.

Table 4.4 Peak hour traffic volume on Adams Road

Peak Hour	2020 (tube count)	2024 (interpolation from 2020 survey and 2026 STFM outputs)
AM	171	490
PM	218	470

In 2024, the additional development traffic from the quarry (10 movements in the peak hours) will represent approximately 2% of the future total forecast traffic volume using Adams Road and is not expected to have a significant impact in terms of either traffic flow or traffic safety along Adams Road.

As all heavy vehicles will enter and exit the site via Elizabeth Street, there will be no traffic safety issues on the residential section of Adams Road.

The impact of the quarry traffic on Adams Road traffic will be minimal, particularly when considered in the context of the broader changes to the traffic volumes associated with the Aerotropolis.

As for Elizabeth Drive, the STFM model has already considered the traffic from the approved quarry and the upcoming Western Sydney Airport. The modification changes the access routes; however, the projected traffic on Elizabeth Drive remains more or less the same.

4.5 Impact on public transport, pedestrians and cyclists

Currently there is no designated pedestrian or cycling infrastructure along Adams Road or Elizabeth Drive in the vicinity of the site. The implementation of such facilities may follow overall Aerotropolis development. Any future pedestrian or cycling infrastructure along Adams Road is supported as it would encourage site staff members to consider using active transport modes, rather than driving.

4.6 Adams Road load limit restriction

Adams Road is a council controlled 'local road'. There is an existing load limit restriction (up to 3 tonne) on Adams Road (see Table 2.1). This load limit needs to be lifted to allow heavy vehicles to access the site. Discussions are being held with Liverpool City Council regard upgrading the northern section of Adams Road and lifting the load limit.

The northern section of Adams Road, between the subject property access road and Elizabeth Drive, will be upgraded by the applicant so that the pavement is suitable for use by heavy vehicles, up to B-doubles, and so that the lane and shoulder widths meet Austroads Guidelines.

The applicants have commissioned road surveys and will prepare an upgraded road design. The upgrade design will be agreed with Council prior to an application being lodged to National Heavy Vehicle Regulator (NHVR) to lift the load limits. As part of the application process, NHVR will undertake authority and public consultation.

5 Summary and conclusion

The site at 275 Adams Road, Luddenham is an inactive quarry with approved access and support facilities on Commonwealth-owned land. This Commonwealth-owned land has been dedicated to the development of Western Sydney Airport. An alternative access is proposed via Adams Road for reopening of the quarry. Increase of truck movements is also proposed from the approved 80 daily movements to 100 daily movements. All heavy vehicles associated with the haulage of quarry product will turn right onto Adams Road from the site towards the Elizabeth Drive/Adams Road intersection.

Adams Road currently has a 3 tonne load limit, restricting its use by heavy vehicles. The northern section of Adams Road, between the subject property access road and Elizabeth Drive, will be upgraded by the applicant as part of the proposed development so that the pavement is suitable for use by larger trucks, up to B-doubles, and so that the lane and shoulder widths meet Austroads Guidelines.

The associated traffic impacts for this change of site access and potential cumulative traffic impacts as a result of the development of the Western Sydney Aerotropolis have been assessed.

The outcomes of the assessment are as follows:

- the Elizabeth Drive/Adams Road and the Elizabeth Drive/Luddenham Road intersections are currently operating at LOS A or B with significant capacity to accommodate additional traffic. The development traffic will not deteriorate the operations of the intersections;
- by 2024, the Elizabeth Drive/Adams Road intersection will continue to operate at LOS A during peak periods, with or without the development traffic. The right turn movement Luddenham Road will operate at LOS B and D in the AM and PM peak hours respectively. However, the quarry traffic will not have any major impact on these two analysed intersections;
- in 2024, the additional development traffic from the quarry (10 movements in the peak hours) will represent approximately 2% of the future total forecast traffic volume using Adams Road and is not expected to have a significant impact in terms of either traffic flow or traffic safety along Adams Road;
- swept path analyses of the Adams Road/site access intersection and the Elizabeth Drive/Adams Road intersection show these intersections can accommodate vehicles up to 19 m in length;
- there are no sight distance or safety issues at the Adams Road/site access intersection for vehicles entering or exiting the site; and
- the northern section of Adams Road, between the subject property access road and Elizabeth Drive, will need to be upgraded by the applicant to allow the load limit to be lifted by NHVR with agreement of Liverpool City Council.

6 References

Austroads. 2017. *Guide to Road Design Part 4A: Unsignalised & Signalised Intersections.*

—. 2016. *Guide to Traffic Management Part 3: Traffic Studies and Analysis.*

Department of Infrastructure and Regional Development. 2016. "Western Sydney Airport Environmental Impact Statement."

Department of Infrastructure, Transport, Regional Development and Communications. 2019. *Western Sydney Infrastructure Plan.* 30 10. Accessed 4 9, 2020. https://investment.infrastructure.gov.au/key_projects/road_and_rail_delivery/western_sydney_infrastructure_plan.aspx.

EMM Consulting. 2020. "Luddenham Quarry Scoping Report MOD5."

RTA. 2002. *Guide to Traffic Generating Developments.*

Western Sydney Planning Partnership. 2019. "Draft Western Sydney Aerotropolis Plan."


Appendix A

Meeting minutes




Eric Lei

From: Janet Krick
Sent: Thursday, February 6, 2020 5:20 PM
To: Felix.Liu@transport.nsw.gov.au
Cc: Abdullah Uddin; Phil Towler; John Scarlis; Pascal Bobillier; Michael Coombes; Peter Coombes; Harry Scarlis; George Scarlis
Subject: Traffic impact assessments for 275 Adams Road Luddenham, proposed modification to reactivate the quarry and new SSD project - quarrying, recycling and landfilling
Attachments: RE: Luddenham Clay/Shale Quarry

Hi Felix,

Thank you very much for you and your teams time on Tuesday to discuss the Luddenham Quarry reactivation and new SSD approval. Please see below key outcomes from the meeting and our understanding of TfNSW's assessment requirements for the proposed modification of the existing quarry consent to enable reactivation of the quarry. We have also noted our understanding of the anticipated assessment requirements for a new SSD project which would seek approval for continued extraction in the short term, establishment of a C&D recycling facility and landfilling of unrecyclables in the quarry void with the ultimate objective of rehabilitating the void to enable the long term industrial or commercial use of the site. I have attached my previous email with relevant background information for the proposals.
Could you please circulate to the other meeting participants.

- EMM to undertake SIDRA modelling work based on the existing road network, except the updated intersection layout for The Northern Road/ Adams Road intersection. The updated layout is available at the DPIE website;
- EMM to send an email to TfNSW requesting the output of EMME model. Turn movement data is required for the following intersections which will be analysed. TfNSW to provide EMME data for future nominated years (eg 2020, 2029, 2034, 2039) or advise per annum growth of background traffic that needs to be adopted:
    - The Northern Road/ Adams Road (upgraded layout)
    - Elizabeth Drive/ Adams Road (existing layout)
    - Elizabeth Drive/ Luddenham Road (existing layout)

- Proposed modification – quarry reactivation and establishment of Adams Rd site access:
    - EMM to undertake intersection modelling for existing and 2029 (extension of the quarry)
    - TfNSW to advise EMM for what level of sensitivity testing would be required for the traffic analysis;

- New SSD project to continue quarrying operations, C&D recycling and landfilling:
    - EMM to undertake intersection modelling for existing and 2029, 2034 & 2039 (recycling facility) with a five year increment;
    - Quarry related traffic will be excluded for the analysis beyond 2029;
    - TfNSW to advise EMM for what level of sensitivity testing would be required for the traffic analysis;
- EMM to consider traffic safety matters in the respective traffic impact assessment. Swept path analysis will be required for heavy vehicle movements;
- TfNSW has suggested to send them the traffic report beforehand for their comments before the formal Modification report and EIS submissions. This is to minimise residual work after the respective submission; and
- TfNSW acknowledges that the project team is meeting with Liverpool City Council for their traffic input for the respective traffic impact assessment.

Please let me know if I have overlooked any aspect of our discussion.

Thanks again

Janet Krick
Senior Environmental Planner
EMM
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Connect with us
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Please note my working days are Monday to Thursday


Appendix B

Intersection survey




Project Name: Adams Road intesection with The Northern Road
Project Date: 11/27/2019

		NORTHERN ROAD WESTBOUND						ADAMS ROAD SOUTHBOUND						NORTHERN ROAD EASTBOUND						
		STRAIGHT			RIGHT			LEFT			RIGHT			LEFT			STRAIGHT			
	15 Mins	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	Totals
27-Nov-19	600-614	100	15	**115**	14	0	**14**	8	2	**10**	0	0	**0**	0	0	**0**	118	24	**142**	281
27-Nov-19	615-629	130	17	**147**	11	2	**13**	19	0	**19**	0	0	**0**	3	0	**3**	166	28	**194**	376
27-Nov-19	630-644	117	24	**141**	23	2	**25**	26	1	**27**	2	0	**2**	3	0	**3**	117	27	**144**	342
27-Nov-19	645-659	121	22	**143**	12	1	**13**	16	1	**17**	1	0	**1**	2	2	**4**	93	24	**117**	295
27-Nov-19	700-714	133	15	**148**	17	0	**17**	9	2	**11**	2	1	**3**	13	1	**14**	120	20	**140**	333
27-Nov-19	715-729	140	12	**152**	26	1	**27**	13	1	**14**	1	2	**3**	10	3	**13**	142	20	**162**	371
27-Nov-19	730-744	150	10	**160**	27	0	**27**	7	0	**7**	2	2	**4**	8	1	**9**	133	19	**152**	359
27-Nov-19	745-759	113	13	**126**	19	0	**19**	21	2	**23**	3	0	**3**	4	0	**4**	127	18	**145**	320
27-Nov-19	800-814	102	20	**122**	22	1	**23**	9	1	**10**	1	0	**1**	3	0	**3**	109	14	**123**	282
27-Nov-19	815-829	107	18	**125**	12	0	**12**	19	1	**20**	1	0	**1**	2	2	**4**	82	16	**98**	260
27-Nov-19	830-844	108	18	**126**	17	0	**17**	16	2	**18**	1	0	**1**	4	3	**7**	98	22	**120**	289
27-Nov-19	845-859	97	23	**120**	10	2	**12**	8	4	**12**	2	1	**3**	8	0	**8**	73	19	**92**	247
		1418	207	**1625**	210	9	**219**	171	17	**188**	16	6	**22**	60	12	**72**	1378	251	**1629**	

	NORTHERN ROAD WESTBOUND						ADAMS ROAD SOUTHBOUND						NORTHERN ROAD EASTBOUND						
	STRAIGHT			RIGHT			LEFT			RIGHT			LEFT			STRAIGHT			
Hourly	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	Totals
600-700	468	78	**546**	60	5	**65**	69	4	**73**	3	0	**3**	8	2	**10**	494	103	**597**	1294
615-715	501	78	**579**	63	5	**68**	70	4	**74**	5	1	**6**	21	3	**24**	496	99	**595**	1346
630-730	511	73	**584**	78	4	**82**	64	5	**69**	6	3	**9**	28	6	**34**	472	91	**563**	1341
645-745	544	59	**603**	82	2	**84**	45	4	**49**	6	5	**11**	33	7	**40**	488	83	**571**	1358
700-800	536	50	**586**	89	1	**90**	50	5	**55**	8	5	**13**	35	5	**40**	522	77	**599**	1383
715-815	505	55	**560**	94	2	**96**	50	4	**54**	7	4	**11**	25	4	**29**	511	71	**582**	1332
730-830	472	61	**533**	80	1	**81**	56	4	**60**	7	2	**9**	17	3	**20**	451	67	**518**	1221
745-845	430	69	**499**	70	1	**71**	65	6	**71**	6	0	**6**	13	5	**18**	416	70	**486**	1151
800-900	414	79	**493**	61	3	**64**	52	8	**60**	5	1	**6**	17	5	**22**	362	71	**433**	1078

