



You are invited to attend the next Traffic Committee Meeting:

Date: Tuesday, 5 July 2022
Time: 2:00 to 4:00pm
Location: Council Chamber
62-64 Menangle Street
Picton NSW 2571

AGENDA

Traffic Committee Meeting

5 July 2022

Order Of Business

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1.1	Proposed Roundabout and Pedestrian Improvements at Rockford Road, Remembrance Driveway, Larkin Street and Emmett Street, Tahmoor.....	4
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	No reports this meeting	

1 REPORTS

1.1 PROPOSED ROUNDABOUT AND PEDESTRIAN IMPROVEMENTS AT ROCKFORD ROAD, REMEMBRANCE DRIVEWAY, LARKIN STREET AND EMMETT STREET, TAHMOOR

File Number: 10623#238

EXECUTIVE SUMMARY

Council has received an application for the construction of road improvement works associated with a Seniors Housing Development at 20 Rockford Road, Tahmoor. Road and pedestrian infrastructure improvements were imposed by Council under Development Consent DA/2019/719/1 to ensure adequate public infrastructure was available to service the development.

RECOMMENDATION

That the Local Traffic Committee endorse the below recommendation:

That Council:

1. Endorse signage and linemarking associated with a proposed Roundabout treatment and Pedestrian Refuge Island at the intersection of Rockford Road and Remembrance Driveway, Tahmoor including:
 - (a) R1-3 Roundabout Giveaway signage
 - (b) R5-400 No Stopping Signage on Remembrance Driveway.
2. Endorse the modification of signage and linemarking associated with a proposed Pedestrian Refuge at the intersection of Larkin Street and Remembrance Driveway, Tahmoor including:
 - (a) Relocation of R5-2 2P parking restriction and R5-400 no Stopping signs in Larkin Street.
3. Endorse the signage and linemarking associated with the proposed kerb extensions (Blisters) in Emmett Street, Tahmoor including:
 - (a) Relocation of R5-400 No Stopping and R5-20 timed Bus Zone.
 - (b) Inclusion of R5-400 No Stopping signs adjacent to the kerb blisters.

REPORT

Assessment of the Seniors Housing development at 20 Rockford Road, Tahmoor found that road improvements and upgrades were required to maintain the existing Levels of Service and pedestrian safety of the surrounding road networks.

Adjacent to the development site it has been determined that Kerb and Gutter works and pavement widening are required on Rockford Road and Remembrance Driveway. Road verge will include a pedestrian footpath 1.5m wide to connect the development pedestrian access points to the intersection of Remembrance Driveway and Rockford Road. The pavement widening will also permit formalised on-street parking, adjacent to the Development.

This report includes several improvements adjacent to the development site and pedestrian facilities remote to the site, as detailed below:

- **Pedestrian Refuge Island Rockford Road**

This facility provides improved pedestrian crossing safety. The facility is located approximately 20m east of the new Roundabout intersection with Remembrance Driveway.

Facility is generally designed in accordance with AS1742.10 and includes R5-400 No Stopping on approach and departure sides and advanced refuge warning signs W6-1 and W8-25 on the Rockford Road westbound approach side.

- **Pedestrian Kerb Extension Emmett Street**

It was proposed to include a Median Island Stop Treatment at this intersection with Remembrance Driveway and include pedestrian refuge close to the pedestrian desire lines between the development and the main Tahmoor shopping precinct. Heavy vehicle movements at the intersection have restricted the area for median island treatment. An alternate design using kerb extensions has been considered to reduce the pedestrian crossing distance on Emmett Street with minimal parking loss and bus stop modification.

1.5m wide footpath links to be provided from Remembrance Driveway to the crossing point. Existing kerb ramps at the intersection will be removed and reinstated as kerb.

The design will result in a loss of two (2) on street parking spaces on the southern side of Emmett Street, adjacent to Charlies Liquor Barn. Existing R5-400 no Stopping and R5-20 timed Bus Zone signs to be relocated to the eastern side of the proposed kerb extension.

- **Pedestrian Refuge Island improvements Larkin Street**

The existing median island in Larkin Street at the Remembrance Driveway intersection will be upgraded to a refuge island through the modification of the existing median and inclusion of additional median island and splayed approach linemarking. Advanced refuge warning signs W6-1 and W8-25 will be provided on the Larkin Street approach. Existing R5-400 No Stopping and R5-2 2P parking restrictions will be relocated to accommodate the additional median and splayed approach. These adjustments will result in a loss of an estimated four (4) on street parking spaces, two (2) spaces on each side of Larkin Street.

Intersection Upgrades

In order to maintain the existing Levels of Service at the intersection of Remembrance Driveway and Rockford Road it has been determined that a roundabout treatment is required as part of the development works.

Central median radius is adopted from Austroads guidelines. The circulating lane is adopted to provide movements for the 19m semi trailer design vehicle. Splitter island pedestrian walk through are not provided on Remembrance Driveway. Pedestrian access is provided via pedestrian refuge in Rockford road and footpath links to the existing marked pedestrian crossing in Remembrance Driveway.

Vehicle access is maintained to private properties 1 and 3 Rockford Road, however, the inclusion of the concrete roundabout splitter island on the Rockford Road leg will prevent right turn in and right turn out movements from the properties. Consultation with the property occupiers has not raised any concerns.

The design includes a Pre-construction Road Safety Audit as attached. All items in the audit have been addressed. No safety concerns have been raised in the audit on the proximity to the School Crossing for Tahmoor Public School.

Signage and linemarking includes standard R1-3 Giveaway with roundabout symbolic advanced warning W2-7 on each approach. R5-400 No Stopping restriction signage to be installed on the western side of Remembrance Driveway that will extend the existing no stopping restriction across the roundabout. This will result in the loss of up to twelve (12) on street parking spaces.

Consultation

The applicant has consulted with local businesses regarding the Roundabout and pedestrian facilities.

The occupiers of 1 and 3 Rockford Road have been consulted and no concerns have been raised.

Financial Implications

All design and construction are at no cost to Council. Funding is arranged by the Developer.

ATTACHMENTS

1. **Road Safety Audit**
2. **Design Plans for Roundabout and Pedestrian Facilities**
3. **Outline of Public Consultation and Responses**



Rockford Road and Remembrance
Driveway, Tahmoor
Detailed Design (Pre-Construction) Road Safety Audit

Prepared for
Vivacity Property

19 January 2022

The Transport Planning Partnership



Rockford Road and Remembrance Driveway, Tahmoor

Detailed Design (Pre-Construction) Road Safety Audit

Client: Vivacity Property

Version: V02

Date: 19 January 2022

TPP Reference: 21467

Quality Record

Version	Date	Prepared by	Reviewed by	Approved by	Signature
V01	17/12/2021	Stephen Read Doris Lee	Ken Hollyoak	K. Hollyoak	
V01	19/1/2022	Doris Lee	Ken Hollyoak	K. Hollyoak	



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A. DESIGN DRAWINGS



1 Road Safety Audit Summary

Audited project:	Intersection of Rockford Road and Remembrance Driveway, Tahmoor
Client:	Vivacity Property
Project manager:	Tom Copping
Email address:	tom@vivacityproperty.com.au
Telephone:	0425 555 383
Audit Team:	Stephen Read (level 3 lead road safety auditor) Doris Lee (level 3 road safety auditor)
Audit type:	Detailed Design (Pre-Construction)
Commencement meeting:	N/A
Audit date:	15 December 2021
Completion meeting:	N/A



2 Introduction

2.1 Background

TTPP has been commissioned to undertake a Detailed Design (Pre-Construction) Road Safety Audit for the proposed roundabout at the Rockford Road and Remembrance Driveway intersection, Tahmoor. The road safety audit is required in response to Wollondilly Shire Council's request as part of the DA assessment for the proposed Senior Housing development located adjacent to the subject intersection.

The subject intersection is a T-junction with Remembrance Driveway being the higher order road and Rockford Road being a local road. It is located adjacent to Tahmoor Public School and a low-density residential area. The intersection is located within a 40km/h School Zone which is operational 8am-9:30am and 2:30pm-4pm on school days.

The audit also reviewed the proposed public domain works involving modification of the refuge islands on Emmett Street and Larkin Street at the intersections with Remembrance Drive.

2.2 Audit Objective

The objective of this Audit is to examine the road safety issues associated with the proposed roundabout layout at the Rockford Road and Remembrance Driveway intersection, and in addition the public domain works at the Remembrance Driveway intersections with Emmett Street and Larkin Street.

The Audit is also to ensure that there are no fundamental flaws in the geometric layout in relation to road safety that will be costly to fix at a later date both in terms of cost and time.

2.3 Procedures and Reference Material

The procedures used are described in the following guidelines:

- Roads and Maritime Services' 2011 Guidelines for Road Safety Audit Practices
- Austroads Guide to Road Safety 2019: Part 6 Managing Road Safety Audits
- Austroads Guide to Road Safety 2019: Part 6A Implementing Road Safety Audits.

Austroads checklist was used by the audit team as a reference in this road safety audit. Key elements examined included:

- general topics – drainage, type and degree of access to development
- design issues
- intersections



-
- lighting, signs and delineation
 - physical objects
 - environmental constraints
 - other matters including over size vehicles.

2.4 Audit Team

The RSA was carried out by the following team:

- Stephen Read (RSA-02-0652) – level 3 road safety auditor (lead auditor)
- Doris Lee (RSA-02-0128) – level 3 road safety auditor (team member).

All auditors involved in this project are registered road safety auditors with the NSW Centre for Road Safety and are experienced in traffic engineering and design/ inspection of temporary traffic management schemes.



3 Road Safety Audit Program

3.1 Commencement Meeting

A formal meeting was not held.

3.2 Site and Field Audit

A site inspection was carried out in day and night-time conditions on 15 December 2021. Weather on the day was fine and visibility was excellent.

Observations were made by driving along the audited road section and also from walking on the footpath. Photographs and video footage were taken during the site inspection and have been included in the audit findings (Section 4.3).

3.3 Completion Meeting

A completion meeting is not required.



4 Road Safety Audit Findings

4.1 Introduction

Table 4.1 provides specific details of the audit findings and a risk rating as high, medium or low. The risk ratings have been based on the risk matrix presented in Table 4.1, which has been adopted from the standard Austroads Risk Matrix.

Table 4.1: Risk Matrix

Likelihood Severity	Highly probable	Occasional	Improbable
Major	High	High	Medium
Moderate	High	Medium	Low
Minor	Medium	Low	Low

The terms in Table 4.1 are described below.

Likelihood:

- Highly probable: It is likely that more than one crash of this type could occur within a five-year period.
- Occasional: It is likely that less than one crash of this type could occur within a five-year period.
- Improbable: Less than one crash of this type could occur within a 10-year period.

Severity:

- Major: The crash is likely to result in a fatality or serious injuries

For example, high/medium speed vehicle collision, high/medium speed collision with a fixed object, pedestrian struck at high speed, and cyclist hit by car.

- Moderate: The crash is likely to result in minor injuries or large scale of property damage

For example, some slow speed vehicle collisions, cyclist falls, and rear end crashes.

- Minor: The crash is likely to result in minor property damage or many near miss crash events

For example, some slow speed collisions, pedestrian walks into object (no head injury), and car reverses into post.

Priority:

- High: Very important, and needs to be addressed urgently.
- Medium: Important, and needs to be addressed as soon as possible.



- Low: Needs to be considered as part of regular maintenance/planning program.

4.2 Responding to the Audit Report

As set out in the road safety audit guidelines, the responsibility for the road rests with the project manager, not with the auditor. The project manager is under no obligation to accept the audit findings. Neither is it the role of the auditor to agree to, or approve the project manager's responses to the audit.

The audit provides the opportunity to highlight potential road safety problems and have them formally considered by the project manager in conjunction with all other project considerations.

4.3 Road Safety Audit Findings

The audit findings are documented in Table 4.2 which provides:



- specific details of the road safety issues identified during the audit
- a risk level rating for each of the road safety audit findings.

It should be acknowledged that positive attributes of the audited road section have not been discussed. Deficiencies that do not cause a safety problem are also not listed.



In-line with Transport for NSW best practice recommendations have not been included in the road safety audit findings.



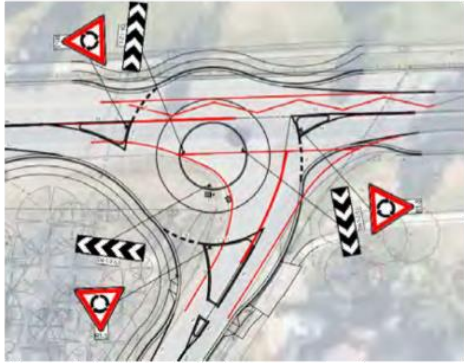

Table 4.2: Road Safety Audit Findings

Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
1	Remembrance Drive – south of Rockford Road	<p>There is an existing pole located on the south-eastern corner of the intersection that will be close to kerb in the future design. This pole would be a hazard to an errant vehicle travelling southbound or over-steering from Rockford Road.</p> <p>There is a risk that a vehicle may travel through the roundabout too fast and hit the pole resulting in serious injury.</p>	 	Occasional	Serious	High	POLE TO BE RELOCATED TO REDUCE ITEM LIKELIHOOD AND SEVERITY PENDING ASSESSMNET BY ARA ELECTRICAL ENGINEERS.



Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
2	Rockford Road at Remembrance Driveway	<p>A domestic driveway that accesses four dwellings is located in the exit lane in close proximity to the roundabout. It appears that some residents would need to reverse onto the roadway to exit the driveway.</p> <p>There is a risk that a vehicle reversing on to the exit lane may not see on-coming traffic or that vehicle on the roundabout may not expect a reversing car resulting in a collision.</p> <p>This may cause low speed crashes with minor injury and vehicle damage.</p>	 	Occasional	Moderate	Medium	<p>RISK NOTED, HOWEVER, DWELLINGS DO NOT HAVE AN ALTERNATE POINT OF ACCESS.</p> <p>SIGNAGE WARNING OF DRIVEWAYS TO BE ADDED TO SIGNAGE AND LINEMARKING PLANS.</p> <p>COUNCIL ARE AWARE OF THIS ISSUE FROM PREVIOUS DISCUSSIONS AND WILL PROVIDE COMMENT ONCE DRAWINGS ARE ISSUED.</p>



Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
3	Roundabout at Remembrance Driveway and Rockford Road.	There is no provision for delineation such as pavement treatment to emphasise the approach towards the splitter islands at night. Furthermore, there are no 'keep left' signs proposed on the splitter islands. Poor delineation of the splitter islands could result in vehicles hitting the splitter island.		Improbable	Minor	Low	KEEP LEFT SIGANCE TO BE ADDED TO ALL ROUNDABOUT SPLITTER ISLANDS
4	Remembrance Driveway and Larkin Street intersection	The existing hold line extends to the edge of the kerb blister and diverts drivers away from the blister while the proposed hold line does not. This may result in drivers hitting the kerb blister.		Improbable	Minor	low	NEW LINE WILL BE MARKED AS PER EXISTING



Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
5	Emmet Street	'TB' line will be across the whole roadway. 'TB1' should be used on the right side of the street. (refer to RTA Delineation – section 6)				Note only	<p>LINE MARKING TO BE UPDATED AS REQUIRED.</p>





Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
6	Emmet Street	<p>Plan does not show the BB line centre line and 'keep left' sign. Poor delineation could result in a vehicle hitting the island in poor light conditions resulting in minor vehicle damage.</p> <p>Plan also does not show pedestrian refuge advance warning signs.</p>		Improbable	Minor	Low	<p>BB CENTRE LINE AND KEEP LEFT SIGNS TO BE ADDED TO THE DESIGN DRAWINGS.</p> <p>W6-1 AND W8-25 WARNING SIGNS TO BE ADDED TO DESIGN DRAWINGS.</p>
7	Larkin Street	<p>Plan does not show the BB line centre line and 'keep left' sign. Poor delineation could result in a vehicle hitting the island in poor light conditions resulting in minor vehicle damage.</p> <p>Plan also does not show pedestrian refuge advance warning signs.</p>		Improbable	Minor	Low	<p>BB CENTRE LINE AND KEEP LEFT SIGNS TO BE ADDED TO THE DESIGN DRAWINGS.</p> <p>W6-1 AND W8-25 WARNING SIGNS TO BE ADDED TO DESIGN DRAWINGS.</p>



Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
8	Roundabout at Remembrance Driveway and Rockford Street	No swept paths provided for the left turn from Remembrance Driveway to Rockford Road. This appears to be tight turn for some vehicles and may result in vehicles hitting the splitter island.				Note only	<p style="color: red;">SWEPT PATH TO BE ADDED TO THE DESIGN DRAWINGS</p>



Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
9	Street Lighting	<p>There is inconsistent street lighting between the new roundabout to the south (near McDonalds) and Rockford Road. The new roundabout is well lit then street lighting is not provided until Rockford Road.</p> <p>Driver's eyes can take time to adjust when driving from street lit sections to non-lit sections resulting in poor visibility.</p>	<p>No Street Lights (looking south)</p>  <p>Street Lights (looking south)</p> 	Improbable	Minor	Low	<p>LIGHTING TO BE REVIEWED BY ARA ELECTRICAL ENGINEERS FOR COMPLIANCE WITH STANDARDS AND ADDITIONAL LIGHTING DESIGNED AND ADDED AS REQUIRED.</p>



Item No.	Location	Descriptions of Findings	Design/ Photo	Likelihood	Severity	Risk Rating	Designer Response
10	Remembrance Drive Northbound entry lane	<p>The angle of the splitter island does not provide much deflection on approach to the roundabout on Remembrance Drive northbound.</p> <p>As a result, there are little physical measures to reduce entry speed, and therefore motorists may travel straight across the apron (40-60mm high) at an excessive speed.</p> <p>In addition, the northbound entry lane is wider than necessary which may result in an entry speed higher than desired, resulting in potential higher speed collisions at the roundabout should they occur.</p>		Occasional	Moderate	Medium	<p>THE SPLITTER ISLAND ON THE NORTHBOUND REMEMBRANCE DRIVEWAY APPROACH WILL BE WIDDEDENED TO INCREASE THE DEFLECTION ANGLE AS MUCH AS REASONABLY POSSIBLE WHILST STILL ALLOWING FOR SWEEPED PATHS.</p>
11	Roundabout Island	<p>Remembrance Driveway is a bus route. The proposed apron is 40-60mm high, while the State Transit Bus Infrastructure Guideline requires the roundabout island to be no more than 50mm to be traversable by buses.</p>				Note only	<p>NOTATION IN DESIGN DRAWINGS TO BE ADJUSTED AS REQUIRED.</p>
12	Remembrance Drive Centreline	<p>Currently, Raised Reflective Pavement Markers (RRPMs) are installed along the centreline on Remembrance Driveway, but the design plan does not indicate such provision along the new section of the road and the roundabout for night time delineation.</p>				Note only	<p>RRPMs TO BE ADDED TO DESIGN DRAWINGS</p>



5 Concluding Statement

The findings and opinions in the report are based on the examination of the specific road and environs, and might not address all concerns existing at the time of the audit.

The auditors have endeavoured to identify features of the road that could be modified in order to improve safety, although it must be recognised that safety cannot be guaranteed since no road can be regarded as absolutely safe.

While every effort has been made to ensure the accuracy of this report, it is made available strictly on the basis that anyone relying on it does so at their own risk without any liability to the Auditors.

A handwritten signature in black ink that reads 'S. Read.' followed by a horizontal line underneath.

Stephen Read
Level 3 Lead Road Safety Auditor
The Transport Planning Partnership

A handwritten signature in black ink that reads 'Doris Lee' followed by a horizontal line underneath.

Doris Lee
Level 3 Road Safety Auditor
The Transport Planning Partnership



Appendix A

Design Drawings

TAHMOOR PUBLIC DOMAIN WORKS

TAHMOOR, NSW, 2573

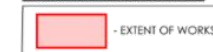


LOCALITY PLAN
SCALE 1:2000

DRAWING LIST

No.	DRAWING TITLE
CA001	COVER SHEET AND LOCALITY PLAN
CA002	GENERAL NOTES AND LEGENDS
CA006	GROUND AND SEDIMENT GENERAL PLAN
CA010	GROUND AND SEDIMENT GENERAL DETAILS
CA000	BULK ENGINEERING PLAN
CA400	STEWORNS AND STORMWATER PLAN - SHEET 1
CA401	STEWORNS AND STORMWATER PLAN - SHEET 2
CA402	STEWORNS AND STORMWATER PLAN - SHEET 3
CA403	STEWORNS AND STORMWATER PLAN - SHEET 4
CA404	STEWORNS AND STORMWATER PLAN - SHEET 5
CA405	STEWORNS AND STORMWATER PLAN - SHEET 6
CA406	STEWORNS AND STORMWATER PLAN - SHEET 7
CA008	ROAD LONGITUDINAL SECTIONS - SHEET 1
CA010	ROAD LONGITUDINAL SECTIONS - SHEET 2
CA010	ROAD CROSS SECTIONS - SHEET 1
CA011	ROAD CROSS SECTION - SHEET 2
CA012	ROAD CROSS SECTION - SHEET 3
CA009	SOAKAGE AND LINEMARKING PLAN - SHEET 1
CA007	SOAKAGE AND LINEMARKING PLAN - SHEET 2
CA002	SOAKAGE AND LINEMARKING PLAN - SHEET 3
CA003	SOAKAGE AND LINEMARKING PLAN - SHEET 4
CA004	SOAKAGE AND LINEMARKING PLAN - SHEET 5
CA005	SOAKAGE AND LINEMARKING PLAN - SHEET 6
CA006	STORMWATER LONG SECTIONS - SHEET 1
CA007	STORMWATER LONG SECTIONS - SHEET 2
CA008	TYPICAL DETAILS - SHEET 1
CA009	TYPICAL DETAILS - SHEET 2
CA010	VEHICLE SWEEP PATNS PLAN - SHEET 1
CA011	VEHICLE SWEEP PATNS PLAN - SHEET 2
CA009	SIGN DISTANCE CHECK PLAN - SHEET 1
CA010	SIGN DISTANCE CHECK PLAN - SHEET 2

LOCALITY PLAN LEGEND



NOT TO BE USED FOR CONSTRUCTION

AMODT	DATE	DESCRIPTION	BY



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VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

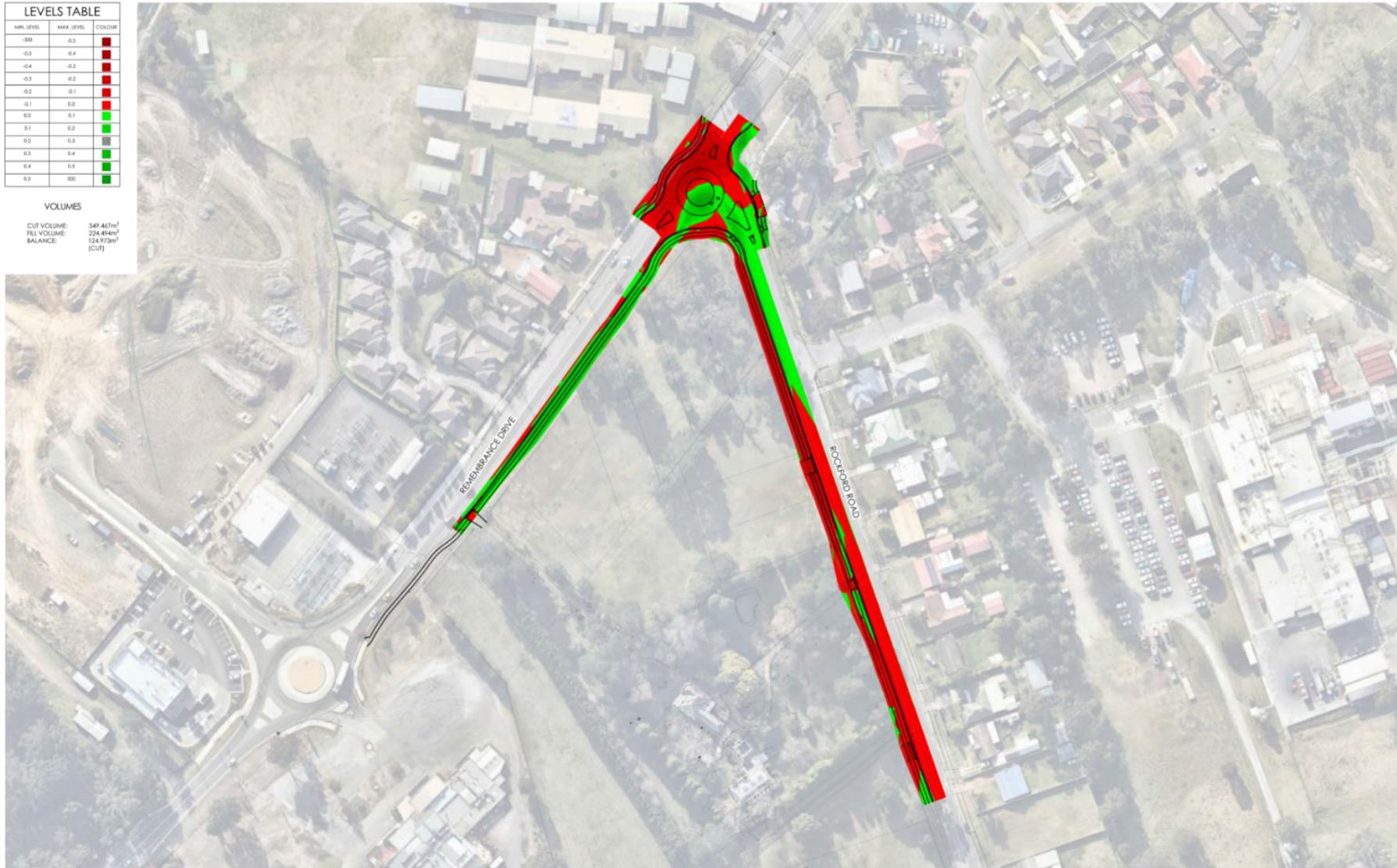
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CIVIL DESIGN
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COVER SHEET

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TAHMOOR PUBLIC DOMAIN WORKS
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TAHMOOR, NSW, 2573

PROJECT DETAILS
DRAWN BY
DATE NOV 2021
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PROJECT NO
N0210873
DRAWING NO
C4001