Project Name: Adams Road Intesection with The Northern Road
Project Date: 11/27/2019

		NORTHERN ROAD WESTBOUND						ADAMS ROAD SOUTHBOUND						NORTHERN ROAD EASTBOUND						
		LEFT			STRAIGHT			STRAIGHT			RIGHT			LEFT			RIGHT			
	15 Mins	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
27-Nov-19	1500-1514	102	15	**117**	9	2	**11**	19	2	**21**	3	1	**4**	0	2	**2**	99	11	**110**	265
27-Nov-19	1515-1529	114	25	**139**	18	1	**19**	15	3	**18**	3	1	**4**	3	1	**4**	128	16	**144**	328
27-Nov-19	1530-1544	108	20	**128**	11	2	**13**	27	3	**30**	4	0	**4**	5	0	**5**	107	13	**120**	300
27-Nov-19	1545-1559	136	20	**156**	10	2	**12**	24	0	**24**	1	0	**1**	2	0	**2**	144	18	**162**	357
27-Nov-19	1600-1614	144	16	**160**	15	0	**15**	21	0	**21**	2	1	**3**	2	1	**3**	129	19	**148**	350
27-Nov-19	1615-1629	156	10	**166**	12	2	**14**	31	1	**32**	4	4	**8**	2	0	**2**	147	11	**158**	380
27-Nov-19	1630-1644	128	17	**145**	9	1	**10**	24	4	**28**	2	0	**2**	0	0	**0**	137	10	**147**	332
27-Nov-19	1645-1659	144	15	**159**	12	0	**12**	28	3	**31**	2	0	**2**	1	1	**2**	136	11	**147**	353
27-Nov-19	1700-1714	181	17	**198**	18	0	**18**	39	0	**39**	5	0	**5**	3	0	**3**	130	8	**138**	401
27-Nov-19	1715-1729	169	11	**180**	16	0	**16**	27	0	**27**	3	1	**4**	2	0	**2**	165	9	**174**	403
27-Nov-19	1730-1744	168	10	**178**	24	1	**25**	16	1	**17**	5	0	**5**	5	2	**7**	139	7	**146**	378
27-Nov-19	1745-1759	119	4	**123**	16	0	**16**	11	0	**11**	4	0	**4**	5	0	**5**	120	11	**131**	290
		1669	180	**1849**	170	11	**181**	282	17	**299**	38	8	**46**	30	7	**37**	1581	144	**1725**	

	NORTHERN ROAD WESTBOUND						ADAMS ROAD SOUTHBOUND						NORTHERN ROAD EASTBOUND						
	STRAIGHT			RIGHT			LEFT			RIGHT			LEFT			STRAIGHT			
Hourly	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
1500-1600	460	80	**540**	48	7	**55**	85	8	**93**	11	2	**13**	10	3	**13**	478	58	**536**	1250
1515-1615	502	81	**583**	54	5	**59**	87	6	**93**	10	2	**12**	12	2	**14**	508	66	**574**	1335
1530-1630	544	66	**610**	48	6	**54**	103	4	**107**	11	5	**16**	11	1	**12**	527	61	**588**	1387
1545-1645	564	63	**627**	46	5	**51**	100	5	**105**	9	5	**14**	6	1	**7**	557	58	**615**	1419
1600-1700	572	58	**630**	48	3	**51**	104	8	**112**	10	5	**15**	5	2	**7**	549	51	**600**	1415
1615-1715	609	59	**668**	51	3	**54**	122	8	**130**	13	4	**17**	6	1	**7**	550	40	**590**	1466
1630-1730	622	60	**682**	55	1	**56**	118	7	**125**	12	1	**13**	6	1	**7**	568	38	**606**	1489
1645-1745	662	53	**715**	70	1	**71**	110	4	**114**	15	1	**16**	11	3	**14**	570	35	**605**	1535
1700-1800	637	42	**679**	74	1	**75**	93	1	**94**	17	1	**18**	15	2	**17**	554	35	**589**	1472

Project Name: Adams Road intesection with Elizabeth Road
Project Date: 11/27/2019

		ELIZABETH DRIVE WESTBOUND						ELIZABETH DRIVE EASTBOUND						ADAMS ROAD NORTHBOUND						
		LEFT			STRAIGHT			STRAIGHT			RIGHT			LEFT			RIGHT			
	15mins	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	Totals
27-Nov-19	600-614	4	0	**4**	73	5	**78**	*115*	*15*	**130**	*7*	*2*	**9**	12	0	**12**	4	0	**4**	237
27-Nov-19	615-629	7	0	**7**	82	3	**85**	*155*	*28*	**183**	*17*	*1*	**18**	16	0	**16**	1	0	**1**	310
27-Nov-19	630-644	7	0	**7**	114	5	**119**	*138*	*27*	**165**	*26*	*1*	**27**	23	0	**23**	9	0	**9**	350
27-Nov-19	645-659	9	0	**9**	70	8	**78**	*131*	*12*	**143**	*19*	*1*	**20**	11	0	**11**	6	0	**6**	267
27-Nov-19	700-714	5	0	**5**	77	19	**96**	*131*	*10*	**141**	*5*	*0*	**5**	17	0	**17**	7	0	**7**	271
27-Nov-19	715-729	4	0	**4**	81	22	**103**	*158*	*18*	**176**	*7*	*0*	**7**	23	0	**23**	4	0	**4**	317
27-Nov-19	730-744	3	0	**3**	77	6	**83**	*158*	*7*	**165**	*8*	*0*	**8**	26	0	**26**	15	1	**16**	301
27-Nov-19	745-759	6	0	**6**	107	7	**114**	*108*	*13*	**121**	*11*	*1*	**12**	24	0	**24**	5	0	**5**	282
27-Nov-19	800-814	3	0	**3**	77	5	**82**	*105*	*13*	**118**	*10*	*0*	**10**	25	0	**25**	9	0	**9**	247
27-Nov-19	815-829	5	1	**6**	94	21	**115**	*95*	*16*	**111**	*14*	*3*	**17**	10	0	**10**	8	0	**8**	267
27-Nov-19	830-844	4	0	**4**	71	11	**82**	*81*	*13*	**94**	*9*	*0*	**9**	15	0	**15**	2	0	**2**	206
27-Nov-19	845-859	0	1	**1**	70	8	**78**	*62*	*17*	**79**	*7*	*4*	**11**	14	0	**14**	5	0	**5**	188
		57	2	**59**	993	120	**1113**	1437	189	**1626**	140	13	**153**	216	0	**216**	75	1	**76**	

	ELIZABETH DRIVE WESTBOUND						ELIZABETH DRIVE EASTBOUND						ADAMS ROAD NORTHBOUND						
	LEFT			STRAIGHT			STRAIGHT			RIGHT			LEFT			RIGHT			
Hourly	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	Totals
600-700	27	0	**27**	339	21	**360**	539	82	**621**	69	5	**74**	62	0	**62**	20	0	**20**	1164
615-715	28	0	**28**	343	35	**378**	555	77	**632**	67	3	**70**	67	0	**67**	23	0	**23**	1198
630-730	25	0	**25**	342	54	**396**	558	67	**625**	57	2	**59**	74	0	**74**	26	0	**26**	1205
645-745	21	0	**21**	305	55	**360**	578	47	**625**	39	1	**40**	77	0	**77**	32	1	**33**	1156
700-800	18	0	**18**	342	54	**396**	555	48	**603**	31	1	**32**	90	0	**90**	31	1	**32**	1171
715-815	16	0	**16**	342	40	**382**	529	51	**580**	36	1	**37**	98	0	**98**	33	1	**34**	1147
730-830	17	1	**18**	355	39	**394**	466	49	**515**	43	4	**47**	85	0	**85**	37	1	**38**	1097
745-845	18	1	**19**	349	44	**393**	389	55	**444**	44	4	**48**	74	0	**74**	24	0	**24**	1002
800-900	12	2	**14**	312	45	**357**	343	59	**402**	40	7	**47**	64	0	**64**	24	0	**24**	908

Project Name: Adams Road intesection with Elizabeth Road
Project Date: 11/27/2019

		ELIZABETH DRIVE WESTBOUND						ELIZABETH DRIVE EASTBOUND						ADAMS ROAD NORTHBOUND						
		LEFT			STRAIGHT			STRAIGHT			RIGHT			LEFT			RIGHT			
	15 Mins	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	Totals
27-Nov-19	1500-1514	5	0	**5**	81	19	**100**	79	17	**96**	15	0	**15**	15	1	**16**	5	0	**5**	237
27-Nov-19	1515-1529	5	0	**5**	108	5	**113**	101	7	**108**	21	0	**21**	15	2	**17**	4	0	**4**	268
27-Nov-19	1530-1544	7	0	**7**	115	13	**128**	98	6	**104**	24	1	**25**	12	0	**12**	5	0	**5**	281
27-Nov-19	1545-1559	8	0	**8**	128	13	**141**	111	6	**117**	25	0	**25**	11	0	**11**	4	0	**4**	306
27-Nov-19	1600-1614	5	1	**6**	108	12	**120**	131	7	**138**	14	0	**14**	21	0	**21**	3	0	**3**	302
27-Nov-19	1615-1629	3	0	**3**	168	6	**174**	123	4	**127**	23	0	**23**	26	0	**26**	9	0	**9**	362
27-Nov-19	1630-1644	10	0	**10**	189	9	**198**	108	8	**116**	20	1	**21**	15	1	**16**	6	0	**6**	367
27-Nov-19	1645-1659	6	1	**7**	170	16	**186**	107	1	**108**	34	0	**34**	8	0	**8**	7	0	**7**	350
27-Nov-19	1700-1714	13	0	**13**	183	8	**191**	114	4	**118**	37	0	**37**	12	0	**12**	5	0	**5**	376
27-Nov-19	1715-1729	5	0	**5**	164	7	**171**	122	3	**125**	32	0	**32**	15	0	**15**	6	0	**6**	354
27-Nov-19	1730-1744	10	1	**11**	172	9	**181**	119	5	**124**	25	0	**25**	25	0	**25**	6	0	**6**	372
27-Nov-19	1745-1759	5	0	**5**	94	4	**98**	109	3	**112**	14	0	**14**	11	0	**11**	2	0	**2**	242
		82	3	**85**	1680	121	**1801**	1322	71	**1393**	284	2	**286**	186	4	**190**	62	0	**62**	