LEVELS TABLE		
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-0.4	-0.3	Red
-0.3	-0.2	Red
-0.2	-0.1	Red
-0.1	0.0	Red
0.0	0.1	Green
0.1	0.2	Green
0.2	0.3	Green
0.3	0.4	Green
0.4	0.5	Green
0.5	0.0	Green

VOLUMES
 CUT VOLUME: 349.46m³
 FILL VOLUME: 224.49m³
 BALANCE: 124.97m³ (CUT)



BULK EARTHWORKS PLAN
 SCALE 1:750



NOT TO BE USED FOR CONSTRUCTION			
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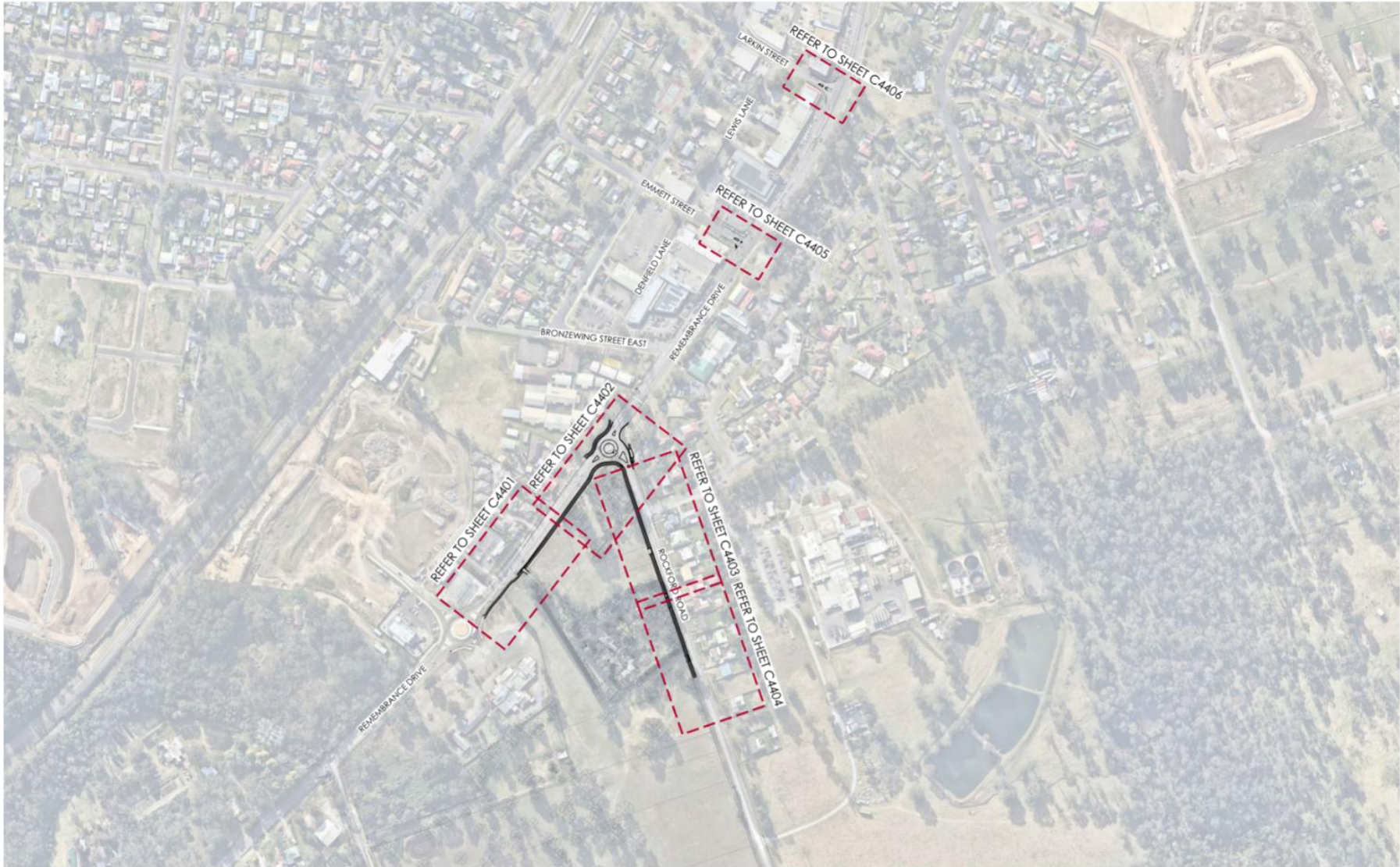


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 STATUS: PRELIMINARY

DISCIPLINE: CIVIL DESIGN
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 ADDRESS: TAHMOOR, NSW, 2573

PROJECT DETAILS
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 DATE: NOV 2021
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 PROJECT: N0210873
 C4200



SITWORKS AND STORMWATER PLAN
SCALE 1:2000

NOT TO BE USED FOR CONSTRUCTION

NO/DT	DATE	DESCRIPTION	BY



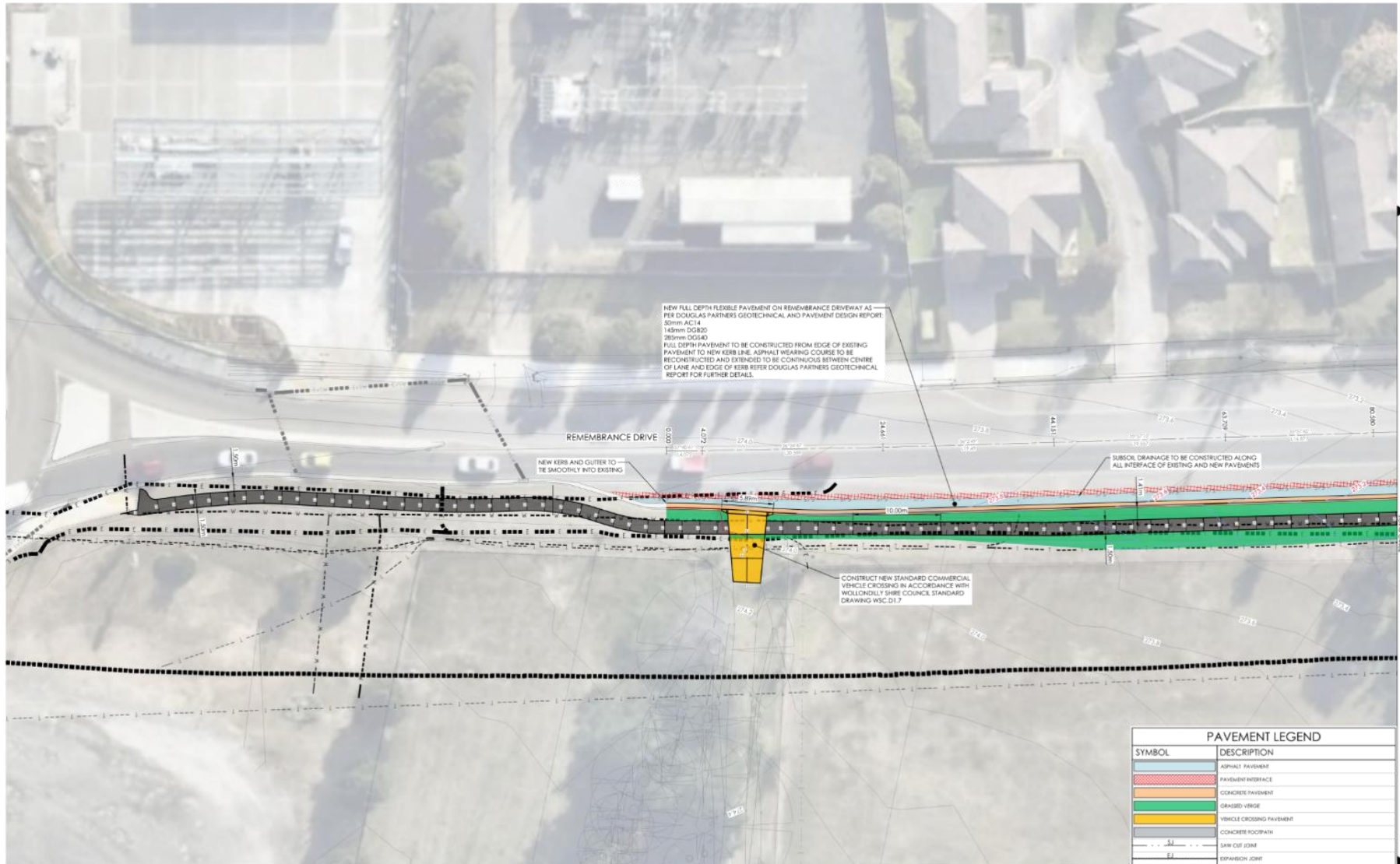
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TAHMOOR, NSW, 2573



PROJECT DETAILS
DRAWN BY
DATE NOV 2015
SCALE 1:2000
PROJECT NO
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C4400



SITWORKS AND STORMWATER PLAN
SCALE 1:200



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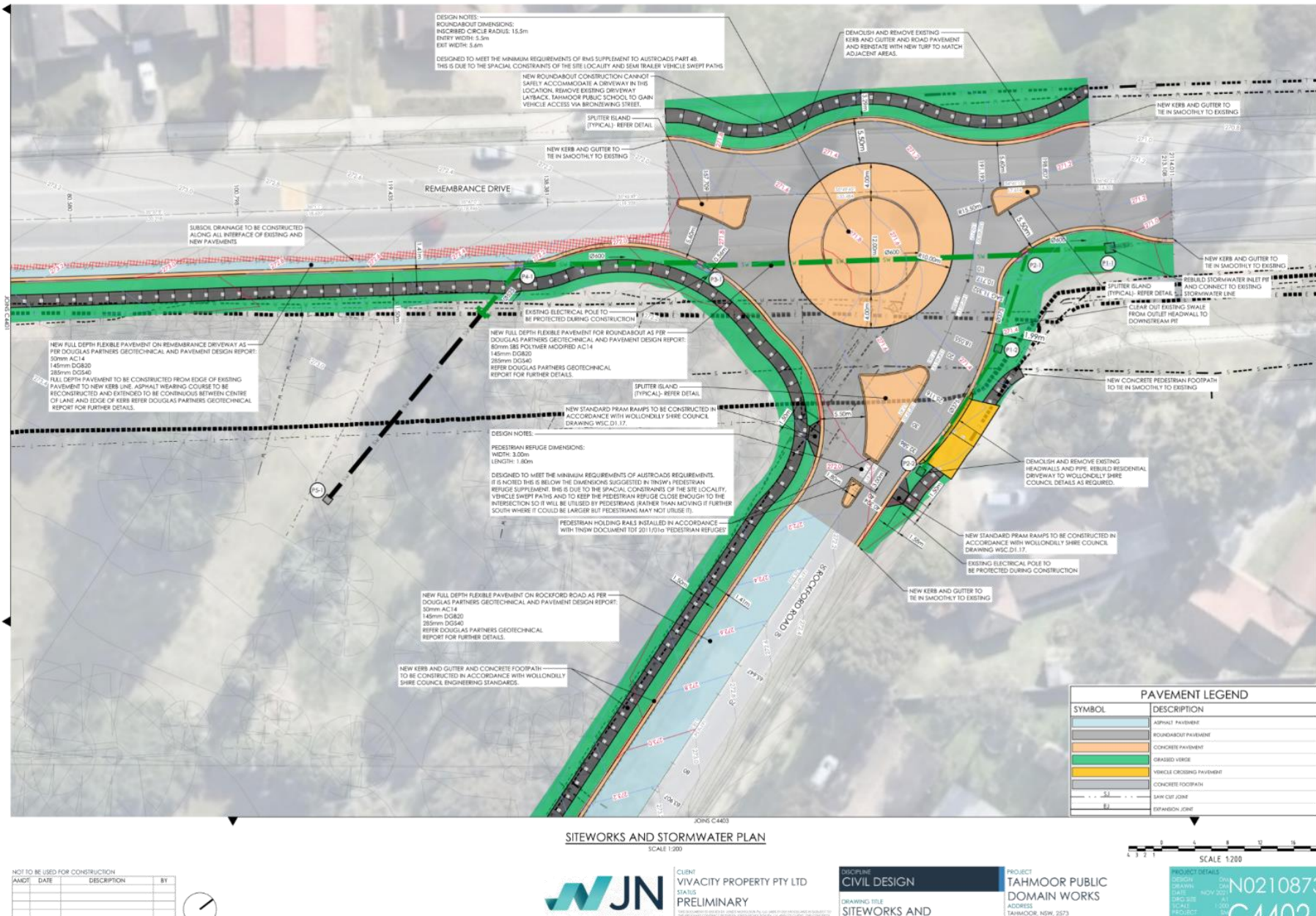


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VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
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PROJECT
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DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGN DRAWN BY
DATE NOV 2021
SCALE 1:200
PROJECT N0210873
C4401



PAVEMENT LEGEND	
SYMBOL	DESCRIPTION
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[Symbol]	ROUNDABOUT PAVEMENT
[Symbol]	CONCRETE PAVEMENT
[Symbol]	GRASSED VERGE
[Symbol]	VEHICLE CROSSING PAVEMENT
[Symbol]	CONCRETE FOOTPATH
[Symbol]	SAW CUT JOINT
[Symbol]	EXPANSION JOINT

SITWORKS AND STORMWATER PLAN
 SCALE 1:200

SCALE 1:200

NO	DATE	DESCRIPTION	BY



VJVACITY PROPERTY PTY LTD
 STATUS: PRELIMINARY

CIVIL DESIGN
 DRAWING TITLE: SITWORKS AND

TAHMOOR PUBLIC DOMAIN WORKS
 ADDRESS: TAHMOOR, NSW, 2573

PROJECT DETAILS
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 SHEET: N0210873
 PROJECT: C4400



SITWORKS AND STORMWATER PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

NO.	DATE	DESCRIPTION	BY



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VIVACITY PROPERTY PTY LTD
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PRELIMINARY

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PROJECT DETAILS
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SITWORKS AND STORMWATER PLAN
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NOT TO BE USED FOR CONSTRUCTION

AMOUNT	DATE	DESCRIPTION	BY

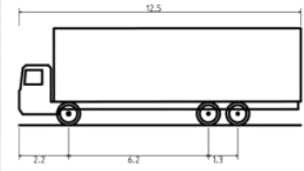
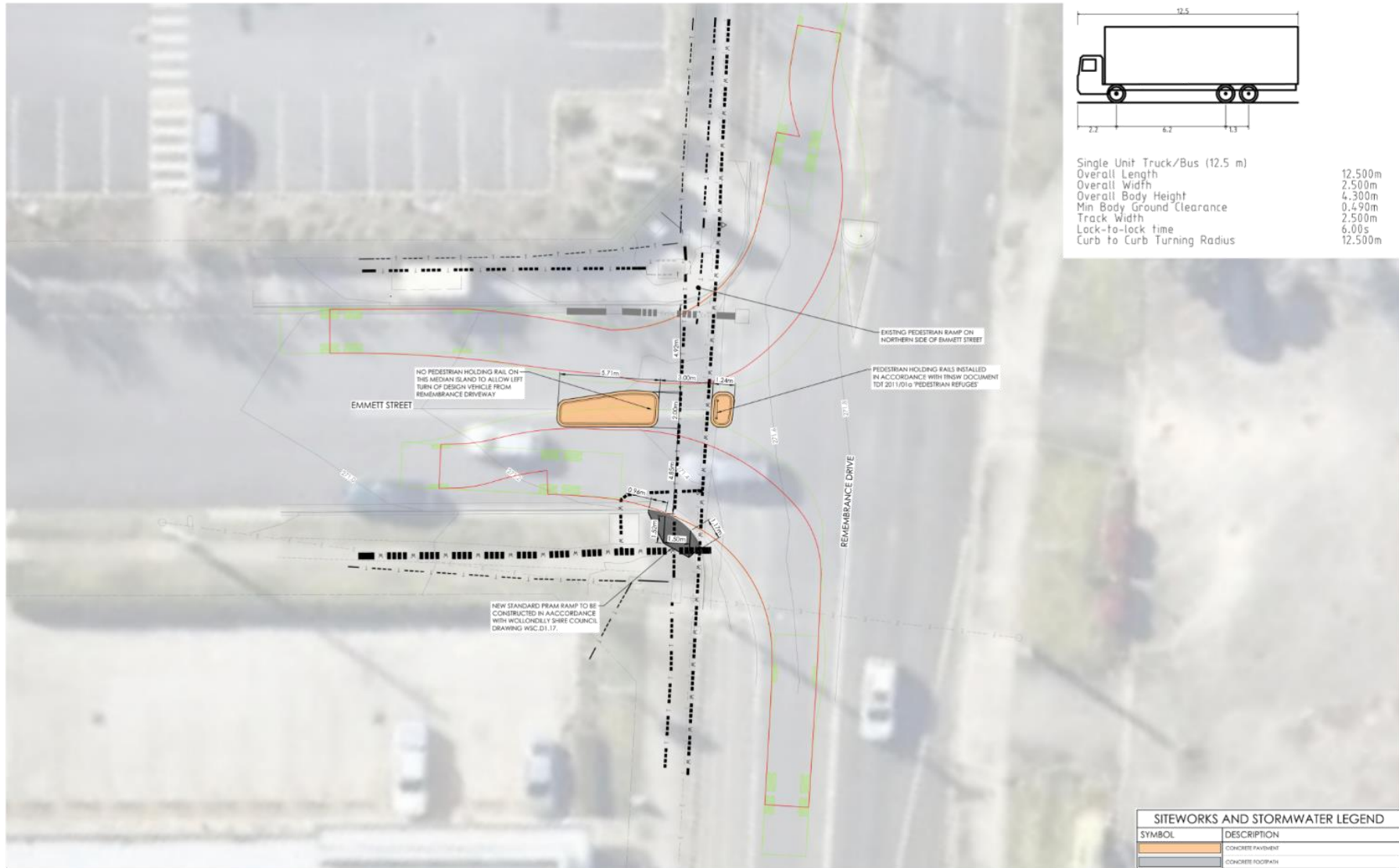


CLIENT
 VIVACITY PROPERTY PTY LTD
 STATUS
 PRELIMINARY

DROPLINE
 CIVIL DESIGN
 DRAWING TITLE
 SITWORKS AND

PROJECT
 TAHMOOR PUBLIC
 DOMAIN WORKS
 ADDRESS
 TAHMOOR, NSW, 2573

PROJECT DETAILS
 DESIGN: DMH
 DRAWN: DMH
 DATE: NOV 2021
 SHEET NO: A1
 SCALE: 1:200
 PROJECT: N0210873
 C4404



Single Unit Truck/Bus (12.5 m)	12.500m
Overall Length	2.500m
Overall Width	4.300m
Min Body Ground Clearance	0.490m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

SITWORKS AND STORMWATER PLAN
SCALE 1:100



NOT TO BE USED FOR CONSTRUCTION

AMDT	DATE	DESCRIPTION	BY

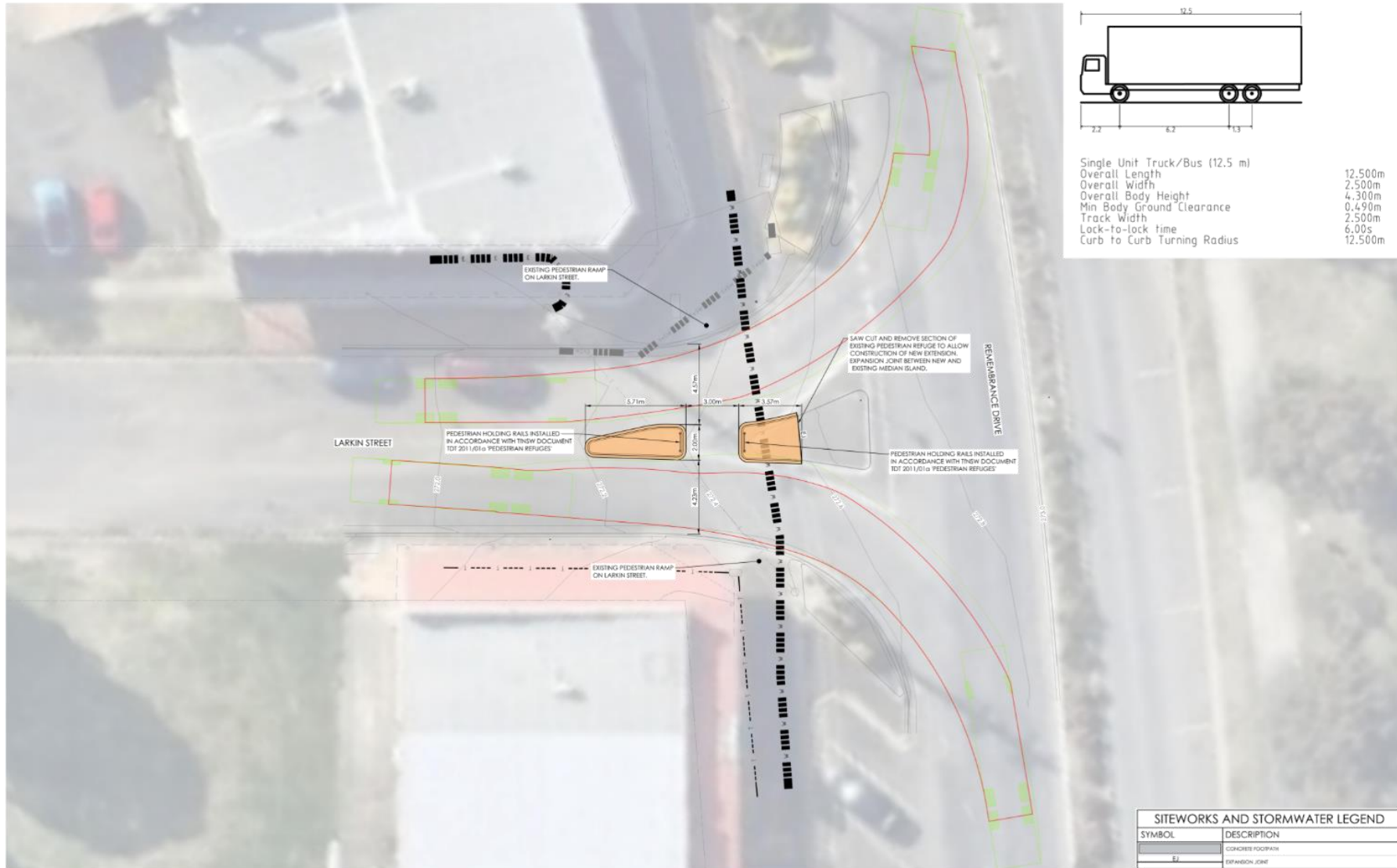


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING FILE
SITWORKS AND STORMWATER PLAN

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DRAWN BY
DATE
NOV 2021
SCALE
1:100
PROJECT
N0210873
C4405



SITWORKS AND STORMWATER PLAN
SCALE 1:100

NOT TO BE USED FOR CONSTRUCTION

AMDT	DATE	DESCRIPTION	BY



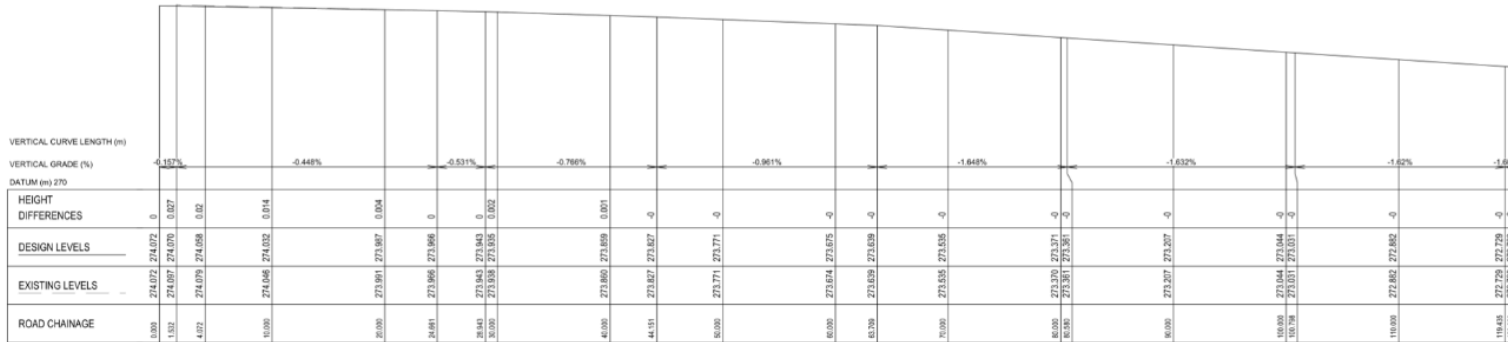
CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING FILE
SITWORKS AND STORMWATER PLAN

PROJECT
TAHMOOR PUBLIC DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

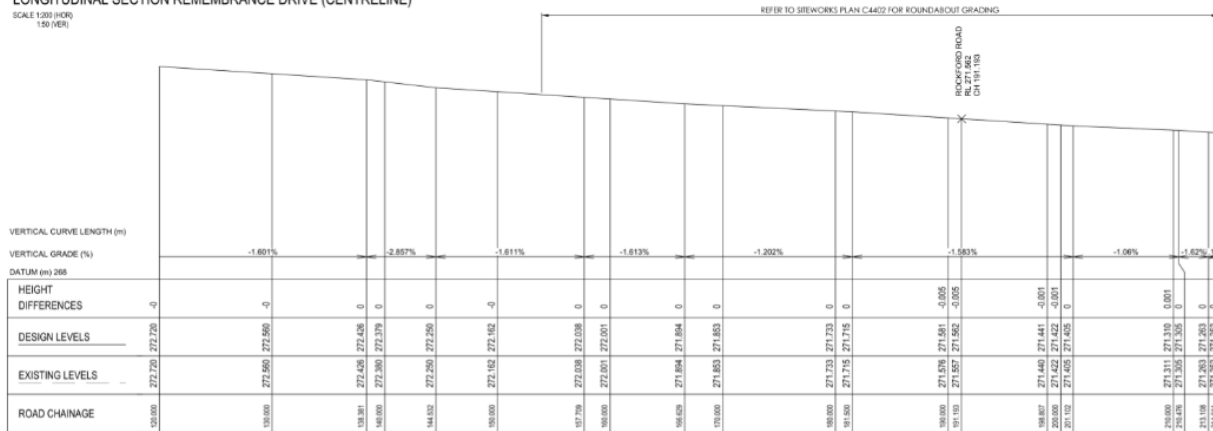


PROJECT DETAILS
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 DRAWN: [Name]
 DATE: NOV 2021
 SHEET: 11
 SCALE: 1:100
 PROJECT: N0210873
 C4107



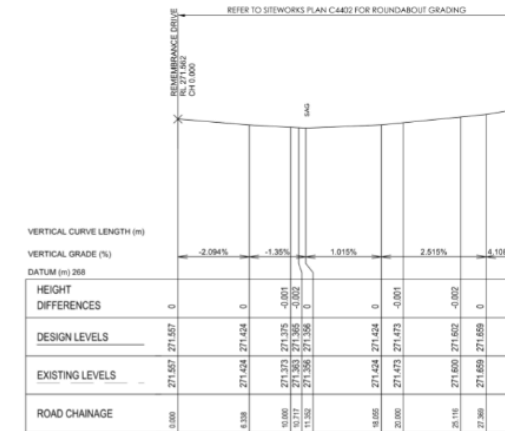
LONGITUDINAL SECTION REMEMBRANCE DRIVE (CENTRELINE)

SCALE 1:200 (HOR)
1:50 (VER)



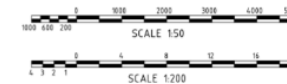
LONGITUDINAL SECTION REMEMBRANCE DRIVE (CENTRELINE)

SCALE 1:200 (HOR)
1:50 (VER)



LONGITUDINAL SECTION ROCKFORD ROAD

SCALE 1:200 (HOR)
1:50 (VER)



NOT TO BE USED FOR CONSTRUCTION			
AMT	DATE	DESCRIPTION	BY

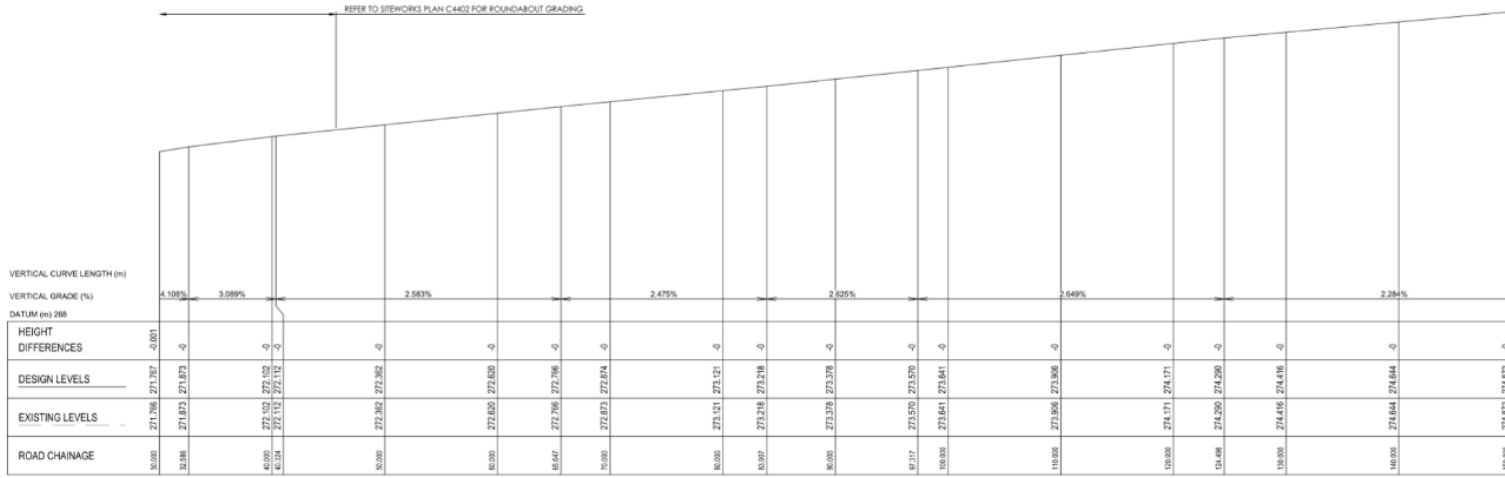


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

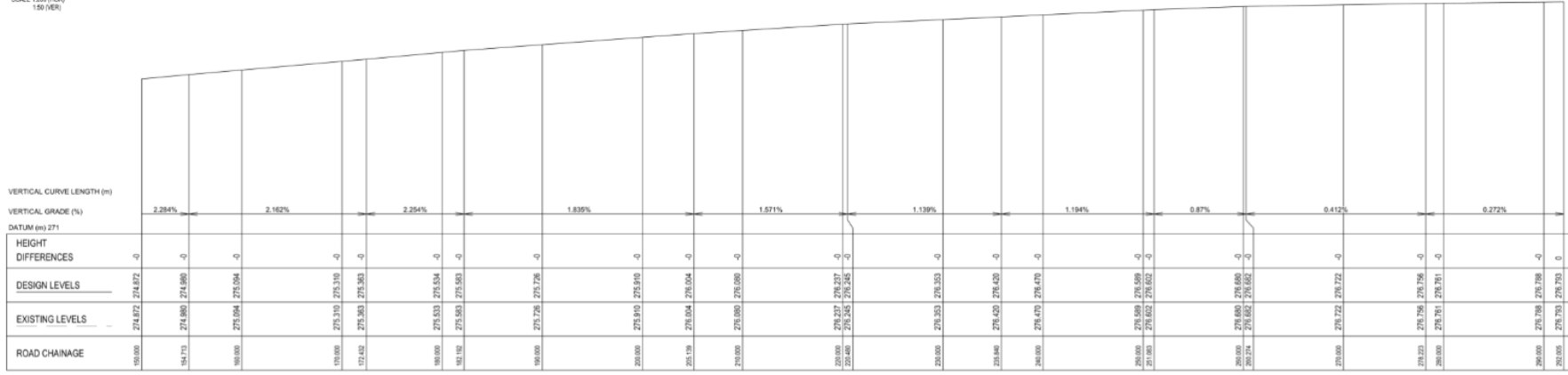
DRAWING TITLE
ROAD LONGITUDINAL

PROJECT
TAHMOOR PUBLIC DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

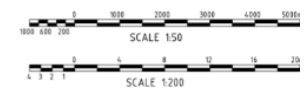
PROJECT DETAILS
DESIGN DRAWN
DATE NOV 20
DWG NO
DRC 3/26
SCALE A1 (3000)
PROJECT
N0210873
C4500



LONGITUDINAL SECTION ROCKFORD ROAD (CENTRELINE)
SCALE 1:200 (HOR)
1:50 (VER)



LONGITUDINAL SECTION ROCKFORD ROAD (CENTRELINE)
SCALE 1:200 (HOR)
1:50 (VER)



NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY

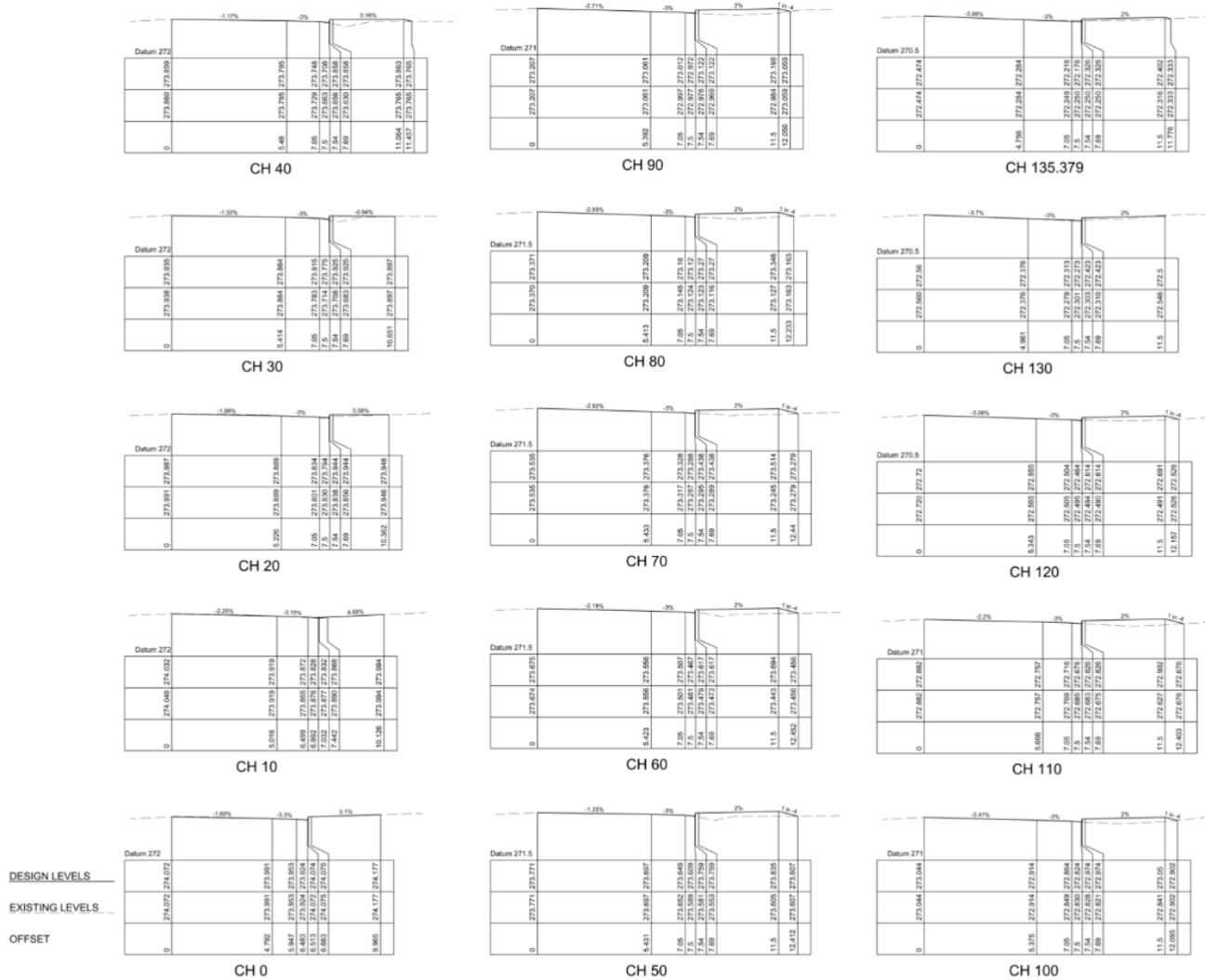


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DROPLINE
CIVIL DESIGN
DRAWING TITLE
ROAD LONGITUDINAL

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGN DRAWN NOV 2021
SCALE ALL DIMENSIONS
PROJECT N0210873
C4501



REMEMBRANCE DRIVE CROSS SECTIONS
SCALE 1:100

NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

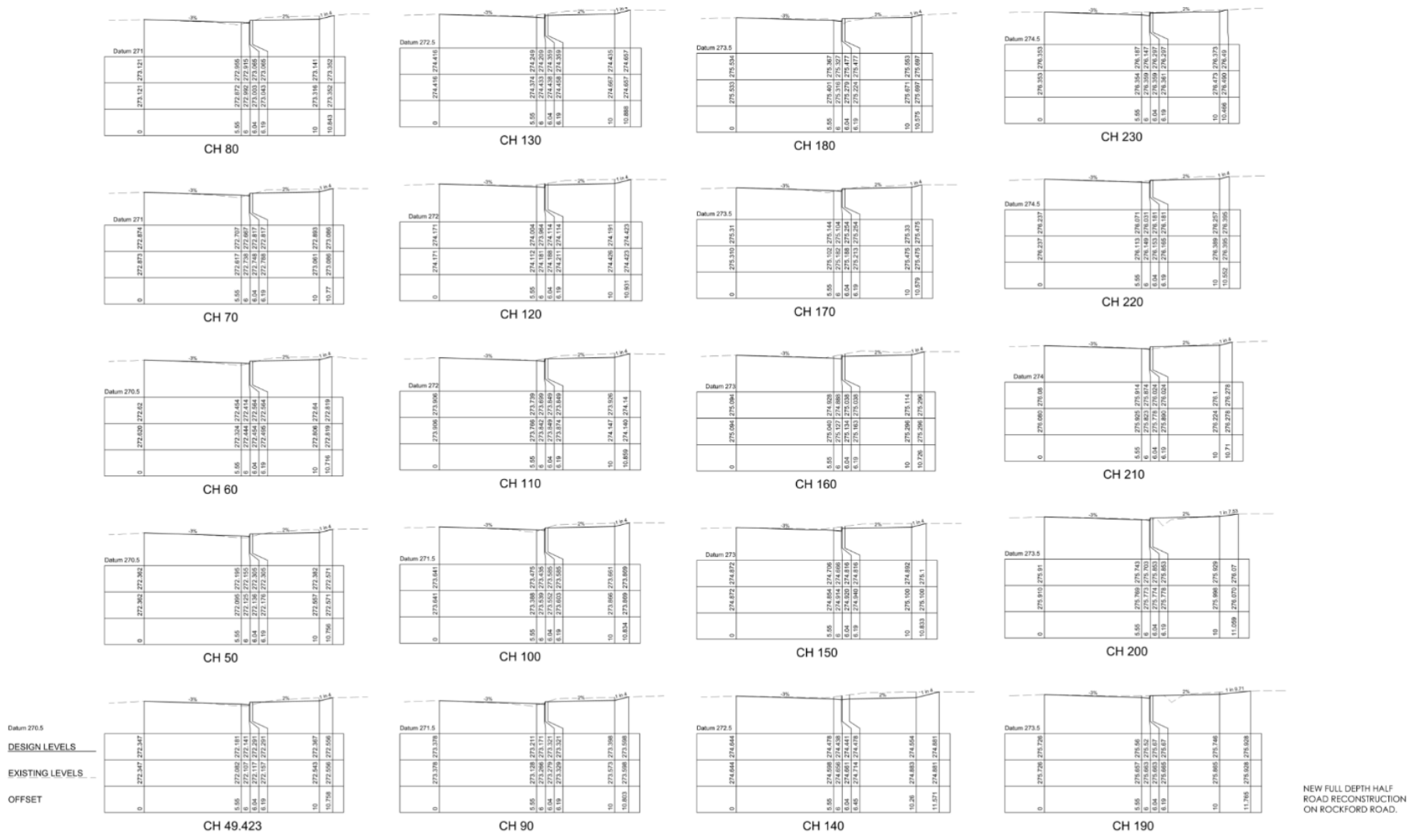
DISCipline
CIVIL DESIGN
DRAWING TITLE
ROAD CROSS SECTIONS

PROJECT
TAHMOOR PUBLIC DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DRAWN BY
DATE
NOV 2021
Dwg No
A1
SCALE
1:100
PROJECT
N0210873
C4510



EXISTING PAVEMENT ON REMEMBRANCE DRIVEWAY TO BE MAINTAINED AND WIDENED WITH NEW FULL DEPTH FLEXIBLE PAVEMENT CONSTRUCTION.



ROCKFORD ROAD CROSS SECTIONS
SCALE 1:100

NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY



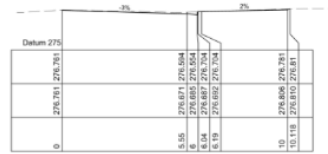
CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DROPLINE
CIVIL DESIGN
DRAWING TITLE
ROAD CROSS SECTIONS

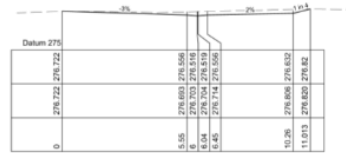
PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



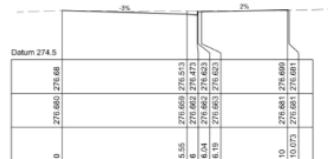
PROJECT DETAILS
DRAWN BY
DATE
NOV 2021
DRAWS
NOV 2021
SCALE
1:100
PROJECT
N0210873
C4511



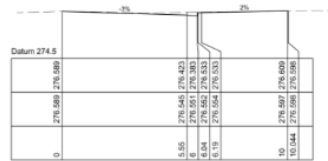
CH 280



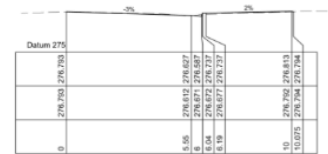
CH 270



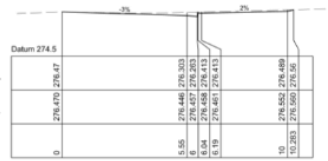
CH 260



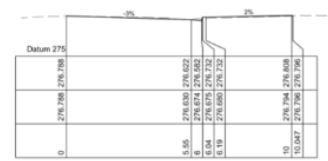
CH 250



CH 292.005



CH 240



CH 290

DESIGN LEVELS
EXISTING LEVELS
OFFSET

ROCKFORD ROAD CROSS SECTIONS
SCALE 1:100

NEW FULL DEPTH HALF ROAD RECONSTRUCTION ON ROCKFORD ROAD.

NOT TO BE USED FOR CONSTRUCTION			
AMCT	DATE	DESCRIPTION	BY



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
ROAD CROSS SECTIONS

PROJECT
TAHMOOR PUBLIC DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



PROJECT DETAILS
EPOCH
DRAWN
DATE
DRO. DATE
SCALE
PROJECT
N0210873
A1
1:100
SA



SIGNAGE AND LINEMARKING LEGEND	
SYMBOL	DESCRIPTION
BB	CONCRETE FOOTPATH
E1	EDGE LINE- E1
E4	EDGE LINE- E4
TR	GIVE WAY LINE- TR
▲	PROPOSED SIGNAGE
—	EXISTING LINEMARKING
—	EXISTING LINEMARKING TO BE REMOVED

SITWORKS AND STORMWATER PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY



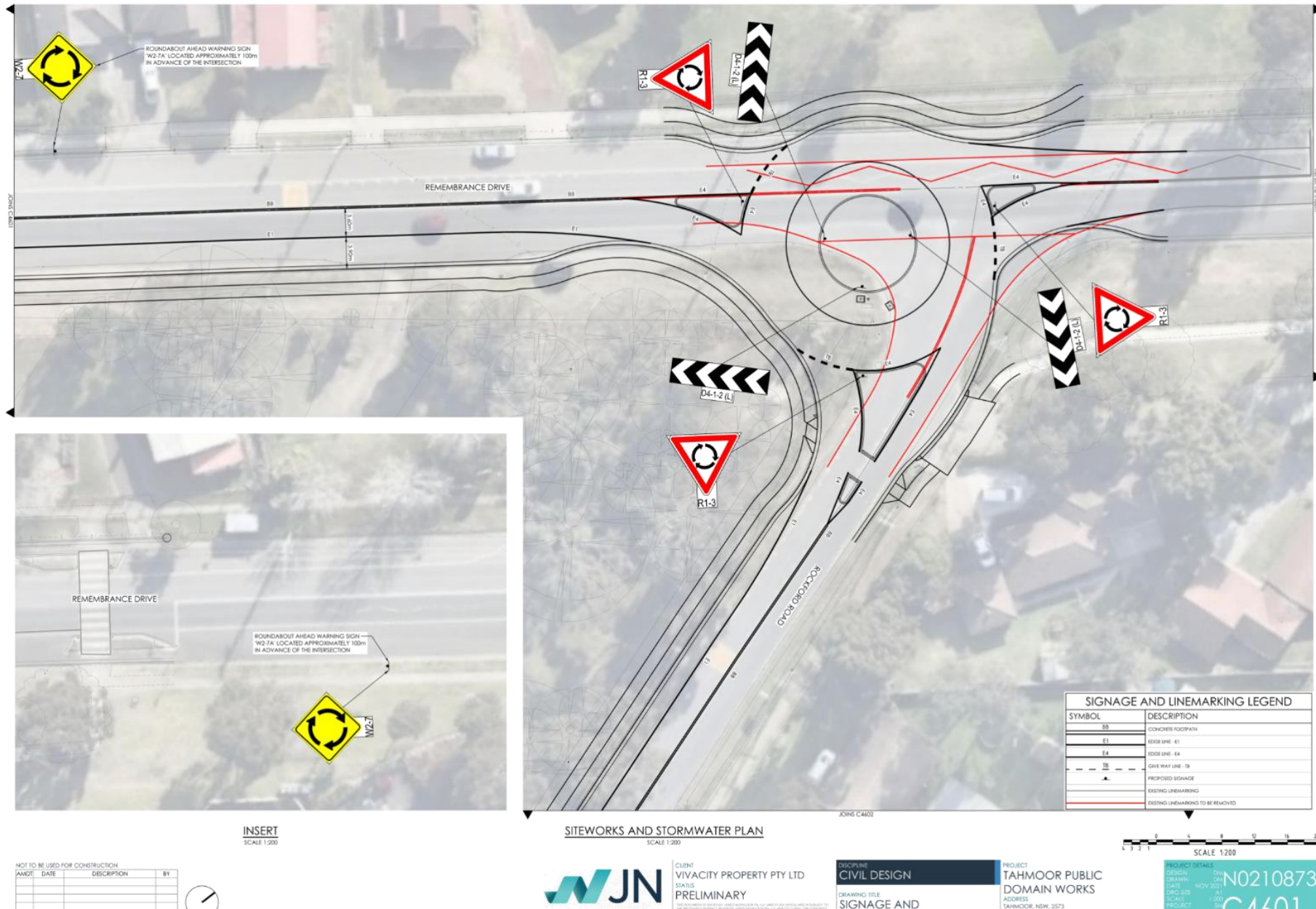
CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

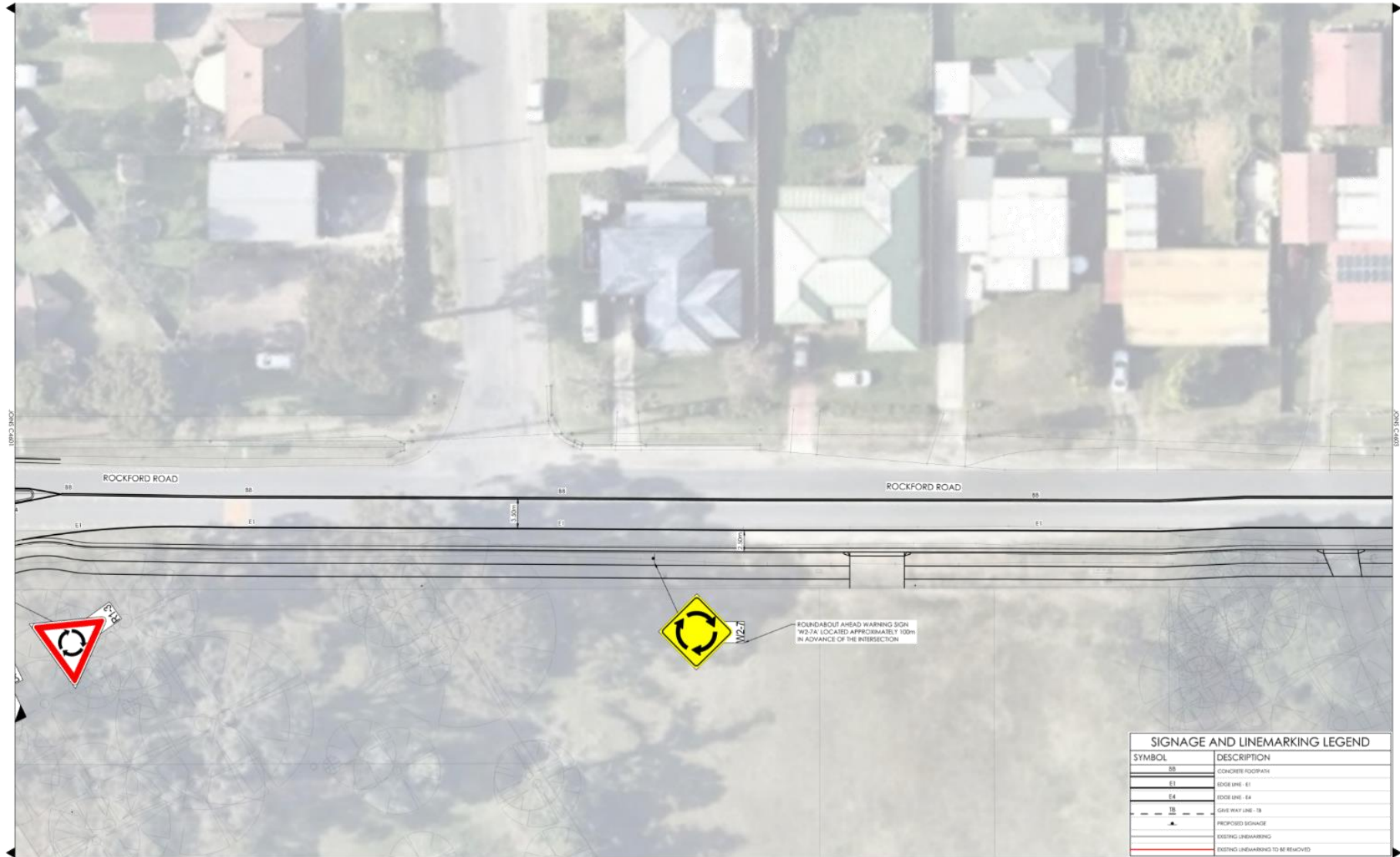
DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SIGNAGE AND

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGNER
DRAWN BY
DATE
SCALE
PROJECT

NO210873
C4400





SITWORKS AND STORMWATER PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

AMC/D	DATE	DESCRIPTION	BY



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SIGNAGE AND

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
 DESIGN: DM
 DRAWN: DM
 DATE: NOV 2021
 SHEET NO: A1
 SCALE: 1:200
 PROJECT: N0210873
 C4100