	ELIZABETH DRIVE WESTBOUND						ELIZABETH DRIVE EASTBOUND						ADAMS ROAD NORTHBOUND						
	LEFT			STRAIGHT			STRAIGHT			RIGHT			LEFT			RIGHT			
Hourly	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	LV	HV	LV+HV	Totals
1500-1600	25	0	**25**	432	50	**482**	389	36	**425**	85	1	**86**	53	3	**56**	18	0	**18**	1092
1515-1615	25	1	**26**	459	43	**502**	441	26	**467**	84	1	**85**	59	2	**61**	16	0	**16**	1157
1530-1630	23	1	**24**	519	44	**563**	463	23	**486**	86	1	**87**	70	0	**70**	21	0	**21**	1251
1545-1645	26	1	**27**	593	40	**633**	473	25	**498**	82	1	**83**	73	1	**74**	22	0	**22**	1337
1600-1700	24	2	**26**	635	43	**678**	469	20	**489**	91	1	**92**	70	1	**71**	25	0	**25**	1381
1615-1715	32	1	**33**	710	39	**749**	452	17	**469**	114	1	**115**	61	1	**62**	27	0	**27**	**1455**
1630-1730	34	1	**35**	706	40	**746**	451	16	**467**	123	1	**124**	50	1	**51**	24	0	**24**	1447
1645-1745	34	2	**36**	689	40	**729**	462	13	**475**	128	0	**128**	60	0	**60**	24	0	**24**	1452
1700-1800	33	1	**34**	613	28	**641**	464	15	**479**	108	0	**108**	63	0	**63**	19	0	**19**	1344

Project Name: Luddenham Road Intesection with Elizabeth Road
Project Date: 11/27/2019

		ELIZABETH DRIVE WESTBOUND						LUDDENHAM SOUTHBOUND						ELIZABETH DRIVE EASTBOUND						
		STRIAGHT			RIGHT			LEFT			RIGHT			LEFT			*STRAIGHT*			
	15 Mins	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	*LV*	*HV*	***LV+HV***	Totals
27-Nov-19	600-614	53	6	**59**	33	0	**33**	*39*	*3*	**42**	16	1	**17**	49	1	**50**	*88*	*13*	***101***	302
27-Nov-19	615-629	68	3	**71**	36	0	**36**	*56*	*3*	**59**	10	0	**10**	47	0	**47**	*128*	*21*	***149***	372
27-Nov-19	630-644	92	4	**96**	53	0	**53**	*54*	*5*	**59**	19	0	**19**	69	0	**69**	*114*	*20*	***134***	430
27-Nov-19	645-659	47	7	**54**	34	1	**35**	*35*	*2*	**37**	17	0	**17**	49	0	**49**	*117*	*9*	***126***	318
27-Nov-19	700-714	58	17	**75**	43	0	**43**	*24*	*0*	**24**	9	1	**10**	57	0	**57**	*118*	*8*	***126***	335
27-Nov-19	715-729	57	22	**79**	47	0	**47**	*28*	*1*	**29**	16	0	**16**	84	0	**84**	*143*	*15*	***158***	413
27-Nov-19	730-744	55	7	**62**	46	0	**46**	*32*	*0*	**32**	17	0	**17**	72	0	**72**	*135*	*7*	***142***	371
27-Nov-19	745-759	65	9	**74**	69	0	**69**	*26*	*3*	**29**	17	0	**17**	65	1	**66**	*97*	*10*	***107***	362
27-Nov-19	800-814	48	6	**54**	57	1	**58**	*31*	*1*	**32**	11	0	**11**	53	0	**53**	*88*	*8*	***96***	304
27-Nov-19	815-829	60	29	**89**	29	1	**30**	*27*	*2*	**29**	16	0	**16**	40	0	**40**	*84*	*16*	***100***	304
27-Nov-19	830-844	58	9	**67**	37	5	**42**	*23*	*0*	**23**	11	0	**11**	39	3	**42**	*64*	*13*	***77***	262
27-Nov-19	845-859	37	13	**50**	34	2	**36**	*17*	*3*	**20**	20	0	**20**	38	0	**38**	*55*	*17*	***72***	236
		698	132	**830**	518	10	**528**	392	23	**415**	179	2	**181**	662	5	**667**	1231	157	**1388**	

	ELIZABETH DRIVE WESTBOUND						LUDDENHAM SOUTHBOUND						ELIZABETH DRIVE EASTBOUND						
	STRIAGHT			RIGHT			LEFT			RIGHT			LEFT			STRAIGHT			
Hourly	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
600-700	260	20	**280**	156	1	**157**	184	13	**197**	62	1	**63**	214	1	**215**	447	63	**510**	1422
615-715	265	31	**296**	166	1	**167**	169	10	**179**	55	1	**56**	222	0	**222**	477	58	**535**	1455
630-730	254	50	**304**	177	1	**178**	141	8	**149**	61	1	**62**	259	0	**259**	492	52	**544**	1496
645-745	217	53	**270**	170	1	**171**	119	3	**122**	59	1	**60**	262	0	**262**	513	39	**552**	1437
700-800	235	55	**290**	205	0	**205**	110	4	**114**	59	1	**60**	278	1	**279**	493	40	**533**	1481
715-815	225	44	**269**	219	1	**220**	117	5	**122**	61	0	**61**	274	1	**275**	463	40	**503**	1450
730-830	228	51	**279**	201	2	**203**	116	6	**122**	61	0	**61**	230	1	**231**	404	41	**445**	1341
745-845	231	53	**284**	192	7	**199**	107	6	**113**	55	0	**55**	197	4	**201**	333	47	**380**	1232
800-900	203	57	**260**	157	9	**166**	98	6	**104**	58	0	**58**	170	3	**173**	291	54	**345**	1106

Project Name: Luddenham Road Intesection with Elizabeth Road
Project Date: 11/27/2019

		ELIZABETH DRIVE WESTBOUND						LUDDENHAM SOUTHBOUND						ELIZABETH DRIVE EASTBOUND						
		STRIAGHT			RIGHT			LEFT			RIGHT			LEFT			STRAIGHT			
	15 Mins	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
27-Nov-19	1500-1514	67	16	**83**	22	3	**25**	37	0	**37**	30	1	**31**	13	0	**13**	57	21	**78**	267
27-Nov-19	1515-1529	85	6	**91**	24	1	**25**	50	0	**50**	42	0	**42**	28	1	**29**	71	11	**82**	319
27-Nov-19	1530-1544	73	9	**82**	30	3	**33**	51	3	**54**	33	3	**36**	20	0	**20**	66	5	**71**	296
27-Nov-19	1545-1559	100	16	**116**	48	0	**48**	63	0	**63**	52	0	**52**	19	1	**20**	65	9	**74**	373
27-Nov-19	1600-1614	96	9	**105**	26	1	**27**	66	1	**67**	46	0	**46**	29	1	**30**	70	7	**77**	352
27-Nov-19	1615-1629	135	7	**142**	44	0	**44**	79	2	**81**	61	2	**63**	21	1	**22**	66	1	**67**	419
27-Nov-19	1630-1644	156	6	**162**	28	3	**31**	54	1	**55**	54	0	**54**	23	1	**24**	60	8	**68**	394
27-Nov-19	1645-1659	143	16	**159**	19	1	**20**	61	0	**61**	45	0	**45**	23	0	**23**	68	1	**69**	377
27-Nov-19	1700-1714	140	7	**147**	34	1	**35**	65	0	**65**	64	0	**64**	21	0	**21**	75	4	**79**	411
27-Nov-19	1715-1729	158	8	**166**	38	0	**38**	84	0	**84**	52	0	**52**	14	1	**15**	70	4	**74**	429
27-Nov-19	1730-1744	164	8	**172**	40	0	**40**	67	0	**67**	46	0	**46**	30	0	**30**	70	5	**75**	430
27-Nov-19	1745-1759	82	4	**86**	27	0	**27**	41	0	**41**	46	3	**49**	23	0	**23**	72	2	**74**	300
		1399	112	**1511**	380	13	**393**	718	7	**725**	571	9	**580**	264	6	**270**	810	78	**888**	

	ELIZABETH DRIVE WESTBOUND						LUDDENHAM SOUTHBOUND						ELIZABETH DRIVE EASTBOUND						
	STRIAGHT			RIGHT			LEFT			RIGHT			LEFT			STRAIGHT			
Hourly	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
1500-1600	325	47	**372**	124	7	**131**	201	3	**204**	157	4	**161**	80	2	**82**	259	46	**305**	1255
1515-1615	354	40	**394**	128	5	**133**	230	4	**234**	173	3	**176**	96	3	**99**	272	32	**304**	1340
1530-1630	404	41	**445**	148	4	**152**	259	6	**265**	192	5	**197**	89	3	**92**	267	22	**289**	1440
1545-1645	487	38	**525**	146	4	**150**	262	4	**266**	213	2	**215**	92	4	**96**	261	25	**286**	1538
1600-1700	530	38	**568**	117	5	**122**	260	4	**264**	206	2	**208**	96	3	**99**	264	17	**281**	1542
1615-1715	574	36	**610**	125	5	**130**	259	3	**262**	224	2	**226**	88	2	**90**	269	14	**283**	1601
1630-1730	597	37	**634**	119	5	**124**	264	1	**265**	215	0	**215**	81	2	**83**	273	17	**290**	1611
1645-1745	605	39	**644**	131	2	**133**	277	0	**277**	207	0	**207**	88	1	**89**	283	14	**297**	1647
1700-1800	544	27	**571**	139	1	**140**	257	0	**257**	208	3	**211**	88	1	**89**	287	15	**302**	1570


Appendix C

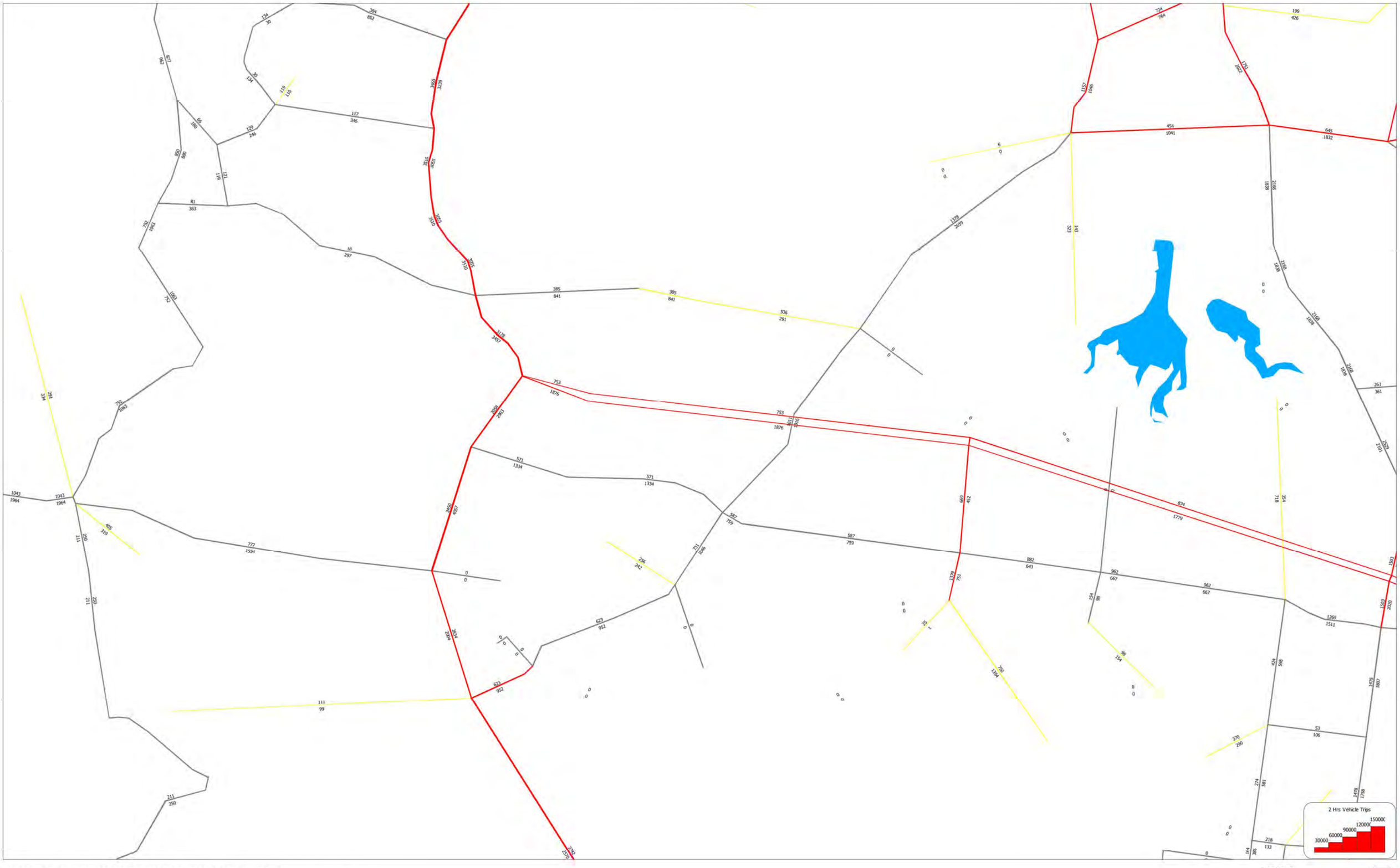
STFM traffic volumes




TRAFFIC VOLUMES__

2011TZ SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL
Scenario 2026: 2026 SYDTRAFFICFORECASTMODELTZ11LU16V151STMV362-7-9AM(mf34)
2020-02-13 08:13

TRAFFIC VOLUMES__



2011TZ SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL
Scenario 20260: 2026 SYDTRAFFICFORECASTMODELTZ11LU16V151STMV362-4-6PM(mf54)
2020-02-13 08:14

TRAFFIC VOLUMES__

2011TZ SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL
Scenario 2031: 2031 SYDTRAFFICFORECASTMODELTZ11LU16V151STMV362-7-9AM(mf35)
2020-02-13 08:13

TRAFFIC VOLUMES__

2011TZ SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL
Scenario 20310: 2031 SYDTRAFFICFORECASTMODELTZ11LU16V151STMV362-4-6PM(mf55)
2020-02-13 08:14

TRAFFIC VOLUMES__

2011TZ SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL
Scenario 2036: 2036 SYDTRAFFICFORECASTMODELTZ11LU16V151STMV362-7-9AM(mf36)
2020-02-13 08:13

TRAFFIC VOLUMES__

2011TZ SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL
Scenario 20360: 2036 SYDTRAFFICFORECASTMODELTZ11LU16V151STMV362-4-6PM(mf56)
2020-02-13 08:14


Appendix D

Swept path assessment




COMMENTS

A3

SYDNEY | Suite 01
Ground Floor
20 Chandos Street,
St Leonards NSW 2065

Phone # 02 9493 9500

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REV	DATE	COMMENT	DRAWN	REVIEWED
5	04/03/20	FOR INFORMATION	EL	AU
4	27/02/20	FOR INFORMATION	EL	AU
3	26/02/20	FOR INFORMATION	EL	AU
2	21/02/20	FOR INFORMATION	EL	AU
1	12/02/20	FOR INFORMATION	EL	AU

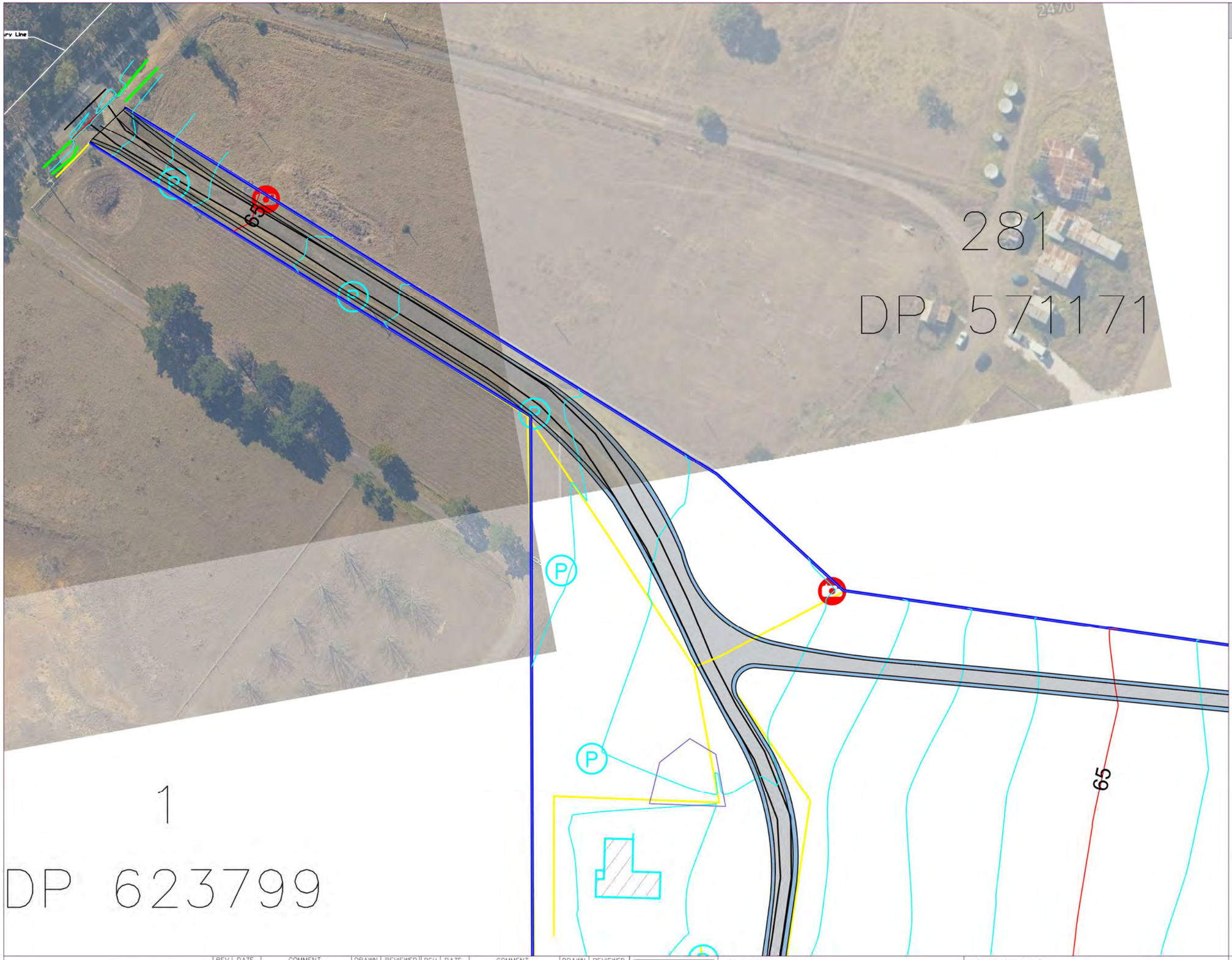
PROJECT:
Luddenham Quarry

DRAWING TITLE:
Concept Internal Road Layout

CLIENT: CPG
DRG. #: EMM-001
PROJECT #: J190749
SCALE: 1:2500

REV: 5

COMMENTS | A3



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4	27/02/20	FOR INFORMATION	EL	AU					
3	26/02/20	FOR INFORMATION	EL	AU					
2	21/02/20	FOR INFORMATION	EL	AU					
1	12/02/20	FOR INFORMATION	EL	AU					

EMM
SYDNEY | Suite 01
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20 Chandos Street,
St Leonards NSW 2065

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PROJECT: Luddenham Quarry

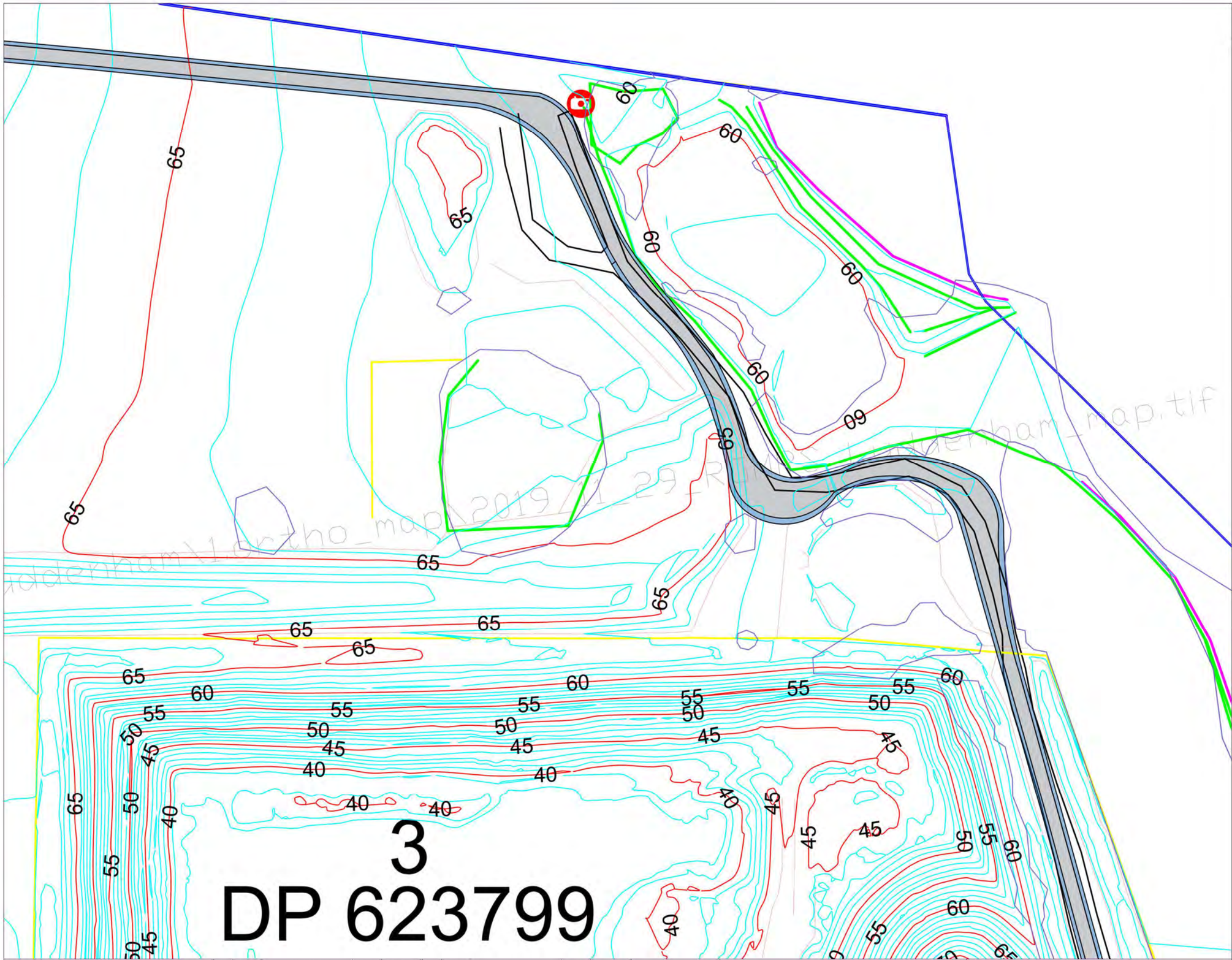
DRAWING TITLE: Concept Internal Road Layout