SIGNAGE AND LINEMARKING PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

ANCDT	DATE	DESCRIPTION	BY



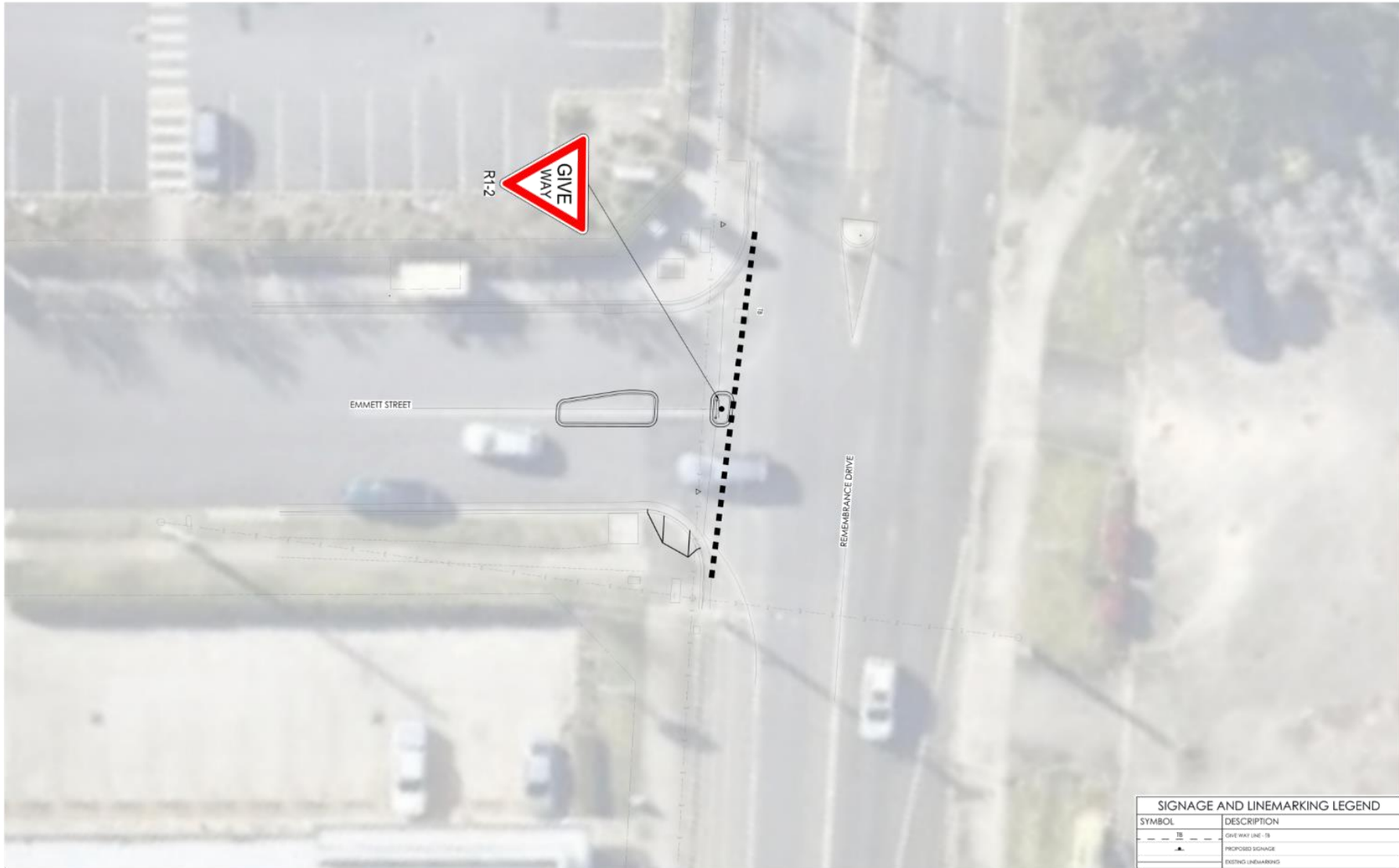
CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SIGNAGE AND

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGNER
DRAWN
DATE
SCALE
PROJECT

N0210873
C4402



SIGNAGE AND LINEMARKING LEGEND	
SYMBOL	DESCRIPTION
---	GIVE WAY LINE: IS
▲	PROPOSED SIGNAGE
---	EXISTING LINEMARKINGS

SIGNAGE AND LINEMARKING PLAN
SCALE 1:200

NOT TO BE USED FOR CONSTRUCTION

AMC/D	DATE	DESCRIPTION	BY



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SIGNAGE AND

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



PROJECT DETAILS
DESIGN: JMN
DRAWN: JMN
DATE: NOV 2021
SHEET: A1
SCALE: 1:100
PROJECT: N0210873
C4101



SIGNAGE AND LINEMARKING PLAN
SCALE 1:200

NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY



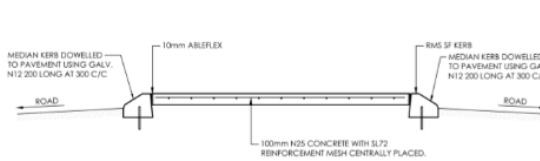
CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SIGNAGE AND

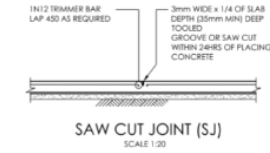
PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



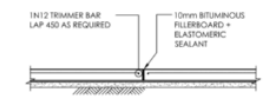
PROJECT DETAILS
DRAWN BY: DM
DATE: NOV 2021
DWD: 338
SCALE: 1:100
PROJECT: N0210873
C4405



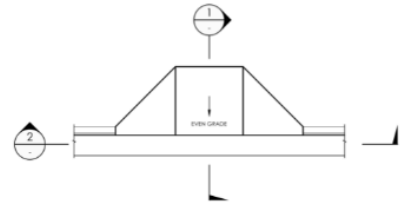
MIDBLOCK PEDESTRIAN REFUGE DETAIL
N.T.S.



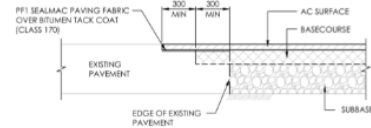
SAW CUT JOINT (SJ)
SCALE 1:20



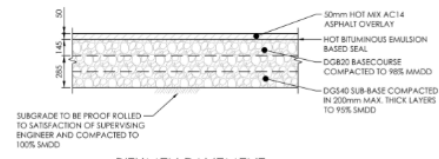
EXPANSION JOINT (EJ)
SCALE 1:20



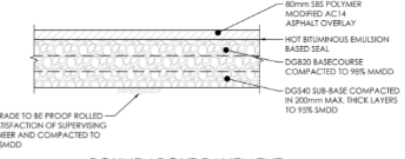
PRAM RAMP DETAIL
SCALE 1:50



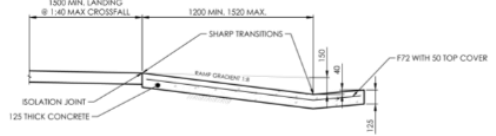
TYPICAL ROAD PAVEMENT JUNCTION WITH EXISTING PAVEMENTS
N.T.S.



BITUMEN PAVEMENT TYPICAL DETAIL
SCALE 1:20



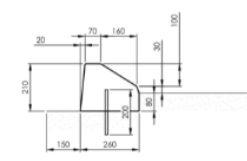
ROUNDBOULT PAVEMENT TYPICAL DETAIL
SCALE 1:20



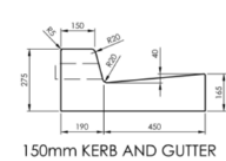
SECTION 1-1
SCALE 1:20



SECTION 2-2
SCALE 1:20

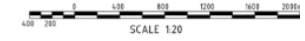


SF TYPE MEDIAN KERB
SCALE 1:10



150mm KERB AND GUTTER
SCALE 1:10

DETAILS SHOWN FOR REFERENCE ONLY.
REFER TO WOLLONDILLY SHIRE SPECIFICATIONS FOR FINAL CIVIL WORKS SPECIFICATIONS AND DOUGLAS PARTNERS PAVEMENT DESIGN REPORT FOR PAVEMENT DEPTHS AND DESIGNS.



NOT TO BE USED FOR CONSTRUCTION			
AMNT	DATE	DESCRIPTION	BY

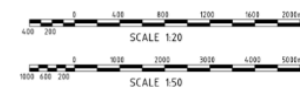
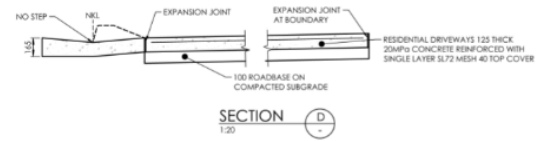
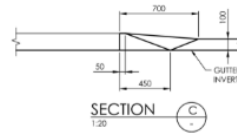
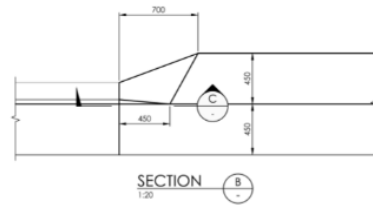
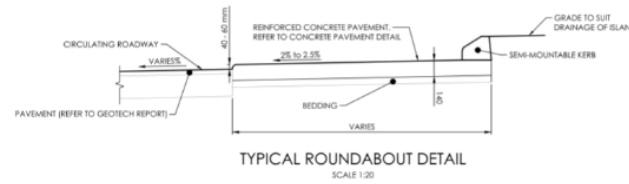
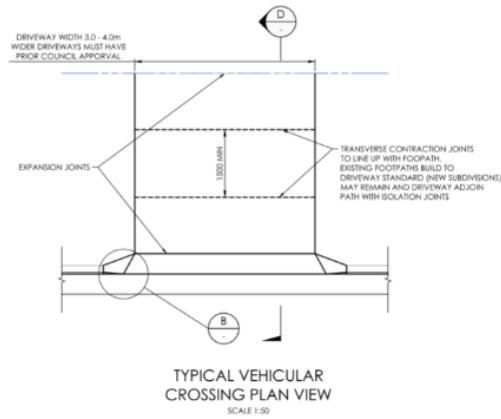


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
TYPICAL DETAILS

PROJECT
TAHMOOR PUBLIC DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGN NO
DRAWN BY
DATE NOV 2021
Dwg No
NO210873
SCALE 1:1000
PROJECT C4000



NOT TO BE USED FOR CONSTRUCTION

AMDT	DATE	DESCRIPTION	BY



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN

DRAWING TITLE
TYPICAL DETAILS

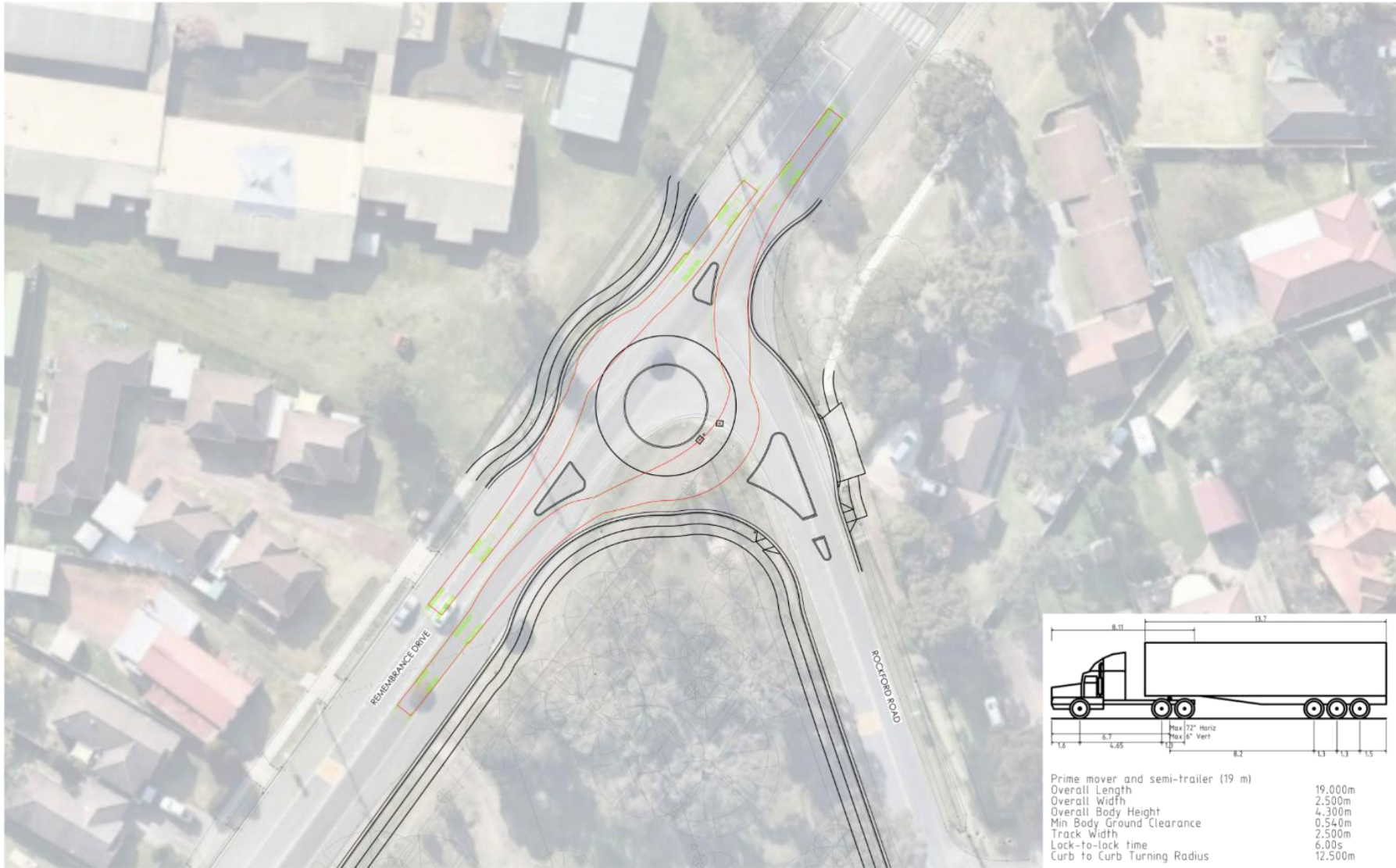
PROJECT
**TAHMOOR PUBLIC
DOMAIN WORKS**
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS

DESIGN: JON
DRAWN: DW
DATE: NOV 2021
DRG. SIZE: A1
SCALE: AS SHOWN
PROJECT: TAHMOOR

N0210873

C4001



VEHICLE SWEEP PATHS PLAN
SCALE 1:250

NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY



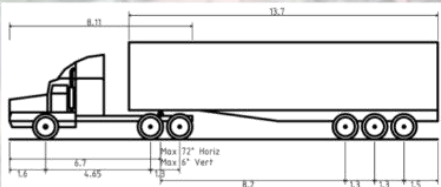
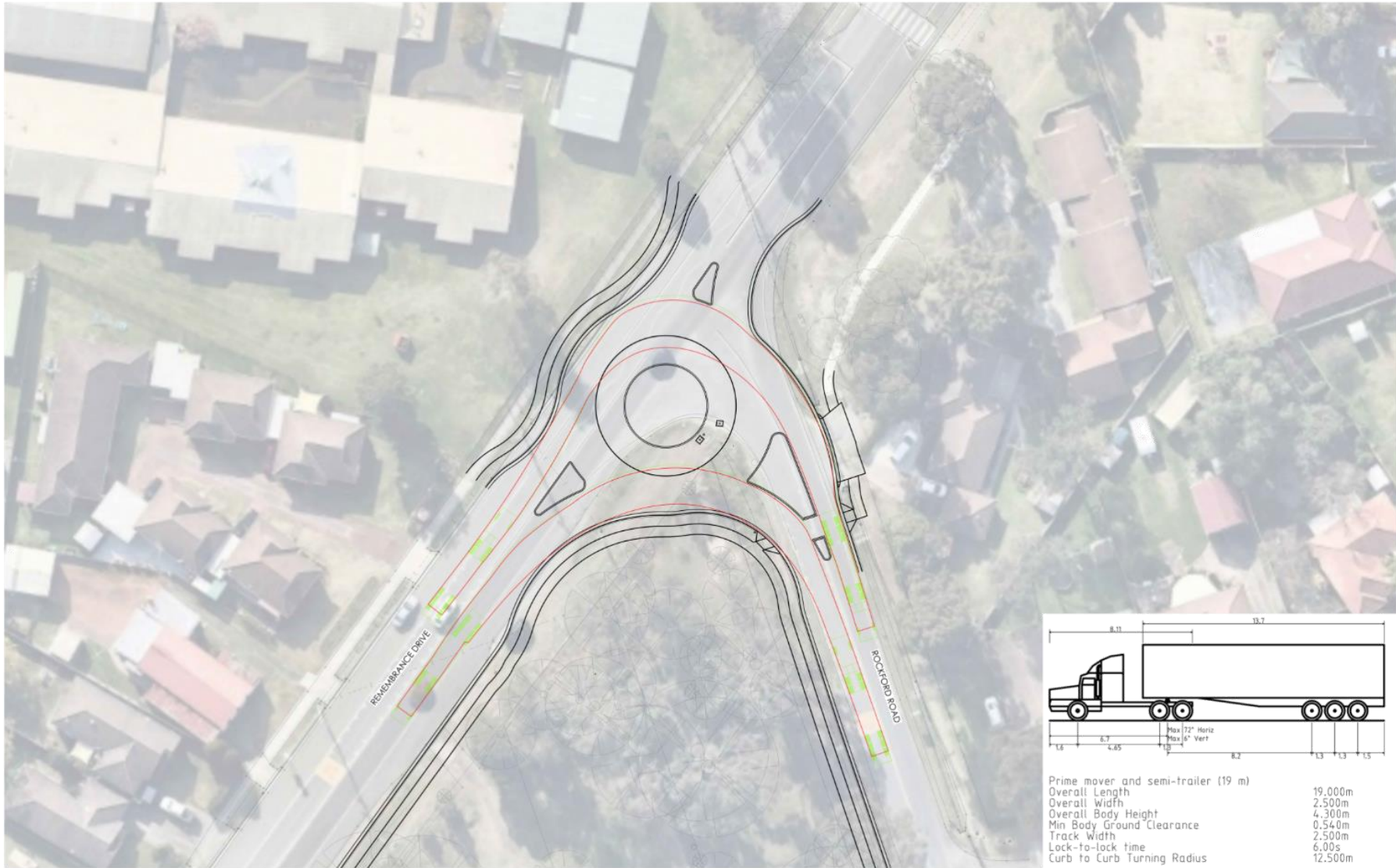
CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
VEHICLE SWEEP PATHS

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



PROJECT DETAILS
DRAWN BY
DATE NOV 2021
SCALE 1:250
PROJECT
N0210873
C4010



Prime mover and semi-trailer (19 m)	
Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

VEHICLE SWEEP PATHS PLAN
SCALE 1:250

NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
VEHICLE SWEEP PATHS

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



PROJECT DETAILS
DRAWN: [blank] CHK: [blank]
DATE: NOV 2021
DRAWN BY: [blank]
SCALE: 1:250
PROJECT: [blank]

N0210873
C4011



SIGHT DISTANCE CHECK PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY

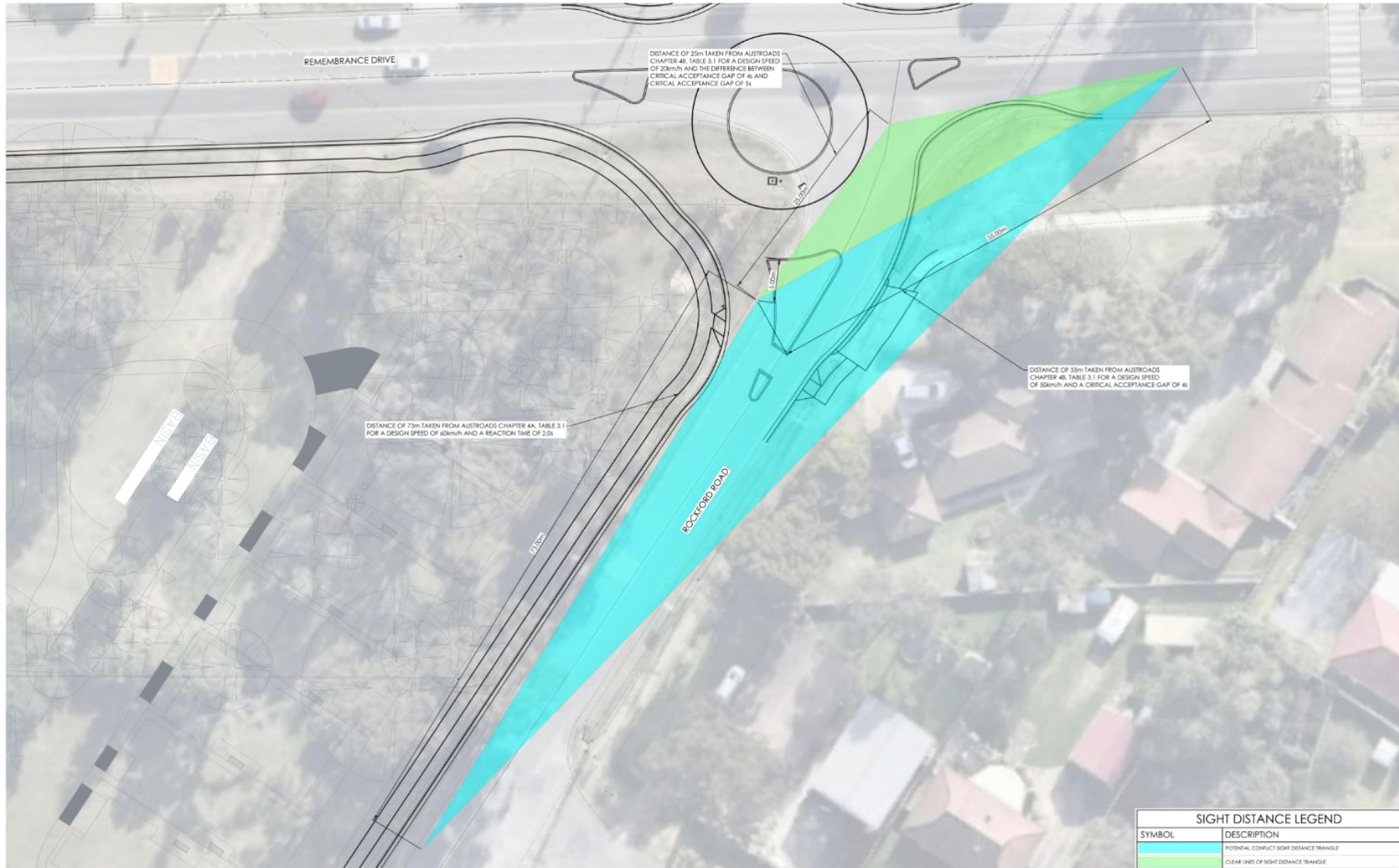


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SIGHT DISTANCE

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGN: 50m
DRAWN: DM
DATE: NOV 2021
SHEET: 11
SCALE: 1:200
PROJECT: N0210873
C4020



SIGHT DISTANCE CHECK PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

AMC/D	DATE	DESCRIPTION	BY



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SIGHT DISTANCE

PROJECT
TAHMOOR PUBLIC DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DRAWN: DM
DATE: NOV 2021
SCALE: A1
PROJECT: N0210873
C4021

The Transport Planning Partnership
Suite 402 Level 4, 22 Atchison Street
St Leonards NSW 2065