CLIENT:	CPG
DRG. #:	EMM-002
PROJECT #:	J190749
SCALE:	1:1000

REV: 5

COMMENTS

A3



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20 Chandos Street,
St Leonards NSW 2065

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REV	DATE	COMMENT	DRAWN	REVIEWED
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4	27/02/20	FOR INFORMATION	EL	AU
3	26/02/20	FOR INFORMATION	EL	AU
2	21/02/20	FOR INFORMATION	EL	AU
1	12/02/20	FOR INFORMATION	EL	AU

PROJECT:
Luddenham Quarry

DRAWING TITLE:
Concept Internal Road Layout

CLIENT:	CPG
DRG. #:	EMM-003
PROJECT #:	J190749
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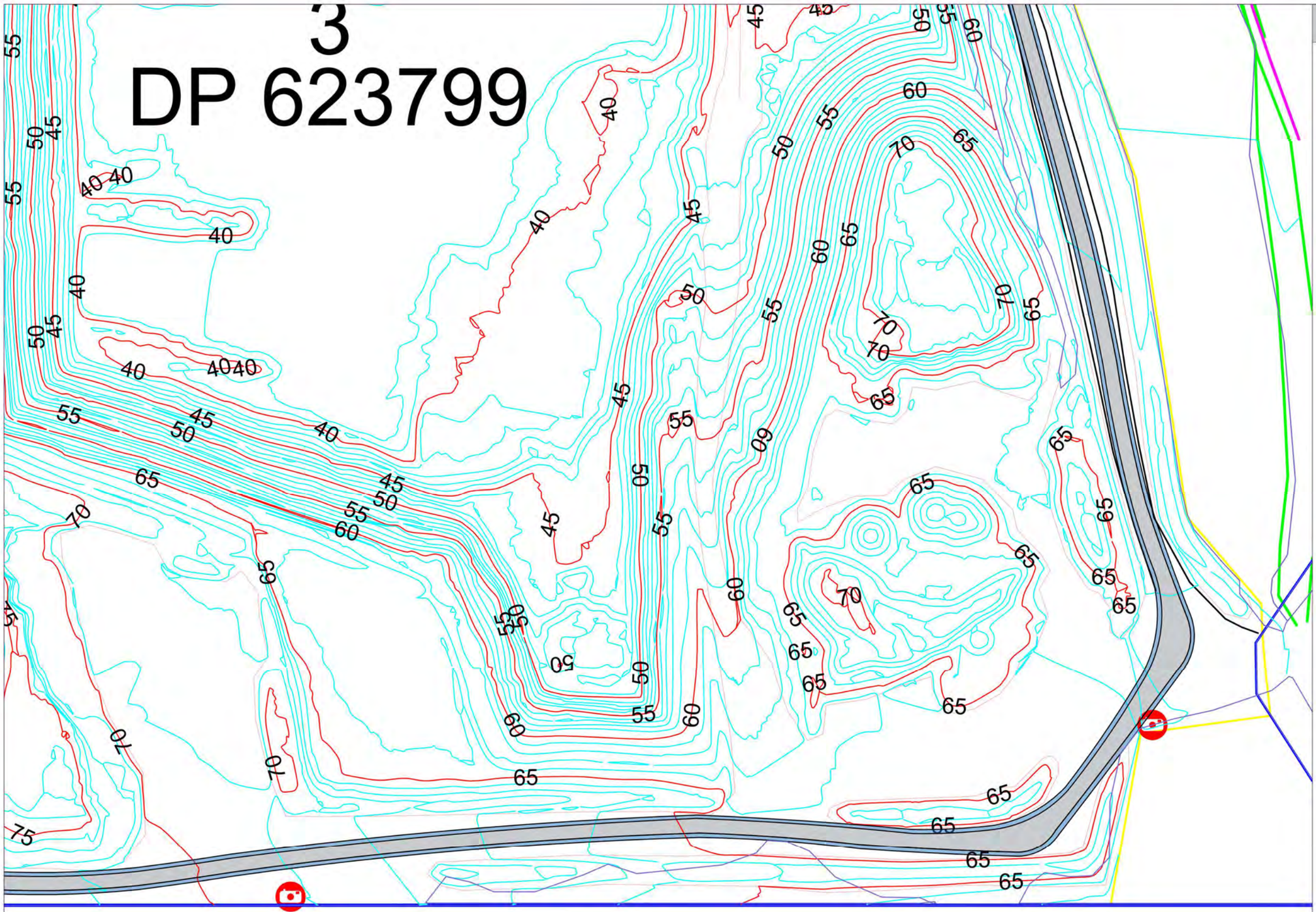
REV: 5



COMMENTS

A3

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3	26/02/20	FOR INFORMATION	EL	AU					
2	21/02/20	FOR INFORMATION	EL	AU					
1	12/02/20	FOR INFORMATION	EL	AU					

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PROJECT:
Luddenham Quarry

DRAWING TITLE:
Concept Internal Road Layout

CLIENT: CPG
DRG. #: EMM-004
PROJECT #: J190749
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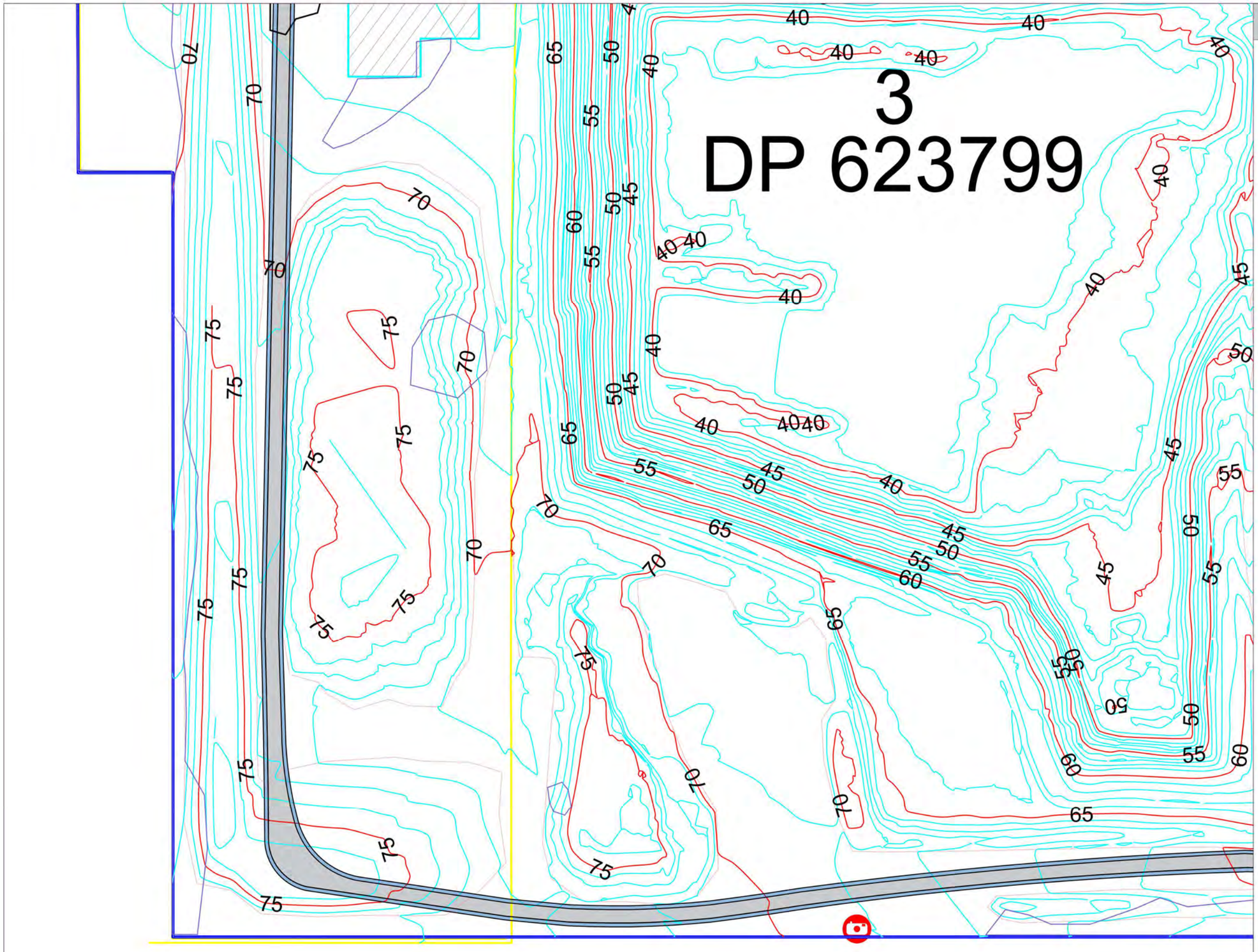

COMMENTS A3

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REV	DATE	COMMENT	DRAWN	REVIEWED	REV	DATE	COMMENT	DRAWN	REVIEWED
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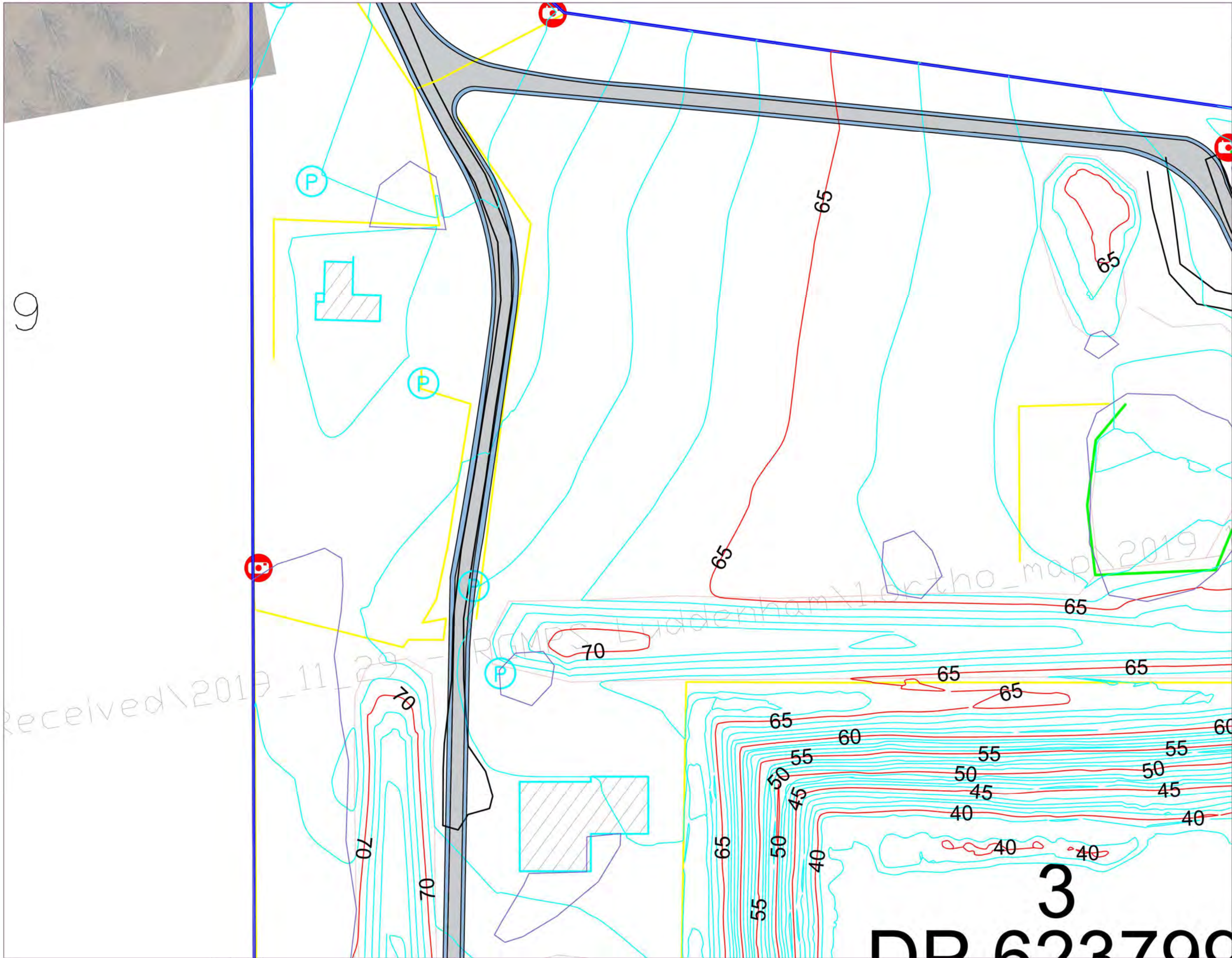
4	27/02/20	FOR INFORMATION	EL	AU					
3	26/02/20	FOR INFORMATION	EL	AU					
2	21/02/20	FOR INFORMATION	EL	AU					
1	12/02/20	FOR INFORMATION	EL	AU					

PROJECT:
Luddenham Quarry

DRAWING TITLE:
Concept Internal Road Layout

CLIENT:	CPG
DRG. #:	EMM-005
PROJECT #:	J190749
SCALE:	1:1000

REV: 5



COMMENTS

A3

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SYDNEY | Suite 01
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St Leonards NSW 2065

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REV	DATE	COMMENT	DRAWN	REVIEWED	REV	DATE	COMMENT	DRAWN	REVIEWED
5	04/03/20	FOR INFORMATION	EL	AU					
4	27/02/20	FOR INFORMATION	EL	AU					
3	26/02/20	FOR INFORMATION	EL	AU					
2	21/02/20	FOR INFORMATION	EL	AU					
1	12/02/20	FOR INFORMATION	EL	AU					

PROJECT: Luddenham Quarry

DRAWING TITLE: Concept Internal Road Layout

CLIENT: CPG

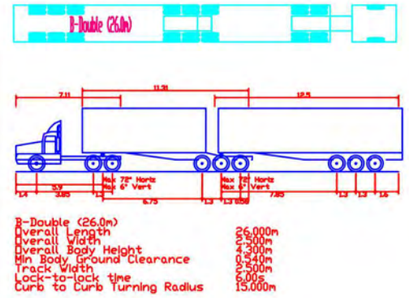
DRG. #: EMM-006

PROJECT #: J190749

SCALE: 1:1000

REV: 5

COMMENTS | A3



281
DP 571171

1
DP 623799

2
DP 571171

3
DP 623799

DP

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REV	DATE	COMMENT	DRAWN	REVIEWED
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4	27/02/20	FOR INFORMATION	EL	AU
3	26/02/20	FOR INFORMATION	EL	AU
2	21/02/20	FOR INFORMATION	EL	AU
1	12/02/20	FOR INFORMATION	EL	AU

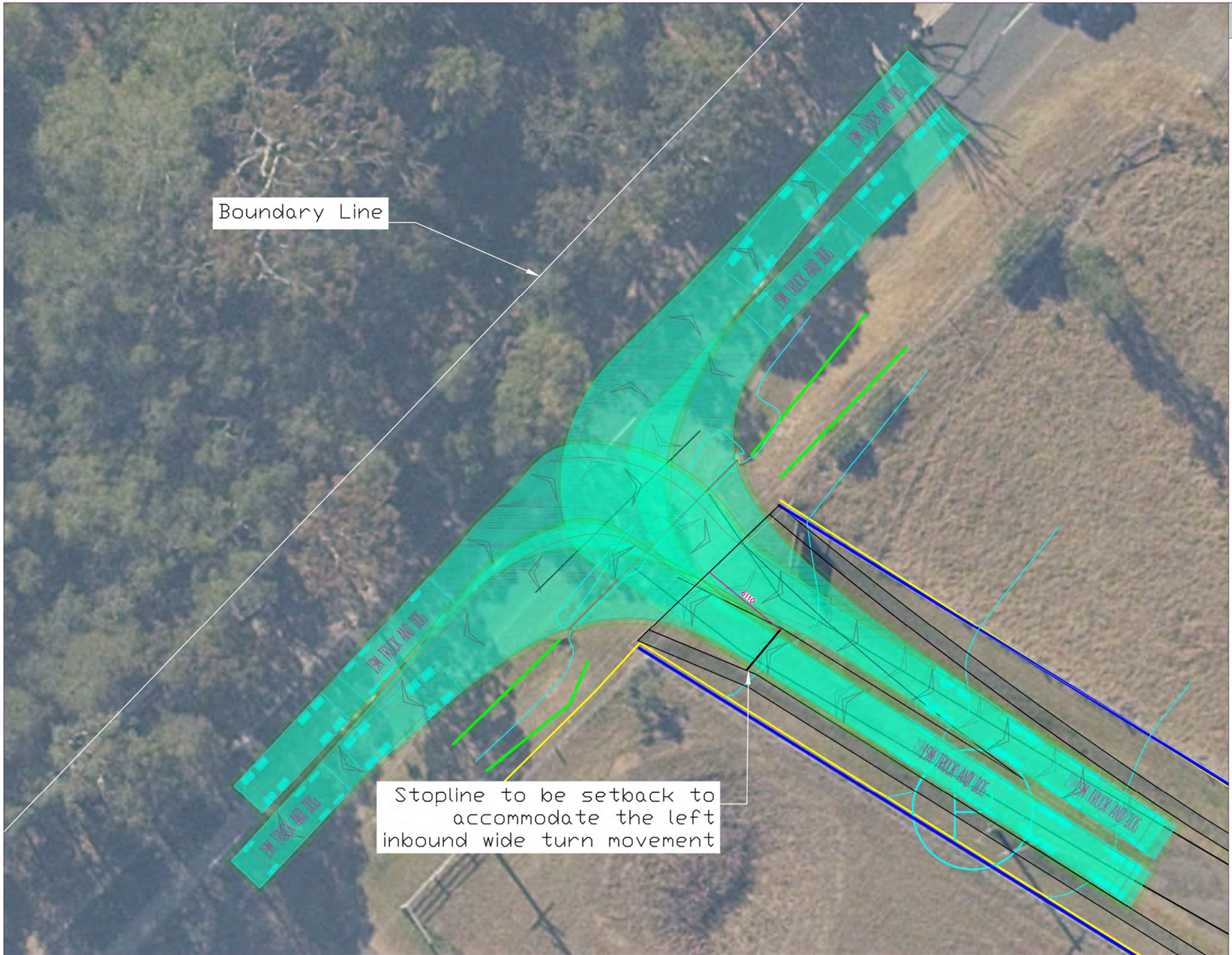
PROJECT: Luddenham Quarry

DRAWING TITLE: Internal Road Swept Path

26m B-Double

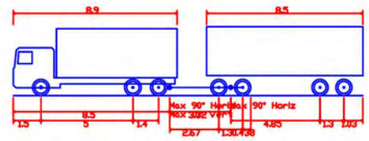
CLIENT: CPG
DRG. #: EMM-101
PROJECT #: J190749
SCALE: 1:2500

REV: 5



COMMENTS

A3



19M TRUCK AND DOG	
Overall Length	19.000m
Overall Width	2.600m
Overall Body Height	3.738m
Min Body Ground Clearance	0.427m
Track Width	2.500m
Lock-to-lock time	4.00s
Wall to Wall Turning Radius	12.000m

SYDNEY | Suite 01
Ground Floor
20 Chandos Street,
St Leonards NSW 2065

Phone # 02 9493 9500

www.emmconsulting.com.au

REV	DATE	COMMENT	DRAWN	REVIEWED
5	04/03/20	FOR INFORMATION	EL	AU
4	27/02/20	FOR INFORMATION	EL	AU
3	26/02/20	FOR INFORMATION	EL	AU
2	21/02/20	FOR INFORMATION	EL	AU
1	12/02/20	FOR INFORMATION	EL	AU