P.O. Box 237
St Leonards NSW 1590

02 8437 7800

info@tpp.net.au

www.tpp.net.au

TAHMOOR PUBLIC DOMAIN WORKS

TAHMOOR, NSW, 2573

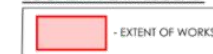


LOCALITY PLAN
SCALE 1:2000

DRAWING LIST

No.	DRAWING TITLE
C4001	COVER SHEET AND LOCALITY PLAN
C4002	GENERAL NOTES AND LEGENDS
C4003	BULK EarthWORKS PLAN
C4004	SEWERWORKS AND STORMWATER PLAN - SHEET 1
C4005	SEWERWORKS AND STORMWATER PLAN - SHEET 2
C4006	SEWERWORKS AND STORMWATER PLAN - SHEET 3
C4007	SEWERWORKS AND STORMWATER PLAN - SHEET 4
C4008	SEWERWORKS AND STORMWATER PLAN - SHEET 5
C4009	SEWERWORKS AND STORMWATER PLAN - SHEET 6
C4010	SEWERWORKS AND STORMWATER PLAN - SHEET 7
C4011	SEWERWORKS AND STORMWATER PLAN - SHEET 8
C4012	SEWERWORKS AND STORMWATER PLAN - SHEET 9
C4013	SEWERWORKS AND STORMWATER PLAN - SHEET 10
C4014	SEWERWORKS AND STORMWATER PLAN - SHEET 11
C4015	SEWERWORKS AND STORMWATER PLAN - SHEET 12
C4016	SEWERWORKS AND STORMWATER PLAN - SHEET 13
C4017	SEWERWORKS AND STORMWATER PLAN - SHEET 14
C4018	SEWERWORKS AND STORMWATER PLAN - SHEET 15
C4019	SEWERWORKS AND STORMWATER PLAN - SHEET 16
C4020	SEWERWORKS AND STORMWATER PLAN - SHEET 17
C4021	SEWERWORKS AND STORMWATER PLAN - SHEET 18
C4022	SEWERWORKS AND STORMWATER PLAN - SHEET 19
C4023	SEWERWORKS AND STORMWATER PLAN - SHEET 20
C4024	SEWERWORKS AND STORMWATER PLAN - SHEET 21
C4025	SEWERWORKS AND STORMWATER PLAN - SHEET 22
C4026	SEWERWORKS AND STORMWATER PLAN - SHEET 23
C4027	SEWERWORKS AND STORMWATER PLAN - SHEET 24
C4028	SEWERWORKS AND STORMWATER PLAN - SHEET 25
C4029	SEWERWORKS AND STORMWATER PLAN - SHEET 26
C4030	SEWERWORKS AND STORMWATER PLAN - SHEET 27
C4031	SEWERWORKS AND STORMWATER PLAN - SHEET 28
C4032	SEWERWORKS AND STORMWATER PLAN - SHEET 29
C4033	SEWERWORKS AND STORMWATER PLAN - SHEET 30
C4034	SEWERWORKS AND STORMWATER PLAN - SHEET 31
C4035	SEWERWORKS AND STORMWATER PLAN - SHEET 32
C4036	SEWERWORKS AND STORMWATER PLAN - SHEET 33
C4037	SEWERWORKS AND STORMWATER PLAN - SHEET 34
C4038	SEWERWORKS AND STORMWATER PLAN - SHEET 35
C4039	SEWERWORKS AND STORMWATER PLAN - SHEET 36
C4040	SEWERWORKS AND STORMWATER PLAN - SHEET 37
C4041	SEWERWORKS AND STORMWATER PLAN - SHEET 38
C4042	SEWERWORKS AND STORMWATER PLAN - SHEET 39
C4043	SEWERWORKS AND STORMWATER PLAN - SHEET 40
C4044	SEWERWORKS AND STORMWATER PLAN - SHEET 41
C4045	SEWERWORKS AND STORMWATER PLAN - SHEET 42
C4046	SEWERWORKS AND STORMWATER PLAN - SHEET 43
C4047	SEWERWORKS AND STORMWATER PLAN - SHEET 44
C4048	SEWERWORKS AND STORMWATER PLAN - SHEET 45
C4049	SEWERWORKS AND STORMWATER PLAN - SHEET 46
C4050	SEWERWORKS AND STORMWATER PLAN - SHEET 47
C4051	SEWERWORKS AND STORMWATER PLAN - SHEET 48
C4052	SEWERWORKS AND STORMWATER PLAN - SHEET 49
C4053	SEWERWORKS AND STORMWATER PLAN - SHEET 50
C4054	SEWERWORKS AND STORMWATER PLAN - SHEET 51
C4055	SEWERWORKS AND STORMWATER PLAN - SHEET 52
C4056	SEWERWORKS AND STORMWATER PLAN - SHEET 53
C4057	SEWERWORKS AND STORMWATER PLAN - SHEET 54
C4058	SEWERWORKS AND STORMWATER PLAN - SHEET 55
C4059	SEWERWORKS AND STORMWATER PLAN - SHEET 56
C4060	SEWERWORKS AND STORMWATER PLAN - SHEET 57
C4061	SEWERWORKS AND STORMWATER PLAN - SHEET 58
C4062	SEWERWORKS AND STORMWATER PLAN - SHEET 59
C4063	SEWERWORKS AND STORMWATER PLAN - SHEET 60
C4064	SEWERWORKS AND STORMWATER PLAN - SHEET 61
C4065	SEWERWORKS AND STORMWATER PLAN - SHEET 62
C4066	SEWERWORKS AND STORMWATER PLAN - SHEET 63
C4067	SEWERWORKS AND STORMWATER PLAN - SHEET 64
C4068	SEWERWORKS AND STORMWATER PLAN - SHEET 65
C4069	SEWERWORKS AND STORMWATER PLAN - SHEET 66
C4070	SEWERWORKS AND STORMWATER PLAN - SHEET 67
C4071	SEWERWORKS AND STORMWATER PLAN - SHEET 68
C4072	SEWERWORKS AND STORMWATER PLAN - SHEET 69
C4073	SEWERWORKS AND STORMWATER PLAN - SHEET 70
C4074	SEWERWORKS AND STORMWATER PLAN - SHEET 71
C4075	SEWERWORKS AND STORMWATER PLAN - SHEET 72
C4076	SEWERWORKS AND STORMWATER PLAN - SHEET 73
C4077	SEWERWORKS AND STORMWATER PLAN - SHEET 74
C4078	SEWERWORKS AND STORMWATER PLAN - SHEET 75
C4079	SEWERWORKS AND STORMWATER PLAN - SHEET 76
C4080	SEWERWORKS AND STORMWATER PLAN - SHEET 77
C4081	SEWERWORKS AND STORMWATER PLAN - SHEET 78
C4082	SEWERWORKS AND STORMWATER PLAN - SHEET 79
C4083	SEWERWORKS AND STORMWATER PLAN - SHEET 80
C4084	SEWERWORKS AND STORMWATER PLAN - SHEET 81
C4085	SEWERWORKS AND STORMWATER PLAN - SHEET 82
C4086	SEWERWORKS AND STORMWATER PLAN - SHEET 83
C4087	SEWERWORKS AND STORMWATER PLAN - SHEET 84
C4088	SEWERWORKS AND STORMWATER PLAN - SHEET 85
C4089	SEWERWORKS AND STORMWATER PLAN - SHEET 86
C4090	SEWERWORKS AND STORMWATER PLAN - SHEET 87
C4091	SEWERWORKS AND STORMWATER PLAN - SHEET 88
C4092	SEWERWORKS AND STORMWATER PLAN - SHEET 89
C4093	SEWERWORKS AND STORMWATER PLAN - SHEET 90
C4094	SEWERWORKS AND STORMWATER PLAN - SHEET 91
C4095	SEWERWORKS AND STORMWATER PLAN - SHEET 92
C4096	SEWERWORKS AND STORMWATER PLAN - SHEET 93
C4097	SEWERWORKS AND STORMWATER PLAN - SHEET 94
C4098	SEWERWORKS AND STORMWATER PLAN - SHEET 95
C4099	SEWERWORKS AND STORMWATER PLAN - SHEET 96
C4100	SEWERWORKS AND STORMWATER PLAN - SHEET 97
C4101	SEWERWORKS AND STORMWATER PLAN - SHEET 98
C4102	SEWERWORKS AND STORMWATER PLAN - SHEET 99
C4103	SEWERWORKS AND STORMWATER PLAN - SHEET 100

LOCALITY PLAN LEGEND



AMOUNT	DATE	DESCRIPTION	BY
4	30.04.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
COVER SHEET

PROJECT
TAHMOOR PUBLIC DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DRAWING NO: N0210873
SCALE: 1:2000
DATE: 30/04/22

LEVELS TABLE		
MIN LEVEL	MAX LEVEL	COLOR
-0.0	-0.5	Red
-0.5	-0.4	Red
-0.4	-0.3	Red
-0.3	-0.2	Red
-0.2	-0.1	Red
-0.1	0.0	Red
0.0	0.1	Red
0.1	0.2	Green
0.2	0.3	Green
0.3	0.4	Green
0.4	0.5	Green
0.5	0.6	Green
0.6	0.0	Green

VOLUMES
 CUT VOLUME: 363.806m³
 FILL VOLUME: 249.668m³
 BALANCE: 114.14m³ (CUT)



BULK EARTHWORKS PLAN
 SCALE 1:1000



NOT TO BE USED FOR CONSTRUCTION			
AMDT	DATE	DESCRIPTION	BY
4	30.04.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM



CLIENT
 VIVACITY PROPERTY PTY LTD
 STATUS
 PRELIMINARY

DISCIPLINE
 CIVIL DESIGN
 DRAWING TITLE
 BULK EARTHWORKS

PROJECT
 TAHMOOR PUBLIC
 DOMAIN WORKS
 ADDRESS
 TAHMOOR, NSW, 2573

PROJECT DETAILS
 DRAWN BY: DM
 SCALE: NOV 2021
 CHECKED BY: A
 SCALE: 1:1000
 PROJECT NO: N0210873
 DRAWING NO: C4200



SITWORKS AND STORMWATER PLAN
SCALE 1:2000



NOT TO BE USED FOR CONSTRUCTION

NO	DATE	DESCRIPTION	BY
4	30.06.22	ISSUED FOR COUNCIL APPROVAL	DM

IN CIVIL
 CLIENT: VIVACITY PROPERTY PTY LTD
 STATUS: DDG IN ADV

DISCIPLINE: CIVIL DESIGN
 PROJECT: TAHMOOR PUBLIC DOMAIN WORKS

PROJECT DETAILS
 DESIGN: DM
 DRAWN: DM
 DATE: NOV 2021
 DWG NO: **N021087**



SITWORKS AND STORMWATER PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY
4	30.06.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SITWORKS AND

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DRAWN BY
DATE
NOV 2021
SCALE
1:200
PROJECT
N0210873
C4401



SITWORKS AND STORMWATER PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

AMC/D	DATE	DESCRIPTION	BY
4	30.04.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SITWORKS AND

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DRAWN BY
DATE
NOV 2021
SCALE
A1
PROJECT
N0210873
C4102



NOT TO BE USED FOR CONSTRUCTION

AMC/D	DATE	DESCRIPTION	BY
4	30.06.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM

SITWORKS AND STORMWATER PLAN
SCALE 1:200



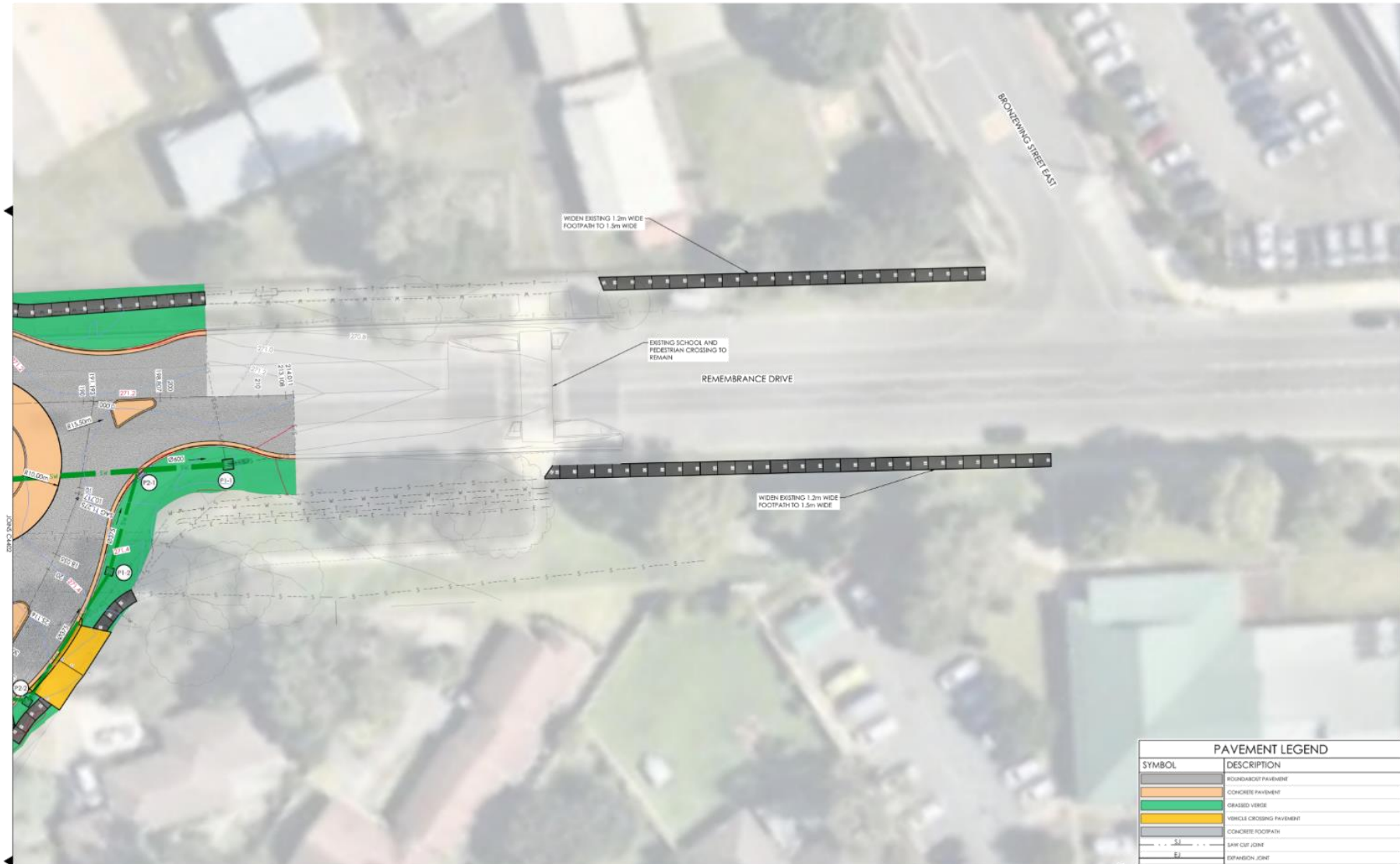
CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SITWORKS AND

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



PROJECT DETAILS
 DESIGN: DM
 DRAWN: DM
 DATE: NOV 2021
 SHEET NO: A1
 SHEET TOTAL: 22
 PROJECT: N0210873
 C4404



SITWORKS AND STORMWATER PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY
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2	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM

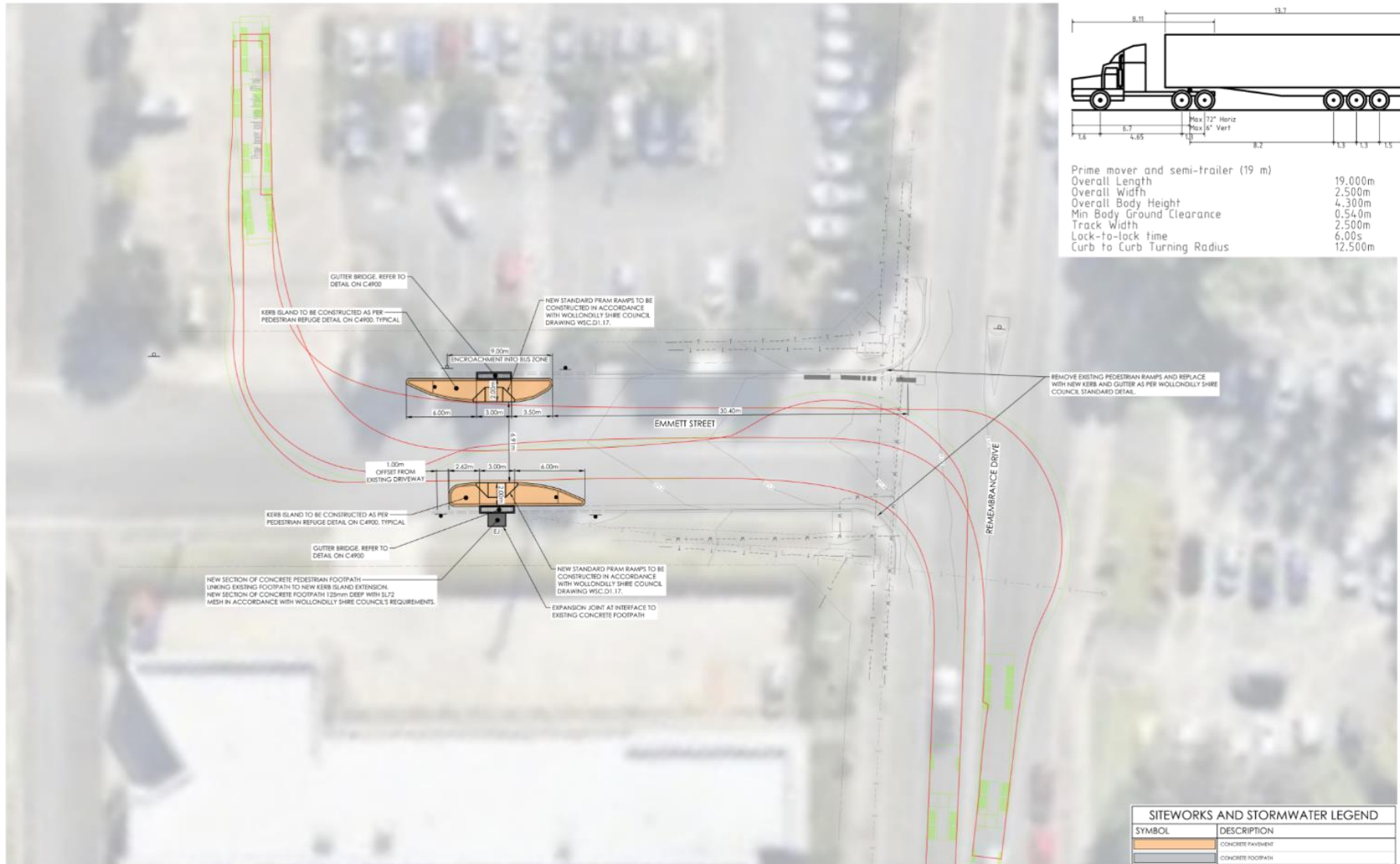


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SITWORKS AND

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DRAWN: DM
DATE: 04.07.22
SCALE: A1
PROJECT: N0210873
C4405



SITWORKS AND STORMWATER PLAN
SCALE 1:150



NOT TO BE USED FOR CONSTRUCTION

NO#	DATE	DESCRIPTION	BY
5	29.06.22	ISSUED FOR COUNCIL APPROVAL	DM
4	08.06.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM

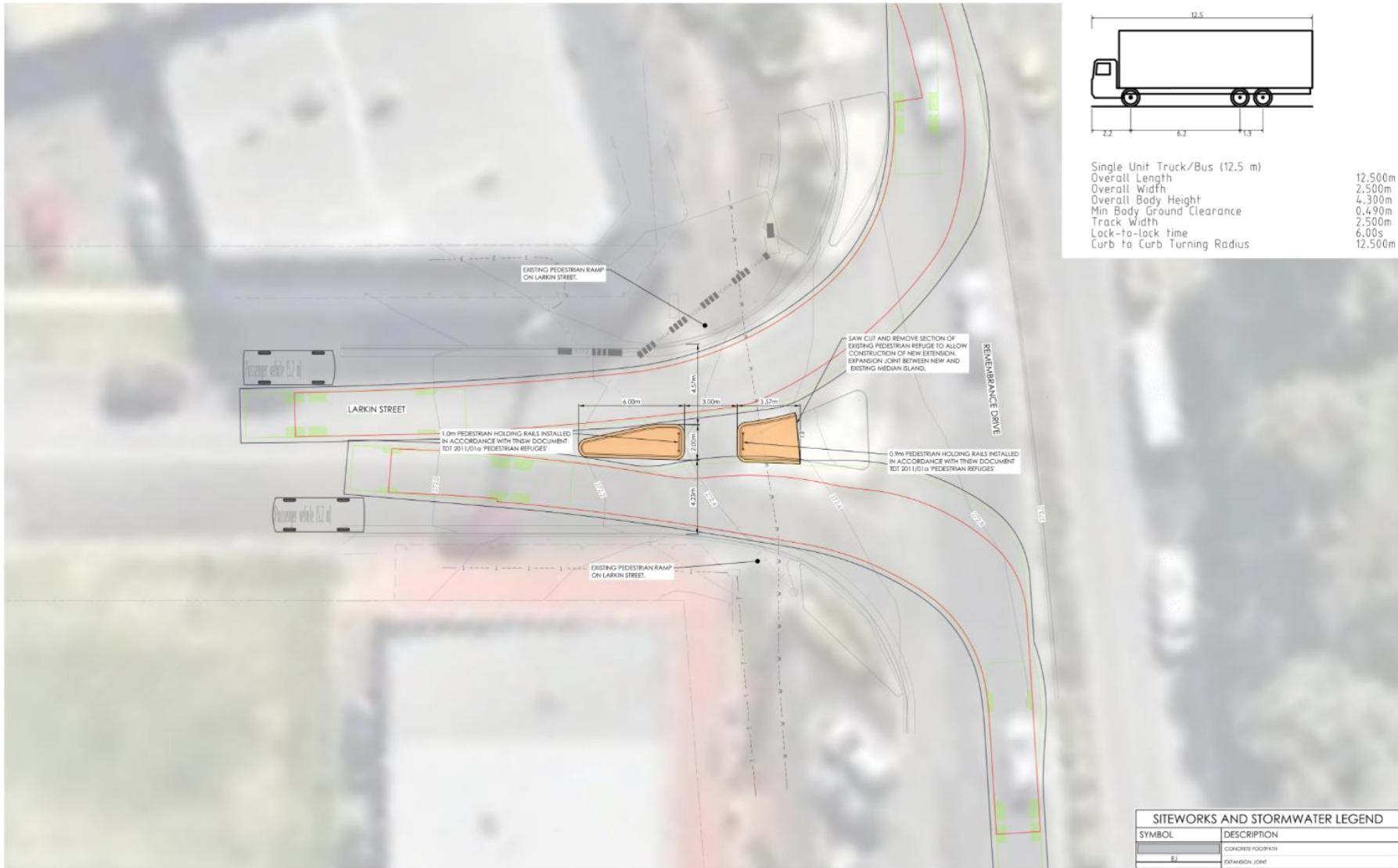


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING FILE
SITWORKS AND STORMWATER PLAN

PROJECT
TAHMOOR PUBLIC DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DRAWN BY DM
DATE NOV 2021
SHEET NO 1
SCALE 1:150
PROJECT NO N0210873
C4900



Single Unit Truck/Bus (12.5 m)	12.500m
Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.490m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

SITEWORKS AND STORMWATER LEGEND	
SYMBOL	DESCRIPTION
	CONCRETE FOOTPATH
	EXPANSION JOINT

SITEWORKS AND STORMWATER PLAN
SCALE 1:100



NOT TO BE USED FOR CONSTRUCTION			
AMOUNT	DATE	DESCRIPTION	BY
4	30.06.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM

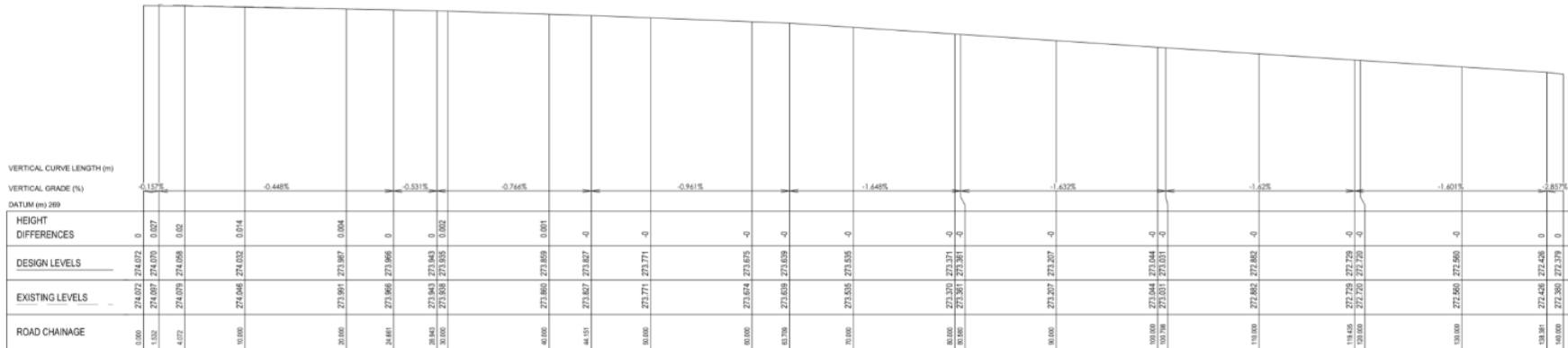


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SITEWORKS AND STORMWATER PLAN

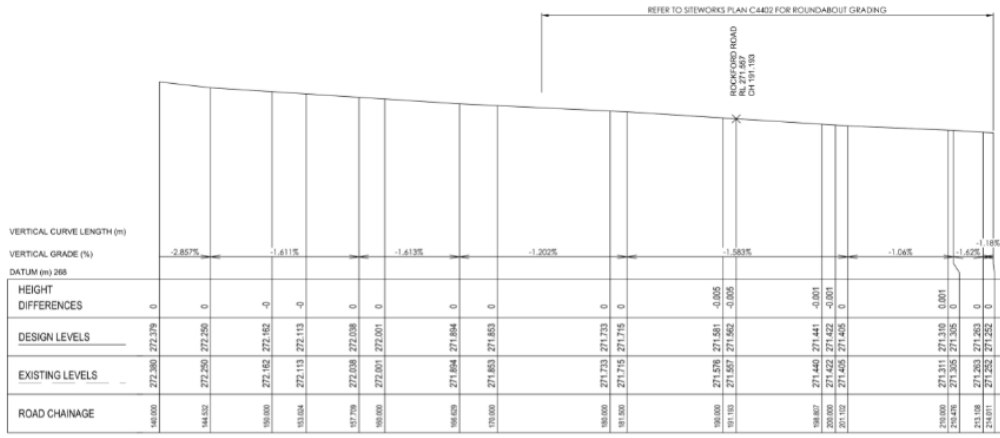
PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGN DRAWN BY DM
DATE NOV 2021
SCALE 1:100
PROJECT NO
N0210873
C4407



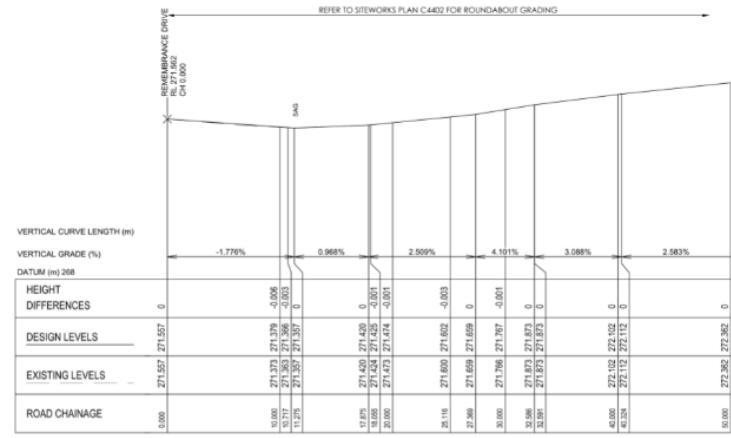
LONGITUDINAL SECTION REMEMBRANCE DRIVE

SCALE 1:200 (HOR)
1:50 (VER)



LONGITUDINAL SECTION REMEMBRANCE DRIVE

SCALE 1:200 (HOR)
1:50 (VER)



LONGITUDINAL SECTION ROCKFORD ROAD

SCALE 1:200 (HOR)
1:50 (VER)



AMCT	DATE	DESCRIPTION	BY
4	30.04.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM