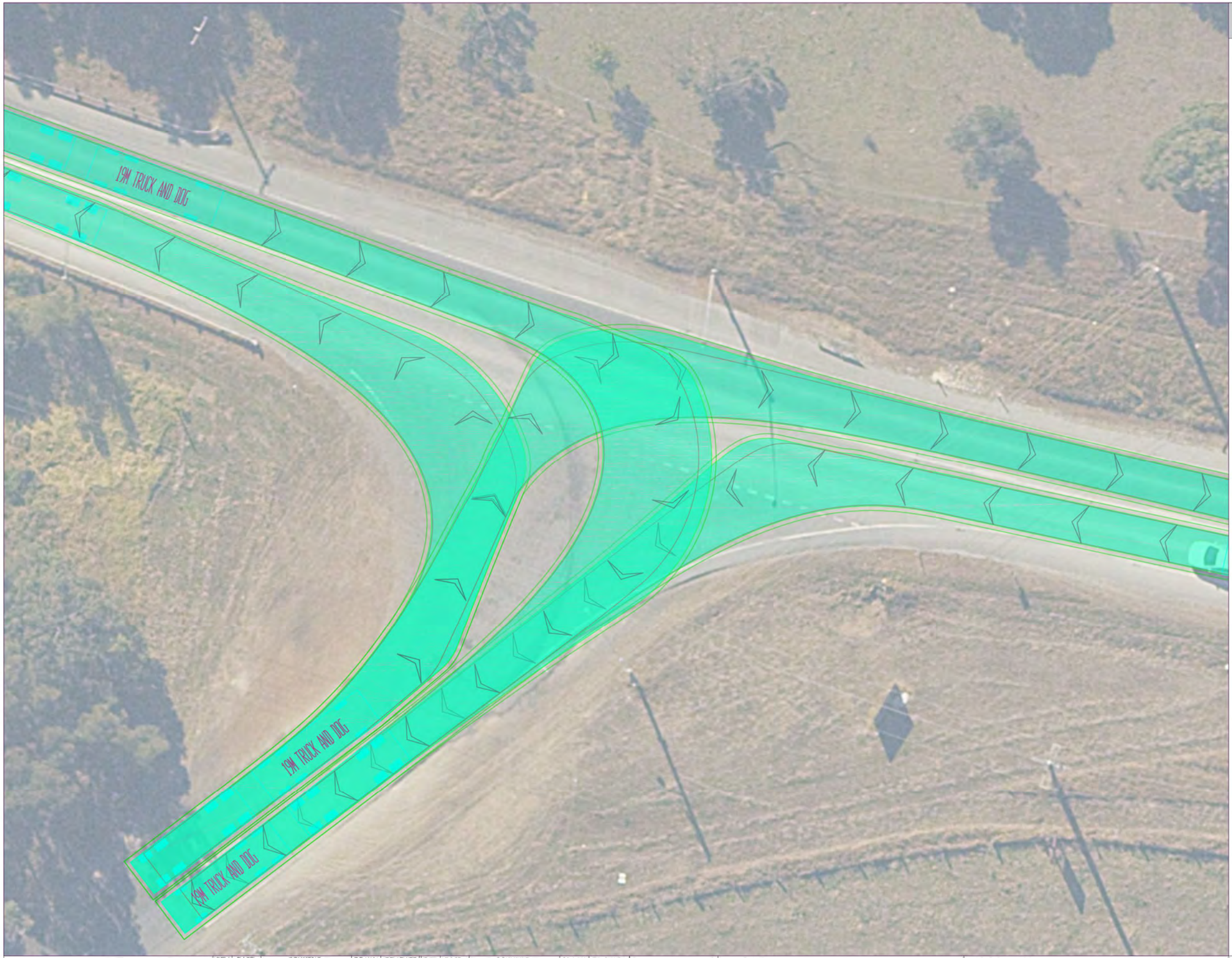
PROJECT:
Luddenham Quarry

DRAWING TITLE:
Site Access

19m Truck and Dog Manoeuvrability

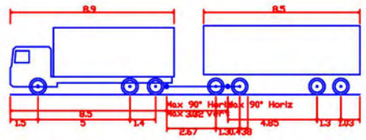
CLIENT:	CPG
DRG. #:	EMM-102d
PROJECT #:	J190749
SCALE:	1:250

REV: 5



COMMENTS

A3



19M TRUCK AND DOG	
Overall Length	19.000m
Overall Width	2.600m
Overall Body Height	3.738m
Min Body Ground Clearance	0.427m
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REV	DATE	COMMENT	DRAWN	REVIEWED	REV	DATE	COMMENT	DRAWN	REVIEWED
5	04/03/20	FOR INFORMATION	EL	AU					
4	27/02/20	FOR INFORMATION	EL	AU					
3	26/02/20	FOR INFORMATION	EL	AU					
2	21/02/20	FOR INFORMATION	EL	AU					
1	12/02/20	FOR INFORMATION	EL	AU					

PROJECT:
Luddenham Quarry

DRAWING TITLE:
Intersection of Elizabeth Drive with Adams Road

19m Truck and Dog Manoeuvrability

CLIENT:	CPG
DRG. #:	EMM-103b
PROJECT #:	J190749
SCALE:	1:250

REV: 5


Appendix E

SIDRA results




MOVEMENT SUMMARY

▽ Site: 102 [2020 baseline Elizabeth Dr/ Adams Rd AM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
21	L2	26	0.0	0.238	3.4	LOS A	0.0	0.0	0.00	0.03	0.00	40.0
22	T1	417	13.6	0.238	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	39.8
Approach		443	12.8	0.238	0.2	NA	0.0	0.0	0.00	0.03	0.00	39.9
NorthWest: Elizabeth Drive												
28	T1	658	10.7	0.389	0.4	LOS A	0.8	6.2	0.15	0.05	0.17	39.5
29	R2	62	3.4	0.389	5.8	LOS A	0.8	6.2	0.15	0.05	0.17	51.1
Approach		720	10.1	0.389	0.8	NA	0.8	6.2	0.15	0.05	0.17	40.2
SouthWest: Adams Road												
30	L2	78	0.0	0.054	7.6	LOS A	0.2	1.7	0.45	0.64	0.45	48.7
32	R2	27	0.0	0.040	9.3	LOS A	0.1	0.7	0.57	0.84	0.57	45.0
Approach		105	0.0	0.054	8.0	LOS A	0.2	1.7	0.48	0.69	0.48	47.5
All Vehicles		1268	10.2	0.389	1.2	NA	0.8	6.2	0.12	0.09	0.13	40.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 112 [2020 baseline Elizabeth Dr/ Adams Rd PM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
21	L2	35	3.0	0.422	3.5	LOS A	0.0	0.0	0.00	0.02	0.00	40.0
22	T1	788	5.2	0.422	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	39.9
Approach		823	5.1	0.422	0.2	NA	0.0	0.0	0.00	0.02	0.00	39.9
NorthWest: Elizabeth Drive												
28	T1	494	3.6	0.379	2.3	LOS A	2.3	16.6	0.44	0.16	0.59	38.0
29	R2	121	0.9	0.379	8.8	LOS A	2.3	16.6	0.44	0.16	0.59	49.3
Approach		615	3.1	0.379	3.6	NA	2.3	16.6	0.44	0.16	0.59	39.8
SouthWest: Adams Road												
30	L2	65	1.6	0.072	9.5	LOS A	0.3	2.0	0.61	0.79	0.61	47.6
32	R2	28	0.0	0.053	10.6	LOS A	0.1	0.9	0.67	0.87	0.67	44.3
Approach		94	1.1	0.072	9.9	LOS A	0.3	2.0	0.62	0.82	0.62	46.3
All Vehicles		1532	4.1	0.422	2.1	NA	2.3	16.6	0.21	0.12	0.27	40.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 202 [2024 baseline Elizabeth Dr/ Adams Rd AM]

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

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
21	L2	21	0.0	0.188	7.0	LOS A	0.0	0.0	0.00	0.04	0.00	73.9
22	T1	324	15.9	0.188	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	78.8
Approach		345	14.9	0.188	0.4	NA	0.0	0.0	0.00	0.04	0.00	78.3
NorthWest: Elizabeth Drive												
28	T1	794	12.1	0.469	0.3	LOS A	1.1	8.3	0.14	0.06	0.16	76.9
29	R2	76	4.2	0.469	8.9	LOS A	1.1	8.3	0.14	0.06	0.16	63.6
Approach		869	11.4	0.469	1.1	NA	1.1	8.3	0.14	0.06	0.16	75.6
SouthWest: Adams Road												
30	L2	311	0.0	0.197	7.4	LOS A	1.0	6.8	0.43	0.65	0.43	55.6
32	R2	108	0.0	0.176	10.2	LOS A	0.4	3.1	0.65	0.87	0.67	58.2
Approach		419	0.0	0.197	8.1	LOS A	1.0	6.8	0.49	0.71	0.49	56.4
All Vehicles		1634	9.2	0.469	2.7	NA	1.1	8.3	0.20	0.22	0.21	69.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 212 [2024 baseline Elizabeth Dr/ Adams Rd PM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
21	L2	24	4.3	0.284	7.1	LOS A	0.0	0.0	0.00	0.03	0.00	72.2
22	T1	529	5.6	0.284	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	79.2
Approach		554	5.5	0.284	0.3	NA	0.0	0.0	0.00	0.03	0.00	78.7
NorthWest: Elizabeth Drive												
28	T1	635	3.8	0.436	1.2	LOS A	2.4	17.2	0.36	0.16	0.46	73.1
29	R2	157	0.7	0.436	10.1	LOS A	2.4	17.2	0.36	0.16	0.46	62.5
Approach		792	3.2	0.436	3.0	NA	2.4	17.2	0.36	0.16	0.46	70.7
SouthWest: Adams Road												
30	L2	219	1.4	0.171	8.2	LOS A	0.8	5.5	0.53	0.73	0.53	55.0
32	R2	95	0.0	0.160	10.4	LOS A	0.4	2.8	0.66	0.87	0.66	58.0
Approach		314	1.0	0.171	8.9	LOS A	0.8	5.5	0.57	0.77	0.57	56.1
All Vehicles		1659	3.6	0.436	3.2	NA	2.4	17.2	0.28	0.23	0.33	69.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 212 [2024 dev Elizabeth Dr/ Adams Rd PM]

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

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
21	L2	28	18.5	0.288	7.3	LOS A	0.0	0.0	0.00	0.03	0.00	66.7
22	T1	529	5.6	0.288	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	79.2
Approach		558	6.2	0.288	0.4	NA	0.0	0.0	0.00	0.03	0.00	78.2
NorthWest: Elizabeth Drive												
28	T1	635	3.8	0.439	1.3	LOS A	2.5	17.7	0.36	0.16	0.48	73.0
29	R2	158	1.3	0.439	10.2	LOS A	2.5	17.7	0.36	0.16	0.48	62.1
Approach		793	3.3	0.439	3.1	NA	2.5	17.7	0.36	0.16	0.48	70.6
SouthWest: Adams Road												
30	L2	220	1.9	0.173	8.2	LOS A	0.8	5.5	0.53	0.73	0.53	54.9
32	R2	99	4.3	0.176	10.8	LOS A	0.5	3.3	0.68	0.88	0.69	56.5
Approach		319	2.6	0.176	9.0	LOS A	0.8	5.5	0.58	0.78	0.58	55.5
All Vehicles		1669	4.2	0.439	3.3	NA	2.5	17.7	0.28	0.23	0.34	68.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 102 [2020 dev Elizabeth Dr/ Adams Rd AM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
21	L2	32	13.3	0.243	3.5	LOS A	0.0	0.0	0.00	0.03	0.00	40.0
22	T1	417	13.6	0.243	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	39.8
Approach		448	13.6	0.243	0.3	NA	0.0	0.0	0.00	0.03	0.00	39.8
NorthWest: Elizabeth Drive												
28	T1	658	10.7	0.392	0.4	LOS A	0.9	6.7	0.15	0.05	0.18	39.4
29	R2	65	4.8	0.392	5.9	LOS A	0.9	6.7	0.15	0.05	0.18	50.6
Approach		723	10.2	0.392	0.9	NA	0.9	6.7	0.15	0.05	0.18	40.2
SouthWest: Adams Road												
30	L2	79	1.3	0.055	7.6	LOS A	0.2	1.7	0.45	0.64	0.45	48.7
32	R2	32	13.3	0.053	10.1	LOS A	0.1	1.0	0.61	0.85	0.61	44.6
Approach		111	4.8	0.055	8.3	LOS A	0.2	1.7	0.50	0.70	0.50	47.2
All Vehicles		1282	10.9	0.392	1.3	NA	0.9	6.7	0.13	0.10	0.14	40.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 112 [2020 dev Elizabeth Dr/ Adams Rd PM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
21	L2	39	13.5	0.426	3.5	LOS A	0.0	0.0	0.00	0.02	0.00	40.0
22	T1	788	5.2	0.426	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	39.9
Approach		827	5.6	0.426	0.2	NA	0.0	0.0	0.00	0.02	0.00	39.9
NorthWest: Elizabeth Drive												
28	T1	494	3.6	0.382	2.4	LOS A	2.4	17.2	0.45	0.16	0.61	37.9
29	R2	122	1.7	0.382	9.0	LOS A	2.4	17.2	0.45	0.16	0.61	49.0
Approach		616	3.2	0.382	3.7	NA	2.4	17.2	0.45	0.16	0.61	39.7
SouthWest: Adams Road												
30	L2	66	3.2	0.074	9.6	LOS A	0.3	2.1	0.61	0.80	0.61	47.5
32	R2	33	12.9	0.070	11.8	LOS A	0.2	1.3	0.70	0.89	0.70	43.7
Approach		99	6.4	0.074	10.3	LOS A	0.3	2.1	0.64	0.83	0.64	45.9
All Vehicles		1542	4.7	0.426	2.3	NA	2.4	17.2	0.22	0.13	0.28	40.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 202 [2024 dev Elizabeth Dr/ Adams Rd AM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
21	L2	26	16.0	0.192	7.3	LOS A	0.0	0.0	0.00	0.05	0.00	67.4
22	T1	324	15.9	0.192	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	78.7
Approach		351	15.9	0.192	0.6	NA	0.0	0.0	0.00	0.05	0.00	77.4
NorthWest: Elizabeth Drive												
28	T1	794	12.1	0.471	0.4	LOS A	1.2	9.0	0.15	0.06	0.18	76.8
29	R2	79	5.3	0.471	9.1	LOS A	1.2	9.0	0.15	0.06	0.18	63.0
Approach		873	11.5	0.471	1.1	NA	1.2	9.0	0.15	0.06	0.18	75.3
SouthWest: Adams Road												
30	L2	312	0.3	0.198	7.4	LOS A	1.0	6.8	0.43	0.65	0.43	55.6
32	R2	113	3.7	0.191	10.6	LOS A	0.5	3.6	0.67	0.88	0.70	56.9
Approach		424	1.2	0.198	8.3	LOS A	1.0	6.8	0.49	0.71	0.50	56.0
All Vehicles		1647	9.8	0.471	2.8	NA	1.2	9.0	0.21	0.23	0.22	69.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 103 [2020 baseline Elizabeth Dr/ Luddenham Rd AM]

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

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
22	T1	320	16.4	0.176	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
23	R2	187	0.6	0.269	8.7	LOS A	1.2	8.6	0.68	0.86	0.76	47.3
Approach		507	10.6	0.269	3.2	NA	1.2	8.6	0.25	0.32	0.28	42.4
NorthEast: Luddenham Road												
24	L2	157	5.4	0.187	10.1	LOS A	0.7	5.3	0.56	0.82	0.56	50.1
26	R2	65	1.6	0.214	18.2	LOS B	0.7	4.8	0.80	0.94	0.86	42.5
Approach		222	4.3	0.214	12.5	LOS A	0.7	5.3	0.63	0.85	0.65	47.1
NorthWest: Elizabeth Drive												
27	L2	273	0.0	0.142	3.4	LOS A	0.0	0.0	0.00	0.45	0.00	38.7
28	T1	573	9.6	0.301	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
Approach		845	6.5	0.301	1.1	NA	0.0	0.0	0.00	0.15	0.00	39.5
All Vehicles		1575	7.5	0.301	3.4	NA	1.2	8.6	0.17	0.30	0.18	41.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 103 [2020 baseline Elizabeth Dr/ Luddenham Rd PM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
22	T1	678	6.1	0.350	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
23	R2	140	1.5	0.116	5.0	LOS A	0.5	3.7	0.47	0.59	0.47	50.1
Approach		818	5.3	0.350	0.9	NA	0.5	3.7	0.08	0.10	0.08	41.4
NorthEast: Luddenham Road												
24	L2	292	0.0	0.239	8.3	LOS A	1.1	7.4	0.42	0.68	0.42	51.4
26	R2	218	0.0	0.661	24.2	LOS B	3.2	22.4	0.90	1.11	1.61	39.7
Approach		509	0.0	0.661	15.1	LOS B	3.2	22.4	0.63	0.86	0.93	44.8
NorthWest: Elizabeth Drive												
27	L2	94	1.1	0.049	3.4	LOS A	0.0	0.0	0.00	0.45	0.00	38.7
28	T1	313	4.7	0.159	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
Approach		406	3.9	0.159	0.8	NA	0.0	0.0	0.00	0.10	0.00	39.6
All Vehicles		1734	3.4	0.661	5.0	NA	3.2	22.4	0.22	0.33	0.31	41.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 103 [2020 dev Elizabeth Dr/ Luddenham Rd AM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
22	T1	321	16.7	0.177	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
23	R2	187	0.6	0.270	8.8	LOS A	1.2	8.6	0.69	0.86	0.77	47.3
Approach		508	10.8	0.270	3.2	NA	1.2	8.6	0.25	0.32	0.28	42.4
NorthEast: Luddenham Road												
24	L2	157	5.4	0.188	10.1	LOS A	0.7	5.3	0.56	0.82	0.56	50.1
26	R2	65	1.6	0.216	18.3	LOS B	0.7	4.9	0.80	0.94	0.87	42.5
Approach		222	4.3	0.216	12.5	LOS A	0.7	5.3	0.63	0.85	0.65	47.0
NorthWest: Elizabeth Drive												
27	L2	273	0.0	0.142	3.4	LOS A	0.0	0.0	0.00	0.45	0.00	38.7
28	T1	576	9.7	0.303	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
Approach		848	6.6	0.303	1.1	NA	0.0	0.0	0.00	0.15	0.00	39.5
All Vehicles		1579	7.6	0.303	3.4	NA	1.2	8.6	0.17	0.30	0.18	41.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 103 [2020 dev Elizabeth Dr/ Luddenham Rd PM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
22	T1	679	6.2	0.351	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
23	R2	140	1.5	0.116	5.0	LOS A	0.5	3.7	0.47	0.59	0.47	50.1
Approach		819	5.4	0.351	0.9	NA	0.5	3.7	0.08	0.10	0.08	41.4
NorthEast: Luddenham Road												
24	L2	292	0.0	0.239	8.3	LOS A	1.1	7.4	0.43	0.68	0.43	51.4
26	R2	218	0.0	0.664	24.4	LOS B	3.2	22.6	0.90	1.11	1.62	39.7
Approach		509	0.0	0.664	15.2	LOS B	3.2	22.6	0.63	0.87	0.94	44.7
NorthWest: Elizabeth Drive												
27	L2	94	1.1	0.049	3.4	LOS A	0.0	0.0	0.00	0.45	0.00	38.7
28	T1	314	5.0	0.160	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
Approach		407	4.1	0.160	0.8	NA	0.0	0.0	0.00	0.10	0.00	39.6
All Vehicles		1736	3.5	0.664	5.0	NA	3.2	22.6	0.22	0.33	0.31	41.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 103 [2024 baseline Elizabeth Dr/ Luddenham Rd AM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
22	T1	398	19.6	0.223	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
23	R2	242	0.4	0.333	8.9	LOS A	1.7	11.8	0.69	0.90	0.85	47.2
Approach		640	12.3	0.333	3.4	NA	1.7	11.8	0.26	0.34	0.32	42.4
NorthEast: Luddenham Road												
24	L2	331	5.7	0.382	11.0	LOS A	2.0	14.9	0.61	0.90	0.78	49.3
26	R2	139	1.5	0.523	25.0	LOS B	2.1	14.5	0.89	1.04	1.29	39.4
Approach		469	4.5	0.523	15.1	LOS B	2.1	14.9	0.69	0.94	0.93	45.2
NorthWest: Elizabeth Drive												
27	L2	268	0.0	0.139	3.4	LOS A	0.0	0.0	0.00	0.45	0.00	38.7
28	T1	546	10.6	0.289	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
Approach		815	7.1	0.289	1.1	NA	0.0	0.0	0.00	0.15	0.00	39.4
All Vehicles		1924	8.2	0.523	5.3	NA	2.1	14.9	0.26	0.41	0.33	41.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 103 [2024 dev Elizabeth Dr/ Luddenham Rd AM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
22	T1	399	19.8	0.224	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
23	R2	242	0.4	0.335	9.0	LOS A	1.7	11.9	0.69	0.90	0.85	47.1
Approach		641	12.5	0.335	3.4	NA	1.7	11.9	0.26	0.34	0.32	42.4
NorthEast: Luddenham Road												
24	L2	331	5.7	0.384	11.0	LOS A	2.0	15.0	0.61	0.90	0.78	49.2
26	R2	139	1.5	0.528	25.2	LOS B	2.1	14.7	0.89	1.04	1.30	39.3
Approach		469	4.5	0.528	15.2	LOS B	2.1	15.0	0.70	0.95	0.94	45.1
NorthWest: Elizabeth Drive												
27	L2	268	0.0	0.139	3.4	LOS A	0.0	0.0	0.00	0.45	0.00	38.7
28	T1	549	10.7	0.291	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
Approach		818	7.2	0.291	1.1	NA	0.0	0.0	0.00	0.15	0.00	39.4
All Vehicles		1928	8.3	0.528	5.3	NA	2.1	15.0	0.26	0.41	0.34	41.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 103 [2024 baseline Elizabeth Dr/ Luddenham Rd PM]

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

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
22	T1	608	6.4	0.316	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
23	R2	128	1.6	0.101	4.7	LOS A	0.5	3.2	0.43	0.55	0.43	50.2
Approach		737	5.6	0.316	0.8	NA	0.5	3.2	0.08	0.10	0.08	41.4
NorthEast: Luddenham Road												
24	L2	520	0.0	0.407	8.4	LOS A	2.4	16.6	0.45	0.69	0.48	51.3
26	R2	389	0.0	0.974	51.9	LOS D	14.2	99.4	0.99	1.86	5.03	30.6
Approach		909	0.0	0.974	27.0	LOS B	14.2	99.4	0.68	1.19	2.43	38.2
NorthWest: Elizabeth Drive												
27	L2	82	1.3	0.043	3.4	LOS A	0.0	0.0	0.00	0.45	0.00	38.7
28	T1	269	5.1	0.138	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
Approach		352	4.2	0.138	0.8	NA	0.0	0.0	0.00	0.11	0.00	39.6
All Vehicles		1998	2.8	0.974	12.8	NA	14.2	99.4	0.34	0.60	1.13	39.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 103 [2024 dev Elizabeth Dr/ Luddenham Rd PM]

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

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Elizabeth Drive												
22	T1	609	6.6	0.317	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
23	R2	128	1.6	0.101	4.7	LOS A	0.5	3.2	0.43	0.56	0.43	50.2
Approach		738	5.7	0.317	0.8	NA	0.5	3.2	0.08	0.10	0.08	41.4
NorthEast: Luddenham Road												
24	L2	520	0.0	0.408	8.5	LOS A	2.4	16.7	0.46	0.70	0.49	51.3
26	R2	389	0.0	0.978	53.6	LOS D	14.6	102.4	0.99	1.88	5.15	30.1
Approach		909	0.0	0.978	27.8	LOS B	14.6	102.4	0.68	1.20	2.49	37.8
NorthWest: Elizabeth Drive												
27	L2	82	1.3	0.043	3.4	LOS A	0.0	0.0	0.00	0.45	0.00	38.7
28	T1	271	5.4	0.139	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
Approach		353	4.5	0.139	0.8	NA	0.0	0.0	0.00	0.11	0.00	39.6
All Vehicles		2000	2.9	0.978	13.1	NA	14.6	102.4	0.34	0.60	1.16	39.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.


Turbot St
Exit


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