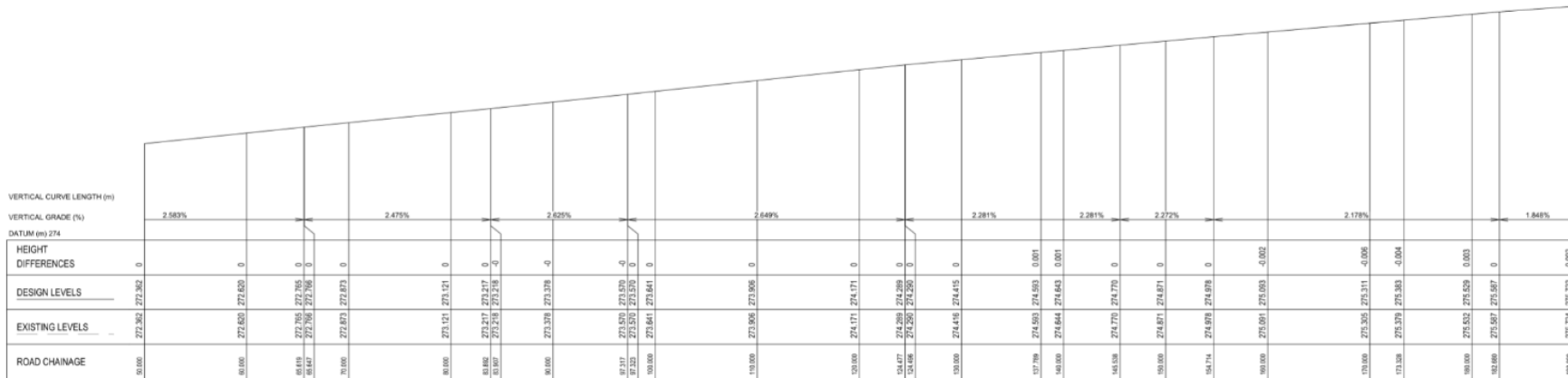


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
ROAD LONGITUDINAL

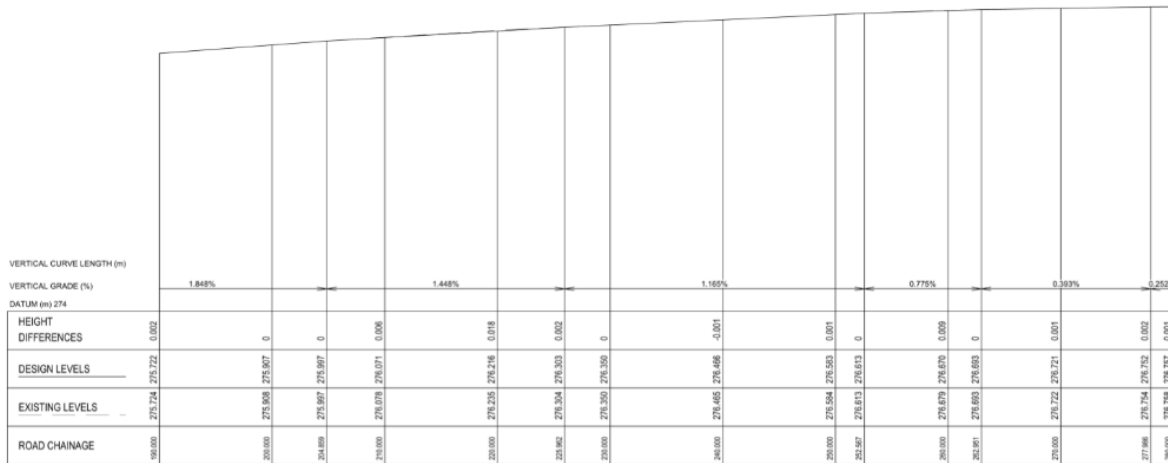
PROJECT
TAHMOOR PUBLIC DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGN DRAWN
DATE NOV 2021
DWG NO N0210873
SCALE: ALL DIMENSIONS
PRODUCT C4500



LONGITUDINAL SECTION ROCKFORD ROAD

SCALE 1:200 (HOR)
1:50 (VER)



LONGITUDINAL SECTION ROCKFORD ROAD

SCALE 1:200 (HOR)
1:50 (VER)

AMCT	DATE	DESCRIPTION	BY
4	30.04.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

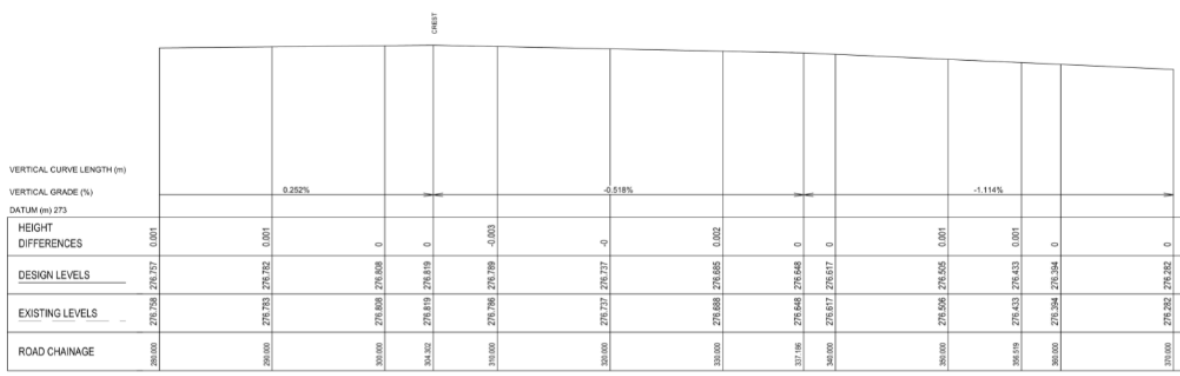
DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
ROAD LONGITUDINAL

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



PROJECT DETAILS
DESIGN NO
DRAWN BY
DATE
DRC NO
SCALE
PROJECT

NO210873
A1
WJN



LONGITUDINAL SECTION ROCKFORD ROAD
SCALE 1:200 (HOR)
1:50 (VER)

NOT TO BE USED FOR CONSTRUCTION			
AMCT	DATE	DESCRIPTION	BY
2	30.04.22	ISSUED FOR COUNCIL APPROVAL	Dm



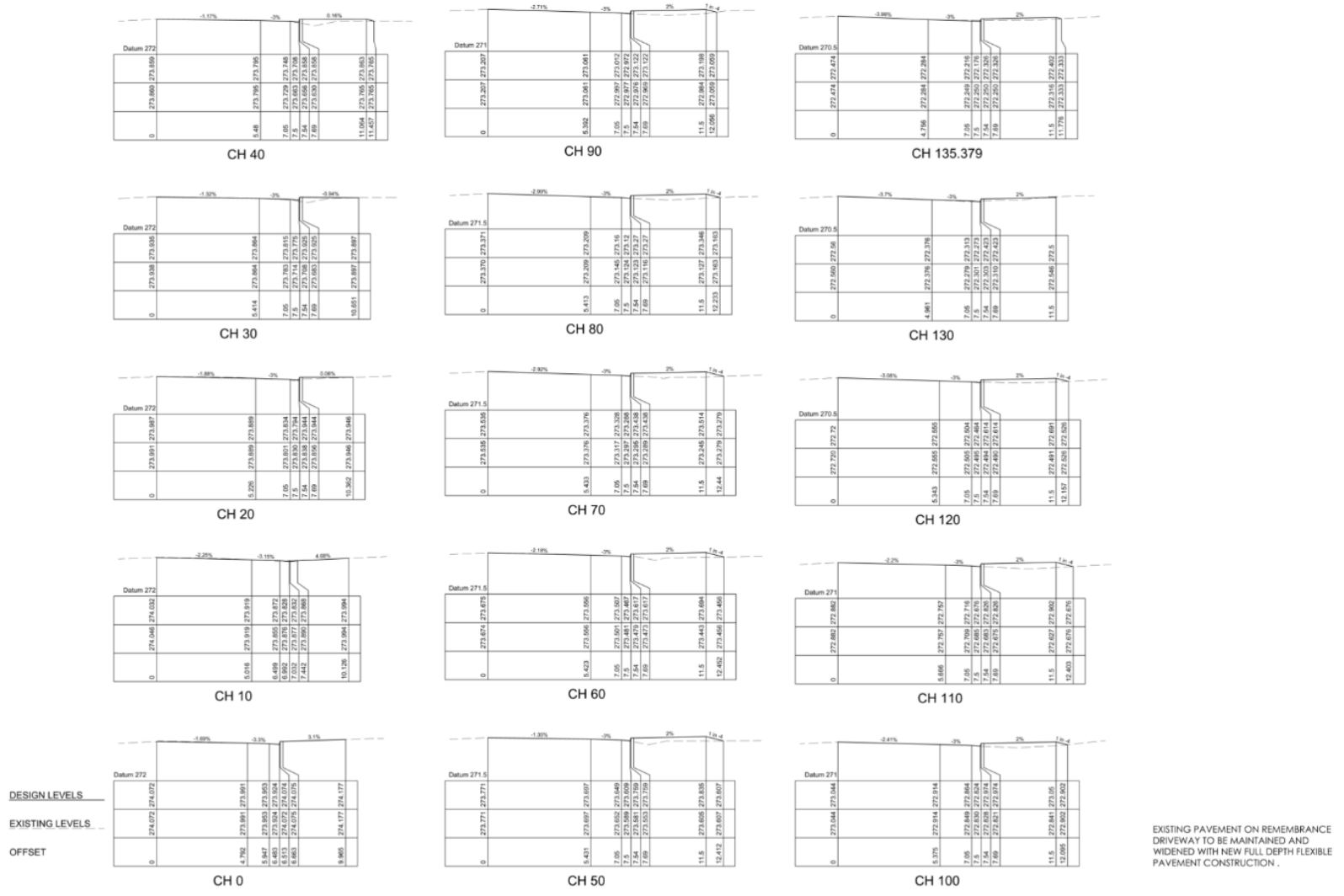
CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DROPLINE
CIVIL DESIGN
DRAWING TITLE
ROAD LONGITUDINAL

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



PROJECT DETAILS
 DESIGN: DM
 DRAWN: DM
 DATE: 14/6/22
 DWG. SIZE: A1
 SCALE: AS SHOWN
 PROJECT: N0210873
 C4500



REMEMBRANCE DRIVE CROSS SECTIONS
SCALE 1:100

EXISTING PAVEMENT ON REMEMBRANCE DRIVEWAY TO BE MAINTAINED AND WIDENED WITH NEW FULL DEPTH FLEXIBLE PAVEMENT CONSTRUCTION.



NOT TO BE USED FOR CONSTRUCTION			
AMCT	DATE	DESCRIPTION	BY
4	30.04.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM

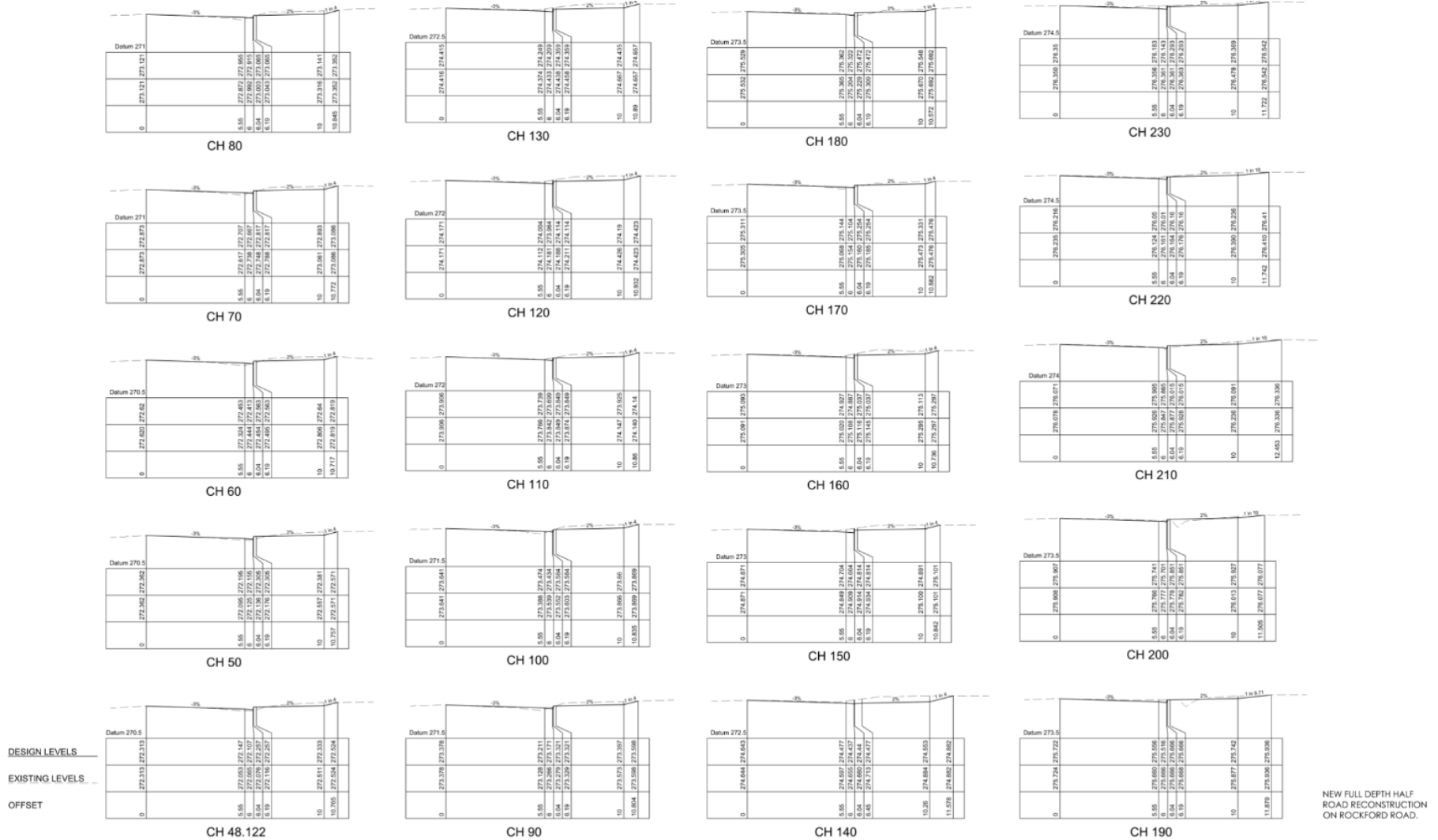


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
ROAD CROSS SECTIONS

PROJECT
TAHMOOR PUBLIC DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DRAWN BY
DATE
NOV 2021
SCALE
1:100
PROJECT
N0210873
C4510



ROCKFORD ROAD CROSS SECTIONS

SCALE 1:100



NOT TO BE USED FOR CONSTRUCTION		
AMCT	DATE	DESCRIPTION
4	30.04.22	ISSUED FOR COUNCIL APPROVAL
3	21.04.22	ISSUED FOR COUNCIL APPROVAL
2	19.01.22	ISSUED FOR COUNCIL APPROVAL

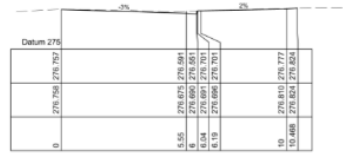


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

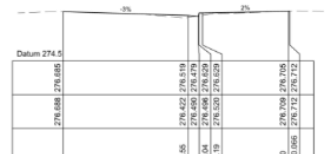
DROPPED
CIVIL DESIGN
DRAWING TITLE
ROAD CROSS SECTIONS

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

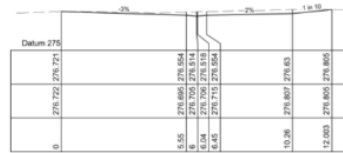
PROJECT DETAILS
 DESIGN DRAWN BY
 DATE NOV 2021
 DRC DATE A1
 SCALE 1:100
 PROJECT N0210873
 C4511



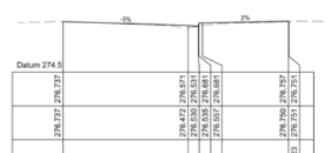
CH 280



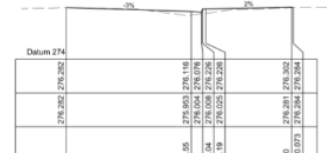
CH 330



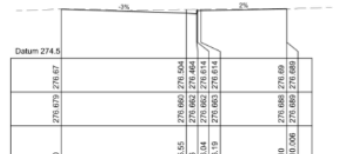
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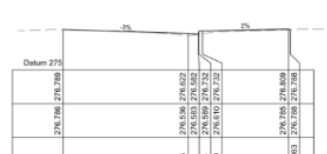
CH 320



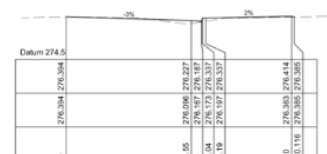
CH 370



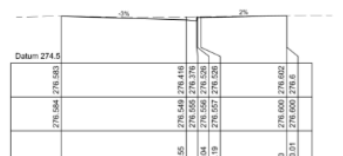
CH 260



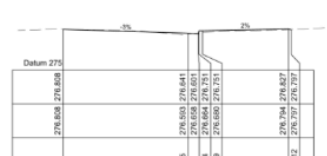
CH 310



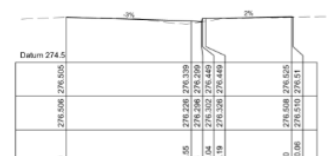
CH 360



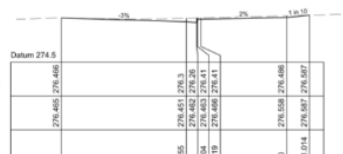
CH 250



CH 300



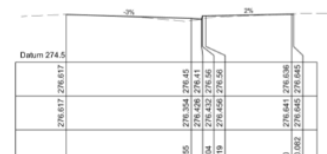
CH 350



CH 240



CH 290



CH 340

DESIGN LEVELS
EXISTING LEVELS
OFFSET

ROCKFORD ROAD CROSS SECTIONS

SCALE 1:100

NEW FULL DEPTH HALF ROAD RECONSTRUCTION ON ROCKFORD ROAD.

NOT TO BE USED FOR CONSTRUCTION		
AMCT	DATE	DESCRIPTION
4	30.04.22	ISSUED FOR COUNCIL APPROVAL
3	21.04.22	ISSUED FOR COUNCIL APPROVAL
2	19.01.22	ISSUED FOR COUNCIL APPROVAL



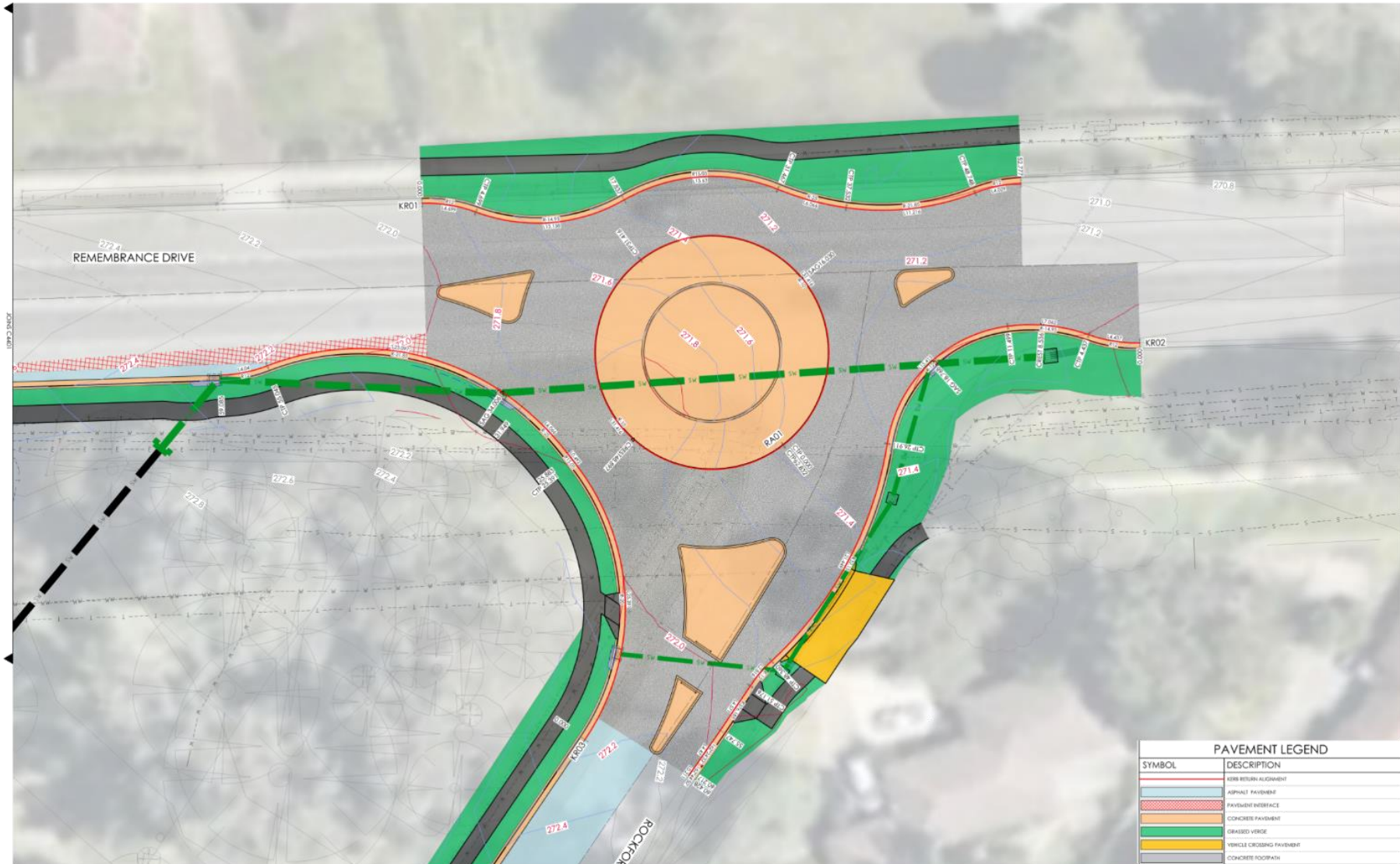
CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DROPLINE
CIVIL DESIGN
DRAWING TITLE
ROAD CROSS SECTIONS

PROJECT
TAHMOOR PUBLIC DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



PROJECT DETAILS
 LEGION DRAWN BY DM
 DATE NOV 2021
 DRG. NO. N0210873
 SCALE 1:100
 PROJECT C4510



KERB RETURN LAYOUT PLAN
SCALE 1:150



NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY
2	30.06.22	ISSUED FOR COUNCIL APPROVAL	DM

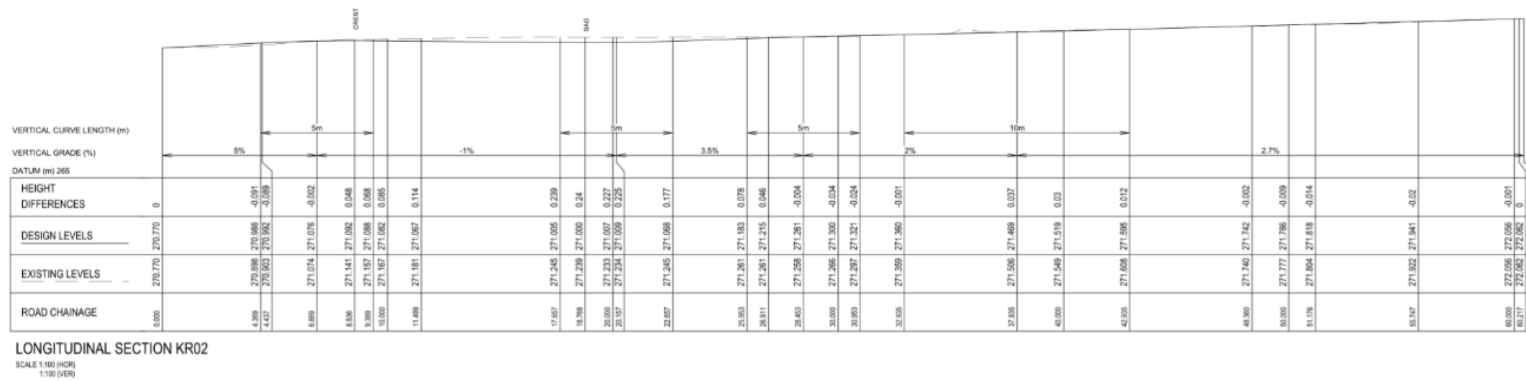
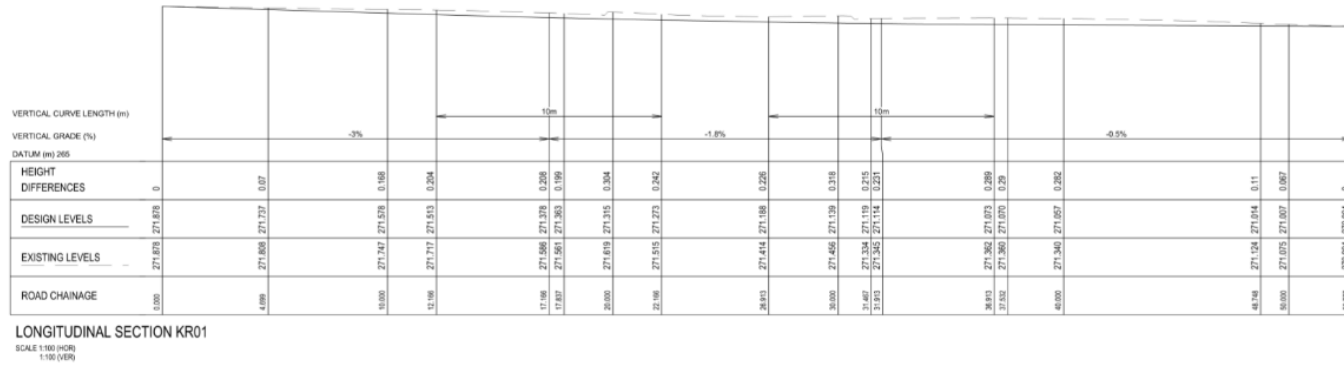


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DROPLINE
CIVIL DESIGN
DRAWING TITLE
KERB RETURN LAYOUT

PROJECT
TAHMOOR PUBLIC DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
 DESIGN: DM
 DRAWN: DM
 DATE: 14/6/2022
 DROPLINE: A1
 SCALE: 1:150
 PROJECT: N0210873
 C4550



NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY
2	30.04.22	ISSUED FOR COUNCIL APPROVAL	Dm



CLIENT
WYVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DROPLINE
CIVIL DESIGN
DRAWING TITLE
KERB RETURN LONGITUDINAL

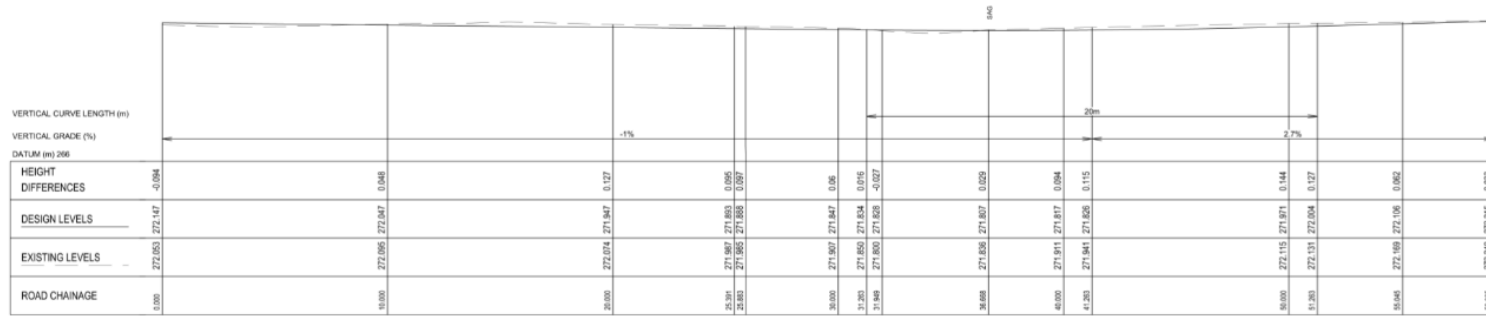
PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



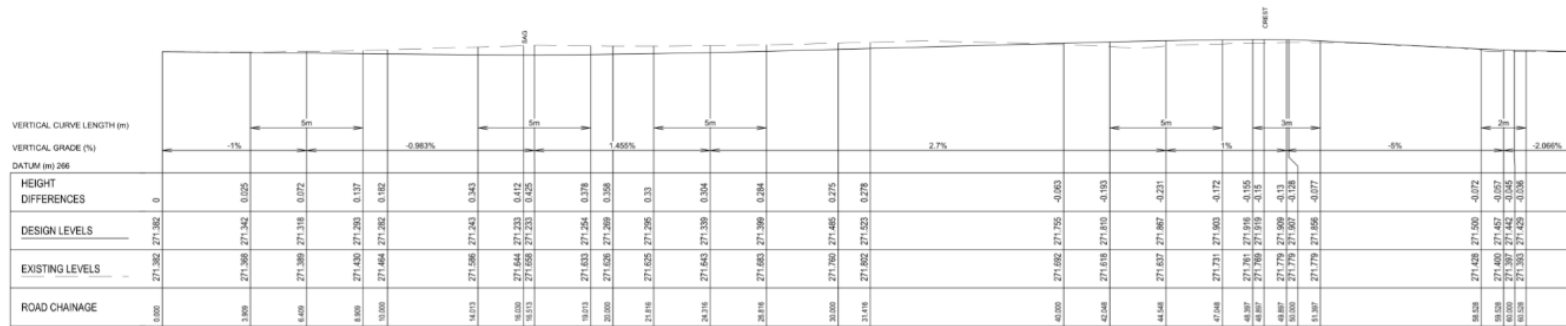
PROJECT DETAILS
EARTHWORKS
DRAWN BY
SCALE
DROPLINE
PROJECT

DM
DM
A1
1:100
SA

N0210873
C4551



LONGITUDINAL SECTION KR03
SCALE 1:100 (HOR)
1:100 (VER)



LONGITUDINAL SECTION RA01
SCALE 1:100 (HOR)
1:100 (VER)

NOT TO BE USED FOR CONSTRUCTION			
AMCTD	DATE	DESCRIPTION	BY
2	30.04.22	ISSUED FOR COUNCIL APPROVAL	DM



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DROPLINE
CIVIL DESIGN
DRAWING TITLE
KERB RETURN LONGITUDINAL

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



PROJECT DETAILS
DRAWN BY
SCALE
DRO. SIZE
ADDRESS
PROJECT

DM
A1
1:100
SA

N0210873
C4550



SITeworks AND STORMwater PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

AMCT#	DATE	DESCRIPTION	BY
4	30.06.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM

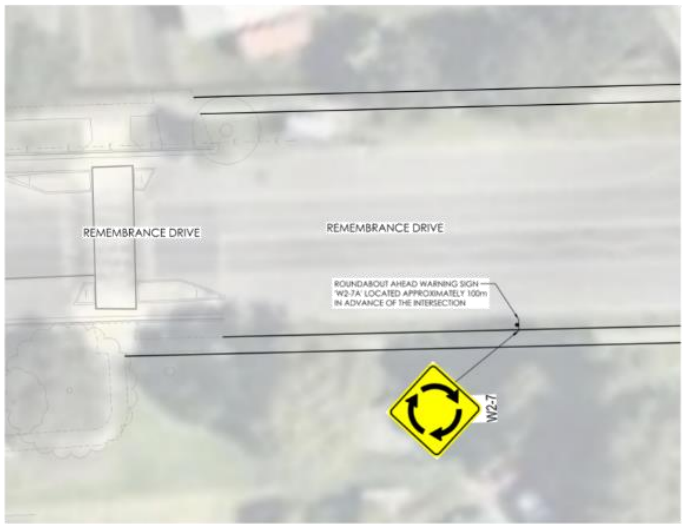
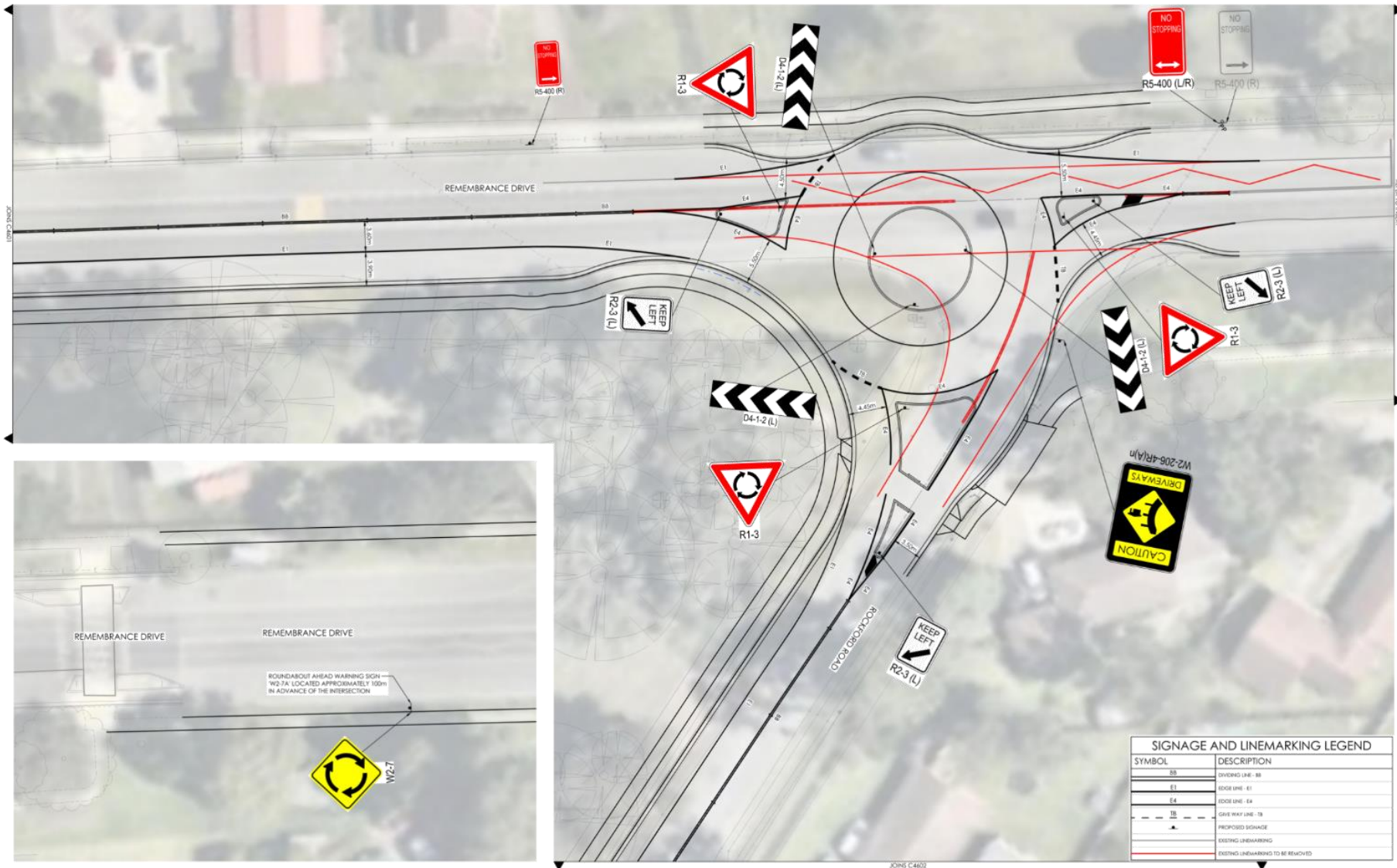


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SIGNAGE AND

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
 DESIGN: DM
 DRAWN: DM
 DATE: NOV 2021
 SHEET: 1 OF 1
 SCALE: 1:200
 PROJECT: SA
 N0210873
 C1400



INSERT
SCALE 1:200

SITWORKS AND STORMWATER PLAN
SCALE 1:200

SCALE 1:200

NOT TO BE USED FOR CONSTRUCTION

AMC#	DATE	DESCRIPTION	BY
4	29.06.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM



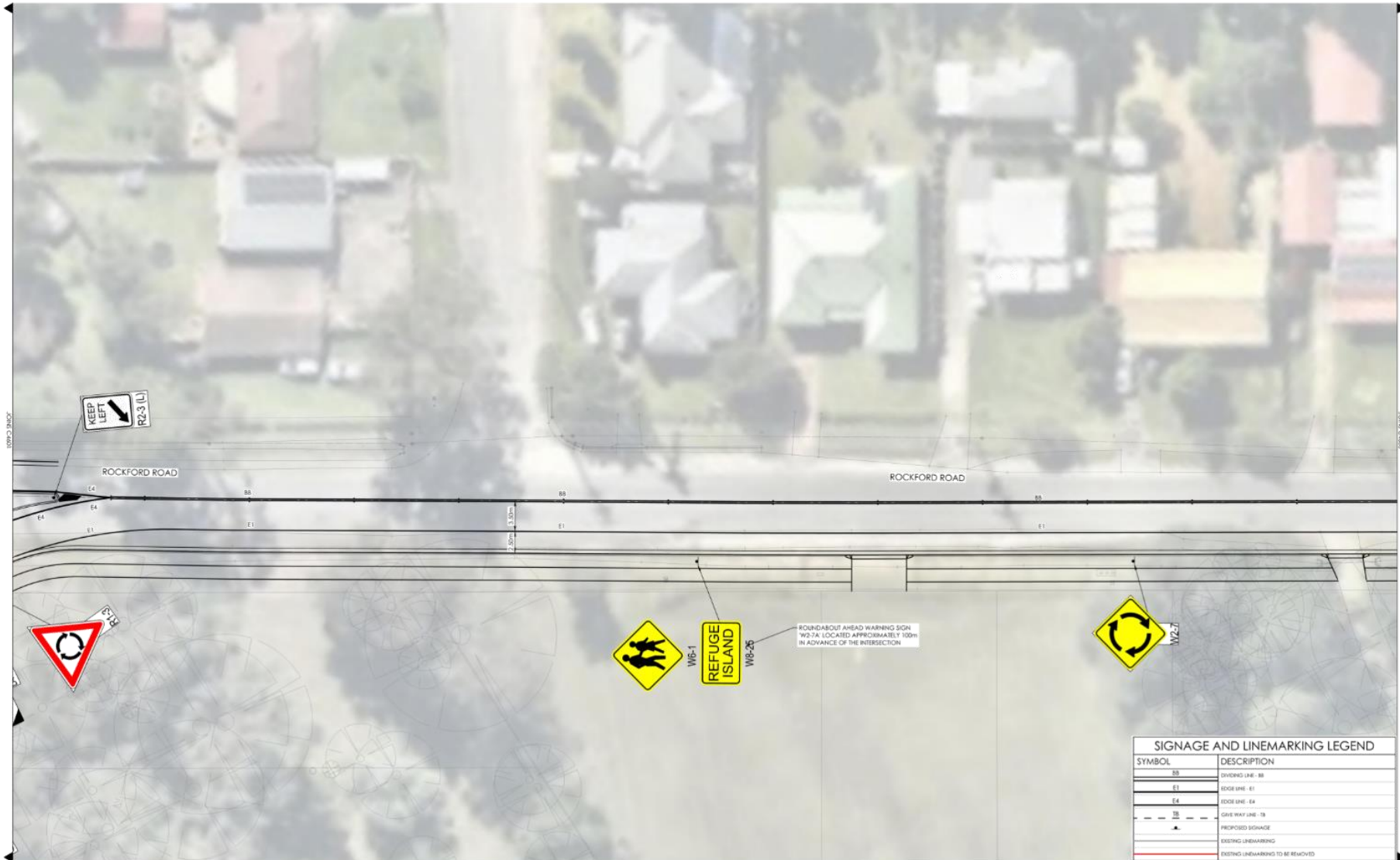
CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SIGNAGE AND

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DRAWN BY
DATE
SCALE
PROJECT

N0210873
C4/01



SITeworks AND STORMwater PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

AMC#	DATE	DESCRIPTION	BY
4	30.04.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
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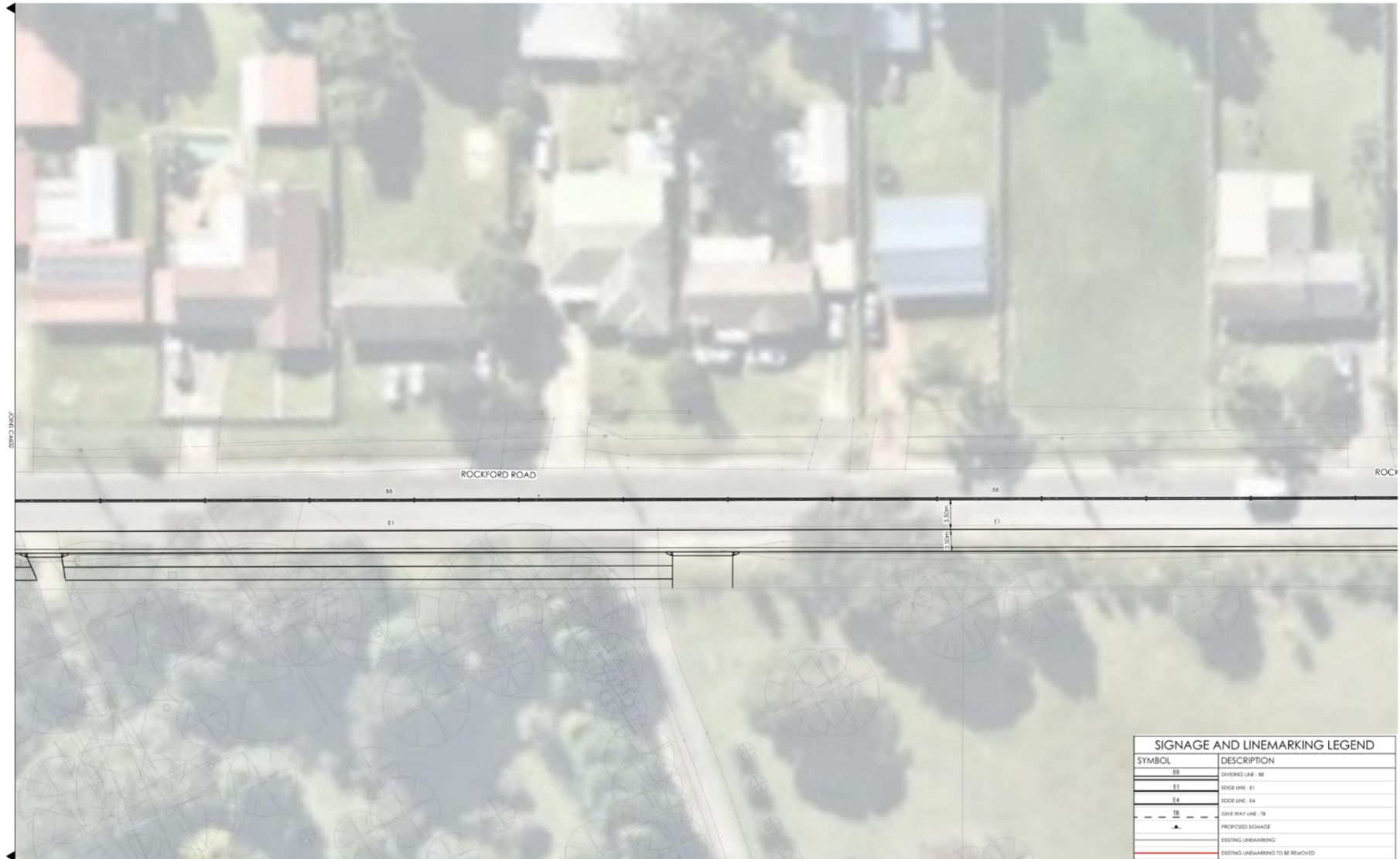


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SIGNAGE AND

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DRAWN: DM
DATE: NOV 2021
SCALE: A1
PROJECT: N0210873
C400



SIGNAGE AND LINEMARKING PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

AMC#	DATE	DESCRIPTION	BY
4	30.06.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM



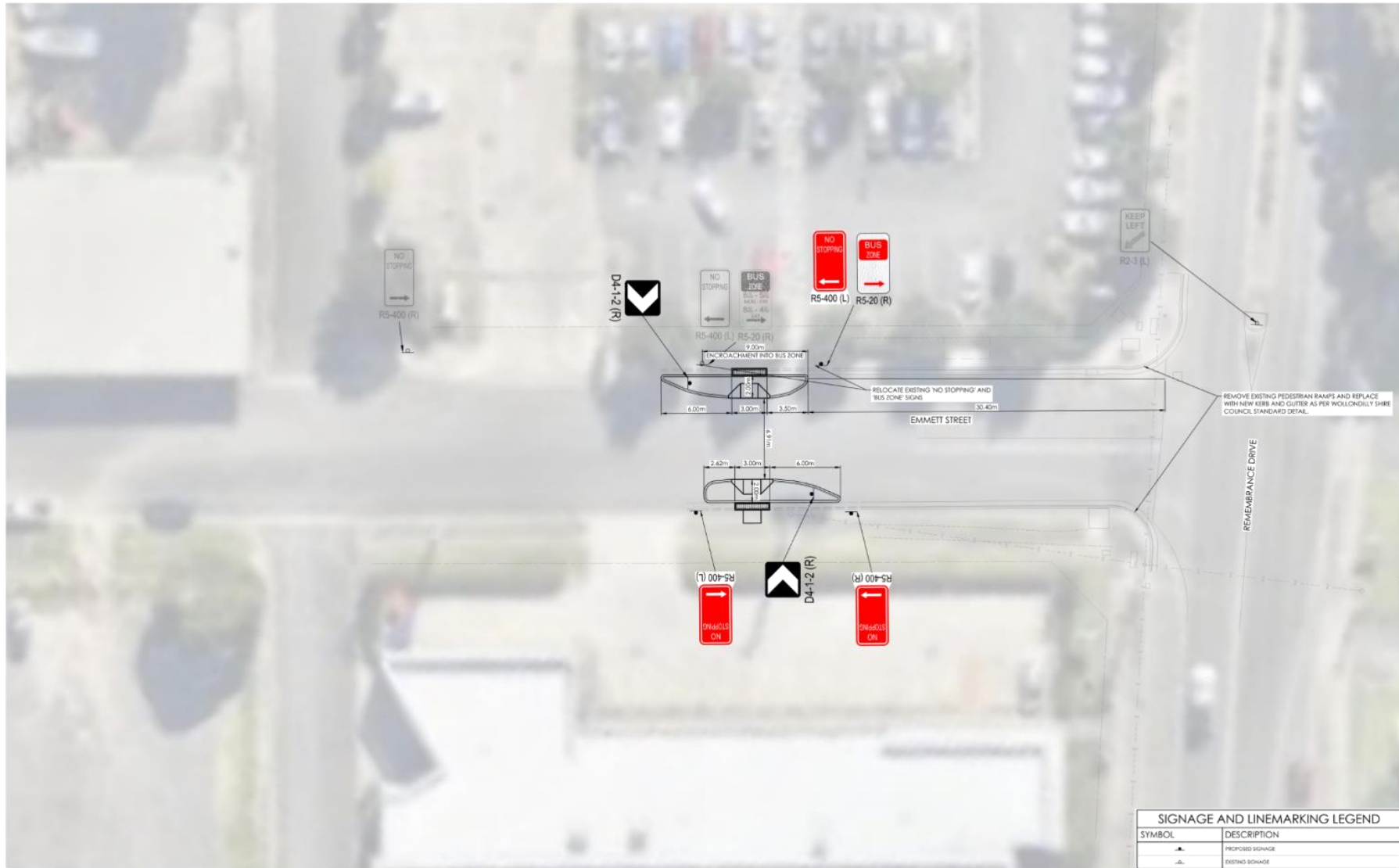
CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SIGNAGE AND

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGNER
DRAWN
DATE
SCALE
PROJECT

N0210873
C1402



SIGNAGE AND LINEMARKING PLAN
SCALE 1:150



NOT TO BE USED FOR CONSTRUCTION

AMOUNT	DATE	DESCRIPTION	BY
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2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM

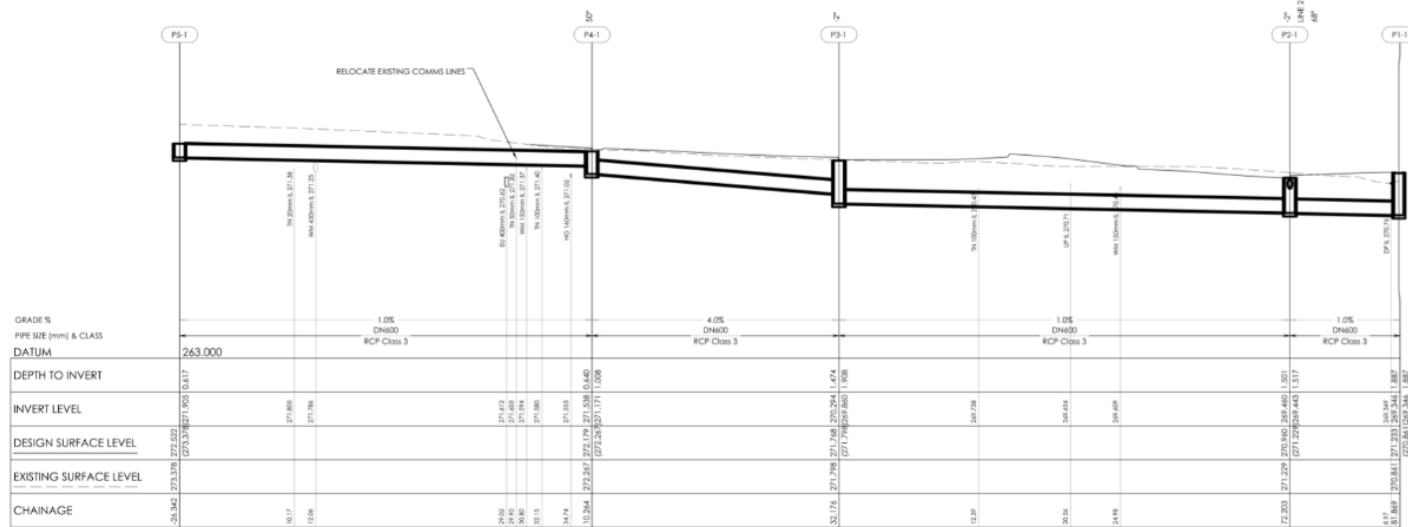


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

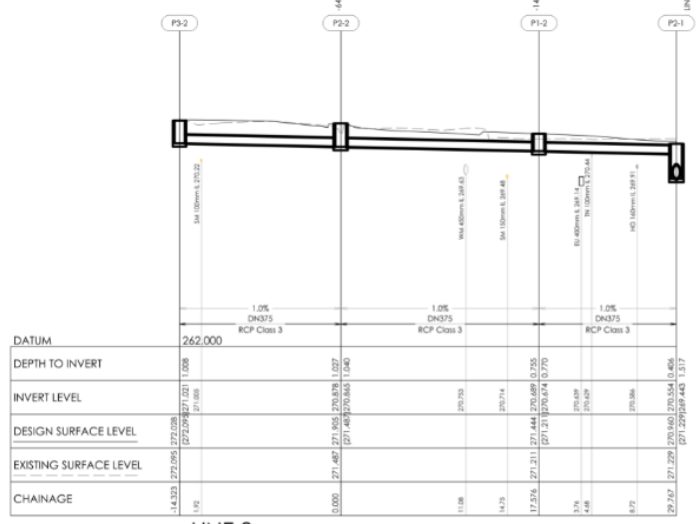
DROPLINE
CIVIL DESIGN
DRAWING TITLE
SIGNAGE AND

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGN: DM
DRAWN: DM
DATE: NOV 2021
SHEET NO: 1
SCALE: 1:150
PROJECT: N0210873
C4101



LINE 1
HORIZONTAL SCALE: 1:200
VERTICAL SCALE: 1:100



LINE 2
HORIZONTAL SCALE: 1:200
VERTICAL SCALE: 1:100

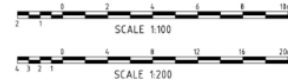
AMCT	DATE	DESCRIPTION	BY
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3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

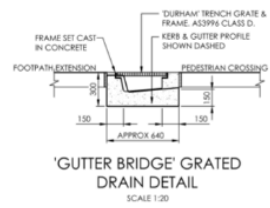
DROPLINE
CIVIL DESIGN
DRAWING TITLE
STORMWATER LONG

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

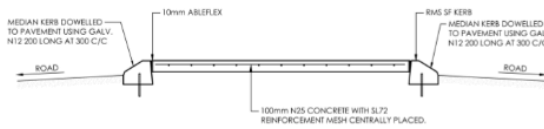


PROJECT DETAILS
DESIGN: DM
DRAWN: DM
DATE: NOV 2021
DROPS: A1
SCALE: A1 (3000)
PROJECT: WA

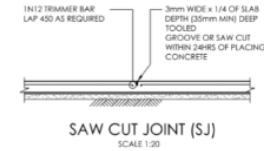
N0210873
C1700



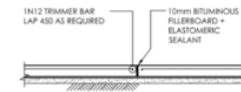
'GUTTER BRIDGE' GRATED DRAIN DETAIL
SCALE 1:20



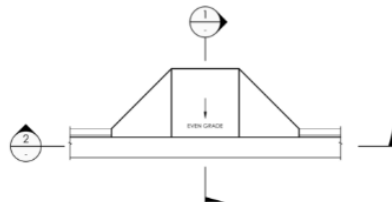
MIDBLOCK PEDESTRIAN REFUGE DETAIL
N.T.S.



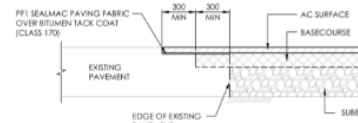
SAW CUT JOINT (SJ)
SCALE 1:20



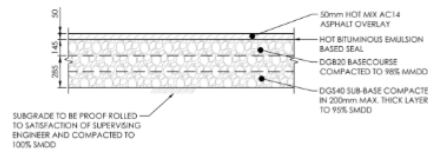
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SCALE 1:20



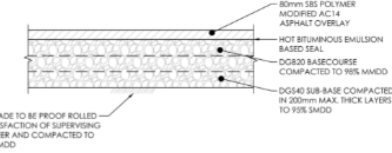
PRAM RAMP DETAIL
SCALE 1:50



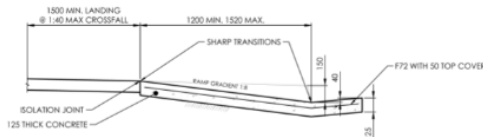
TYPICAL ROAD PAVEMENT JUNCTION WITH EXISTING PAVEMENTS
N.T.S.



BITUMEN PAVEMENT TYPICAL DETAIL
SCALE 1:20



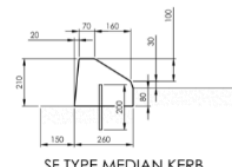
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SCALE 1:20



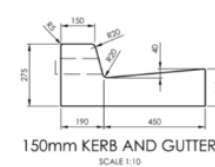
SECTION 1
1:20



SECTION 2
1:20

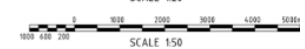


SF TYPE MEDIAN KERB
SCALE 1:10



150mm KERB AND GUTTER
SCALE 1:10

DETAILS SHOWN FOR REFERENCE ONLY.
REFER TO WOLLONDILLY SHIRE SPECIFICATIONS FOR FINAL CIVIL WORKS SPECIFICATIONS AND DOUGLAS PARTNERS PAVEMENT DESIGN REPORT FOR PAVEMENT DEPTHS AND DESIGNS.



AMCT#	DATE	DESCRIPTION	BY
4	30.06.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM

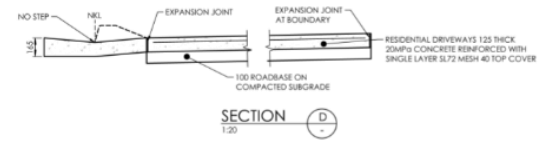
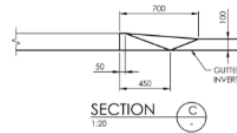
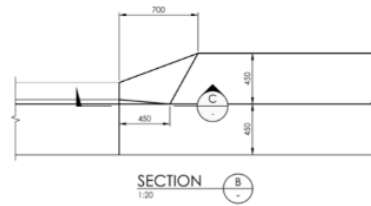
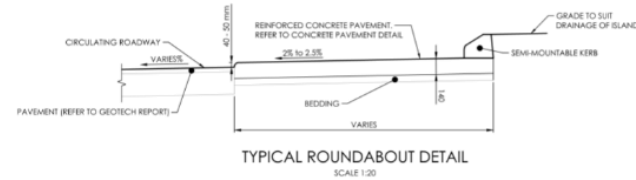
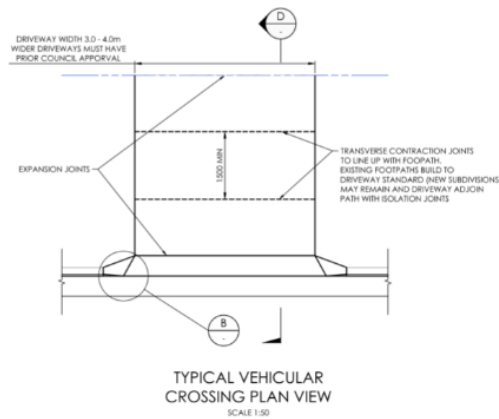


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DROPLINE
CIVIL DESIGN
DRAWING TITLE
TYPICAL DETAILS

PROJECT
TAHMOOR PUBLIC DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGN: DM
DRAWN: DM
DATE: NOV 2021
DRO. USE: A1
SCALE: AS SHOWN
PROJECT: N0210873
C4000



NOT TO BE USED FOR CONSTRUCTION			
AMCT	DATE	DESCRIPTION	BY
4	30.06.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM

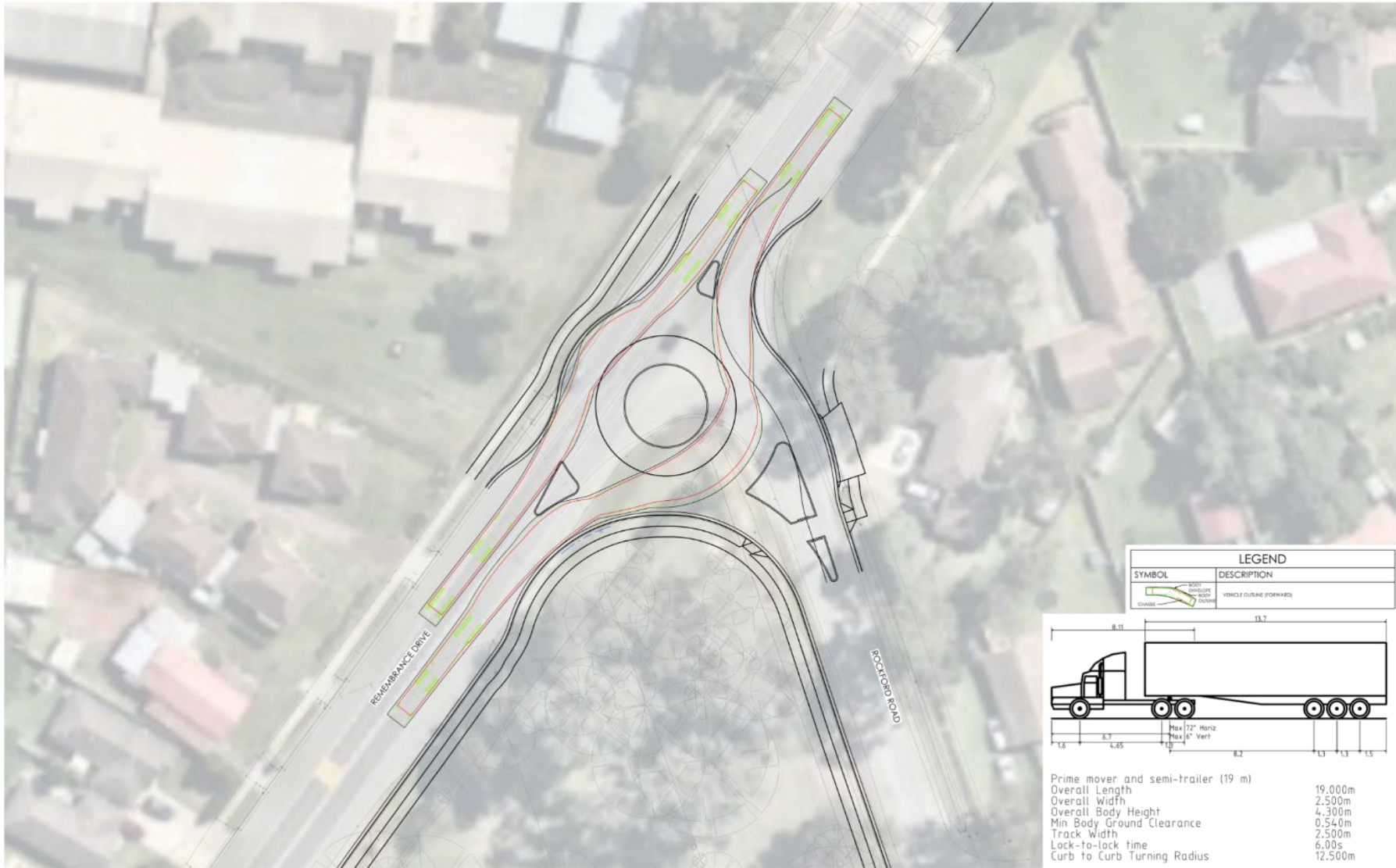


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
TYPICAL DETAILS

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGN
DRAWN
DATE
NOV 2021
DWG. NO.
A1
SCALE
A1 (3000x)
PROJECT
NO210873
C4001



VEHICLE SWEEP PATHS PLAN
SCALE 1:250

NOT TO BE USED FOR CONSTRUCTION			
AMOUNT	DATE	DESCRIPTION	BY
4	30.06.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
VEHICLE SWEEP PATHS

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



PROJECT DETAILS
DRAWING NO
DATE
SCALE
PROJECT

NO210873
A1
1:250
TAHMOOR



VEHICLE SWEEP PATHS PLAN
SCALE 1:250

NOT TO BE USED FOR CONSTRUCTION			
AMOUNT	DATE	DESCRIPTION	BY
4	30.06.22	ISSUED FOR COUNCIL APPROVAL	DM
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CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
VEHICLE SWEEP PATHS

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



PROJECT DETAILS
DRAWN BY
DATE
SCALE
PROJECT

DM
NOV 2021
1:250
TAHMOOR

N0210873
C4011



VEHICLE SWEEP PATHS PLAN
SCALE 1:250

NOT TO BE USED FOR CONSTRUCTION

AMC#	DATE	DESCRIPTION	BY
3	30.06.22	ISSUED FOR COUNCIL APPROVAL	DM
2	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
VEHICLE SWEEP PATHS

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



PROJECT DETAILS
DRAWING NO
DATE
SCALE
PROJECT

N0210873
C4010



SIGHT DISTANCE CHECK PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

AMC#	DATE	DESCRIPTION	BY
4	30.04.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM

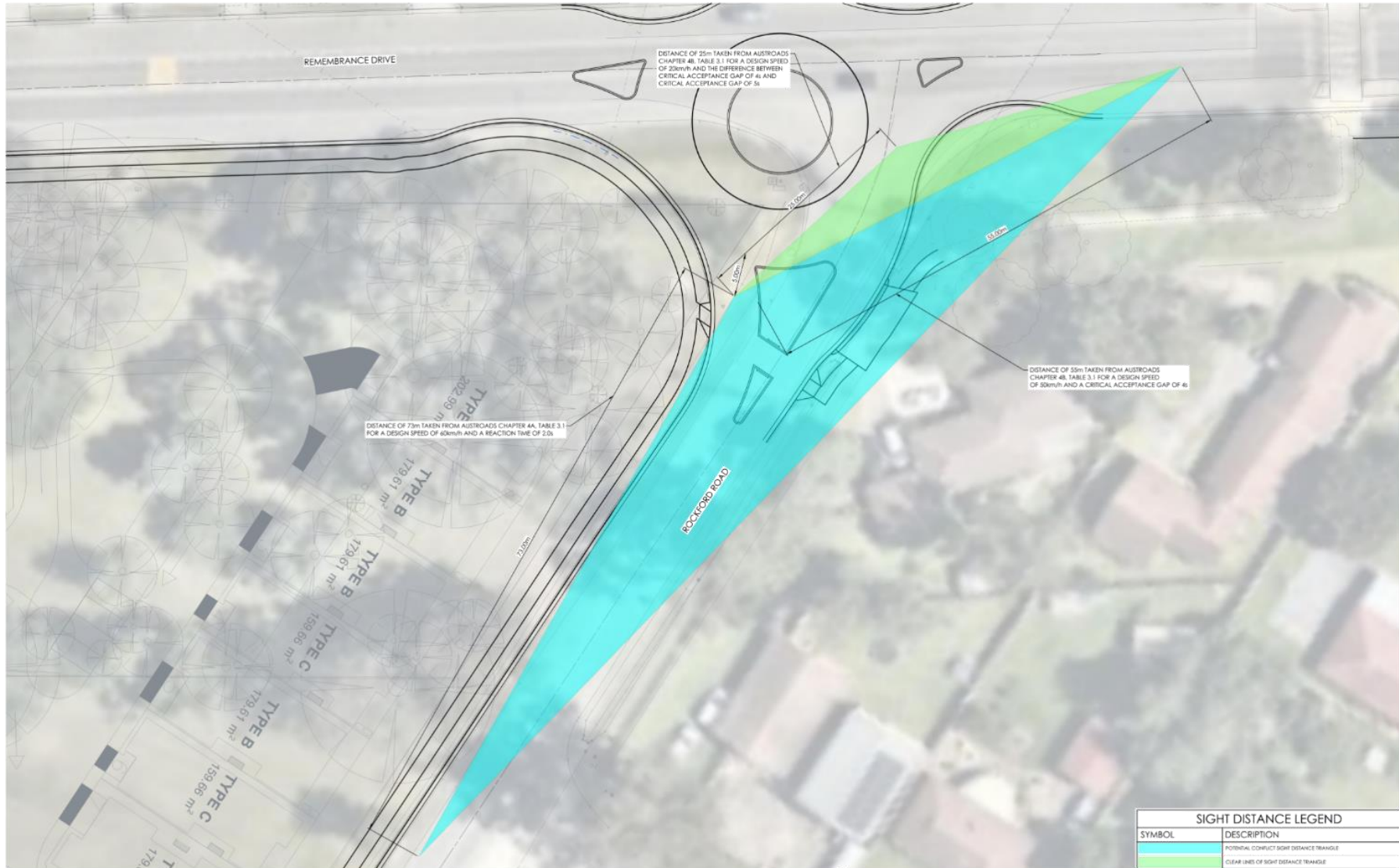


CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SIGHT DISTANCE

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGN
DRAWN
DATE
NOV 2021
SCALE
A1
PROJECT
NO210873
C4020



SIGHT DISTANCE LEGEND	
SYMBOL	DESCRIPTION
	POTENTIAL CONFLICT SIGHT DISTANCE TRIANGLE
	CLEAR LINES OF SIGHT DISTANCE TRIANGLE

SIGHT DISTANCE CHECK PLAN
SCALE 1:200



NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY
4	30.04.22	ISSUED FOR COUNCIL APPROVAL	DM
3	21.04.22	ISSUED FOR COUNCIL APPROVAL	DM
2	19.01.22	ISSUED FOR COUNCIL APPROVAL	DM



CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
SIGHT DISTANCE

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573

PROJECT DETAILS
DESIGN: DM
DRAWN: DM
DATE: NOV 2021
SHEET: 1 OF 1
SCALE: 1:200
PROJECT: SA
N0210873
C4021

STRATFORD GARDENS – PUBLIC ROAD WORKS NOTIFICATION


PUBLIC NOTIFICATION SUMMARY LETTER
REMEMBRANCE DRIVEWAY – ROCKFORD ROAD WORKS

Consultation Period: 17 May, 2022 – 14 June, 2022 via letter box drop

Public Feedback Summary

- No formal written response received, via email or post delivered
- No phone calls received
- Verbal discussions with numerous residents, businesses and school staff during the letter drop

Summary of Verbal Feedback Received

- The BP Service Station (Remembrance Driveway) manager noted the intersection is in desperate need of upgrade works and happy to see something finally happening. The manager described her drive to and from work as taking an excessive amount of time to turn left from Rockford Road in the morning and turn right to Rockford Road in the afternoon.
- Tahmoor Public School (Bronzewing Street and Remembrance Driveway) admin staff noted Rockford Road is in poor condition and needs a lot of work. Generally, the roundabout is a welcome upgrade.
- Tahmoor Public School principal noted the roundabout would force drivers to slow down as they approach, theoretically making the existing pedestrian crossing safer for students and the public.
- Proposed works were discussed with the resident of Unit 1 / 1 Rockford Road. The resident understood the proposed works would permit a left turn only when exiting the driveway on to Rockford Road. The resident understood he would need to access Remembrance Driveway via Hawkins Road and Stratford Road once the proposed works were complete. The resident understood and took no issue with the proposed modified access route.

The expected 30-week construction period was advised. The resident questioned if vehicle access would still be possible during construction; he was advised access may be modified at times but would still be available and he would be notified in advance. The resident was satisfied with this arrangement.

The residents of Unit 2 and Unit 3 of 1 Rockford Road were not home any time we tried to speak directly with them on 17/05/2022, 03/06/2022, and 01/07/2022

- 3 Rockford Road is a privately operated independent living house for adults with disabilities. At the time of visiting, 03/06/2022, a resident support worker on shift advised they had received the public notification letter and it had been passed to house management. No direct comment or issue was raised to her knowledge. The support worker advised it is only staff who drive from the house and didn't see any issue with the proposed roundabout works. She did ask that they be notified of any modified access arrangements during construction.

Additional discussions (01/07/2022) with the on-shift support worker noted support staff can park their vehicles on Ralfe Street and walk to the house for their shift. The support worker noted they have no residents with noise sensitivity issues and the proposed works should have minimal impact on their day-to-day routine.

- In discussion with Tahmoor Public School's site maintenance manager (01/07/2022) regarding the removal of the existing driveway on Remembrance Driveway it was agreed the loss of this driveway is not a significant issue for the school, but access to the gates is required.

It was advised the existing driveway & gates are used for collection of a large dumpster for green waste generated on site. The dumpster bin cannot be located anywhere else within the school grounds where it is clear of student. The dumpster is emptied approximately 5-6 times per year.

While the gate is not a pedestrian entry point, it is an emergency egress point for the school grounds and an emergency vehicle access point, when required.

To mitigate the loss of formal driveway access it was agreed the construction of a section of roll-kerb to facilitate emergency vehicle and waste truck access when necessary would be an acceptable outcome.

STRATFORD GARDENS – PUBLIC ROAD WORKS NOTIFICATION

**EMMETT STREET & LARKIN STREET ROAD WORKS**

Consultation Period: 14 June, 2022 – 28 June, 2022 via letter box drop

Public Feedback Summary

- 1 formal written objection received via email
- No post delivered written response received
- No phone calls received
- Verbal discussions with multiple businesses during the letter drop

Summary of Written Feedback Received

- Formal objection from Aldi (Emmett Street)

Discussions with Tahmoor Aldi Store Management and Area Manager identified the proposed centre of road pedestrian refuge island would not permit Aldi delivery trucks to turn on to left to Emmett Street from Rockford Road nor would it allow delivery trucks exiting Emmett Street turning left or right. Delivery trucks need to swing wide to make these corners.

This feedback was advised to Wollondilly Shire Council (Ben Gibbens) who advised traffic blisters to the edges of Emmett Street should be investigated. The current proposed traffic blister option was given to Tahmoor Aldi for comment. Aldi's national property team advised they are satisfied with the proposed design.

A copy of the correspondence with Aldi's national property team is included with this summary letter.

Summary of Verbal Feedback Received

- Verbal discussions during the letter drop were mostly indifferent or confused.
- Staff at The Personnel Group, Total Water Solutions, and Equissentials on Larkin Street were confused why Vivacity are responsible for the pedestrian island upgrade when Stratford Gardens is approximately 400m away.

These staff were also confused why any works are required to the existing pedestrian island given it was constructed within the last 12 months.

The following are included with this summary letter:

- Email correspondence with Aldi and their formal written objection to the preliminary Emmett Street design
- Remembrance Driveway & Rockford Road public notification letter
- Emmett Street & Larkin Street public notification letter
- NearMaps markup highlighting the businesses, residences, and schools notified of the proposed works

If you wish to discuss the public notification period and feedback received during this process please do not hesitate to contact me.

A handwritten signature in black ink, appearing to read "CH", with a stylized flourish extending to the right.

Chris Hanlon
Avid Project Management
01 JUNE, 2022

chris.hanlon@avidpm.com.au
0432 167 266



17 May, 2022

Reference: DA 2019/719/3

RE: Public Notification of Road Upgrades Remembrance Driveway & Rockford Road

Stratford Gardens is an approved seniors living village to be constructed at 20 Rockford Road, Tahmoor. Significant public road upgrades are required by Wollondilly Shire Council in conjunction with the approved development.

The public upgrade works include, but not wholly limited to:

- Road widening to Rockford Road and Remembrance Driveway.
- Construction of new vehicle crossings as shown in the attached drawings.
- Reconstruction and shaping of existing residential driveways as shown in the attached drawings.
- New concrete footpath to the eastern side of Rockford Road and southern side of Remembrance Driveway.
- Widening of concrete footpaths to Remembrance Driveway (both sides) adjacent the Bronzewing Street East intersection.
- Construction of one new roundabout and traffic calming islands at the Rockford Road / Remembrance Driveway intersection.
- Reshaping of Remembrance Driveway grass verges.
- New stormwater infrastructure.
- New AS1428.1 compliant wheelchair and pram accessible pedestrian ramps.

There are no proposed changes to the pedestrian crossing on Remembrance Driveway to Tahmoor Public School.

Public comment can be submitted to Avid Project Management. These comments will be reported back to Wollondilly Shire Council for consideration in their design approval process.

Chris Hanlon
0432 167 266
chris.hanlon@avidpm.com.au

PO Box 206
Carrington
NSW, 2294

If you require any additional information or would like to discuss the proposed road upgrades, please do not hesitate to contact us.

This public notification period will be open from Tuesday, May 17, 2022 – Tuesday, June 14, 2022.

Yours Faithfully,
AVID PROJECT MANAGEMENT PTY LTD

A handwritten signature in black ink, appearing to read "CH", written over a horizontal line.

Chris Hanlon
Project Manager



PUBLIC CONSULTATION PLAN



14 June, 2022

Reference: DA 2019/719/3

RE: Public Notification of Road Upgrades at Emmett Street & Larkin Street

Stratford Gardens is an approved seniors living village to be constructed at 20 Rockford Road, Tahmoor. Public road upgrades are required by Wollondilly Shire Council in conjunction with the approved development.

The public road upgrades include, but not wholly limited to:

- Construction of new traffic calming islands at Emmett Street to facilitate safer pedestrian crossing.
- Loss of 2 street parking spaces to Emmett Street (south side) to accommodate new traffic islands.
- Modification of the existing traffic island at the Larkin Street – Remembrance Driveway intersection to facilitate safer pedestrian crossing.
- Loss of 3 parallel parking spaces to Larkin Street to accommodate modified traffic island.
- New AS1428.1 compliant wheelchair and pram accessible pedestrian ramps.

Public comment can be submitted to Avid Project Management. These comments will be reported back to Wollondilly Shire Council for consideration in their design approval process.

Chris Hanlon
0432 167 266
chris.hanlon@avidpm.com.au

PO Box 206
Carrington
NSW, 2294

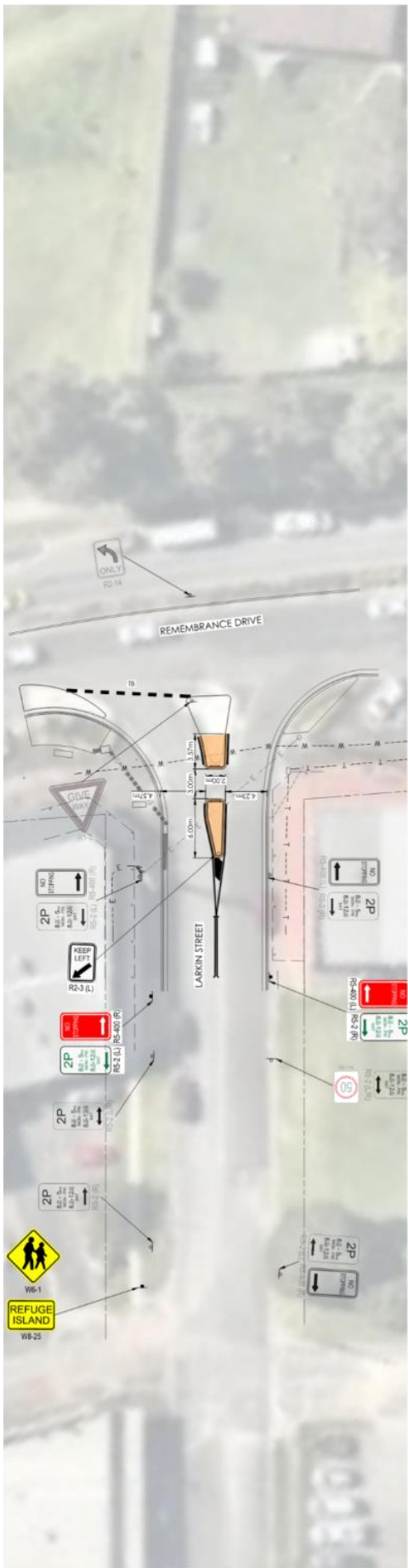
If you require any additional information or would like to discuss the proposed road upgrades, please do not hesitate to contact us.

This public notification period will be open from Tuesday, June 14, 2022 – Tuesday, June 28, 2022.

Yours Faithfully,
AVID PROJECT MANAGEMENT PTY LTD

A handwritten signature in black ink, appearing to read "CH", written over a horizontal line.

Chris Hanlon
Project Manager



PUBLIC CONSULTATION PLAN - LARKIN STREET



PUBLIC CONSULTATION PLAN - EMMETT STREET

SITWORKS AND STORMWATER LEGEND

SYMBOL	DESCRIPTION
	CONCRETE PAVEMENT
	CONCRETE FOOTPATH

**ALDI Stores**

(A Limited Partnership)
ABN 90 196 565 019

10 Burando Road, Prestons, NSW 2170, AUSTRALIA

PRESTONS REGION

Locked Bag 7055
Liverpool Retail
NSW 1871

Telephone: (02) 8783 3000
Facsimile: (02) 8783 3199

24 May 2022

Chris Hanlon
Avid Project Management Pty Ltd
PO Box 206
Carrington NSW 2294

Via email: chris.hanlon@avidpm.com.au

Dear Chris

**Re: ALDI Tahmoor - 153-159 Remembrance Driveway, Tahmoor NSW
Proposed Pedestrian Refuge Island on Emmett Street, Tahmoor**

Thank you for reaching out to ALDI in respect of the proposed development in Emmett Street, Tahmoor which includes the installation of a pedestrian refuge island.

As you would understand any installation of this nature in Emmett Street could, and does, have a large impact on ALDI deliveries as a result of the ALDI truck swept path being impeded.

You will see from the attached truck swept paths that both options which have been suggested will impede the ALDI deliveries. Option 1 impedes the truck entering into Emmett Street from Remembrance Driveway, option 2 impedes the truck exiting from the ALDI loading dock/carpark onto Emmett Street when returning to Remembrance Driveway.

Any degradation of the existing ALDI delivery conditions is obviously unacceptable to ALDI. As such, should either pedestrian refuge island option be included in the proposed development, ALDI will have no alternative but to strongly object to the development.

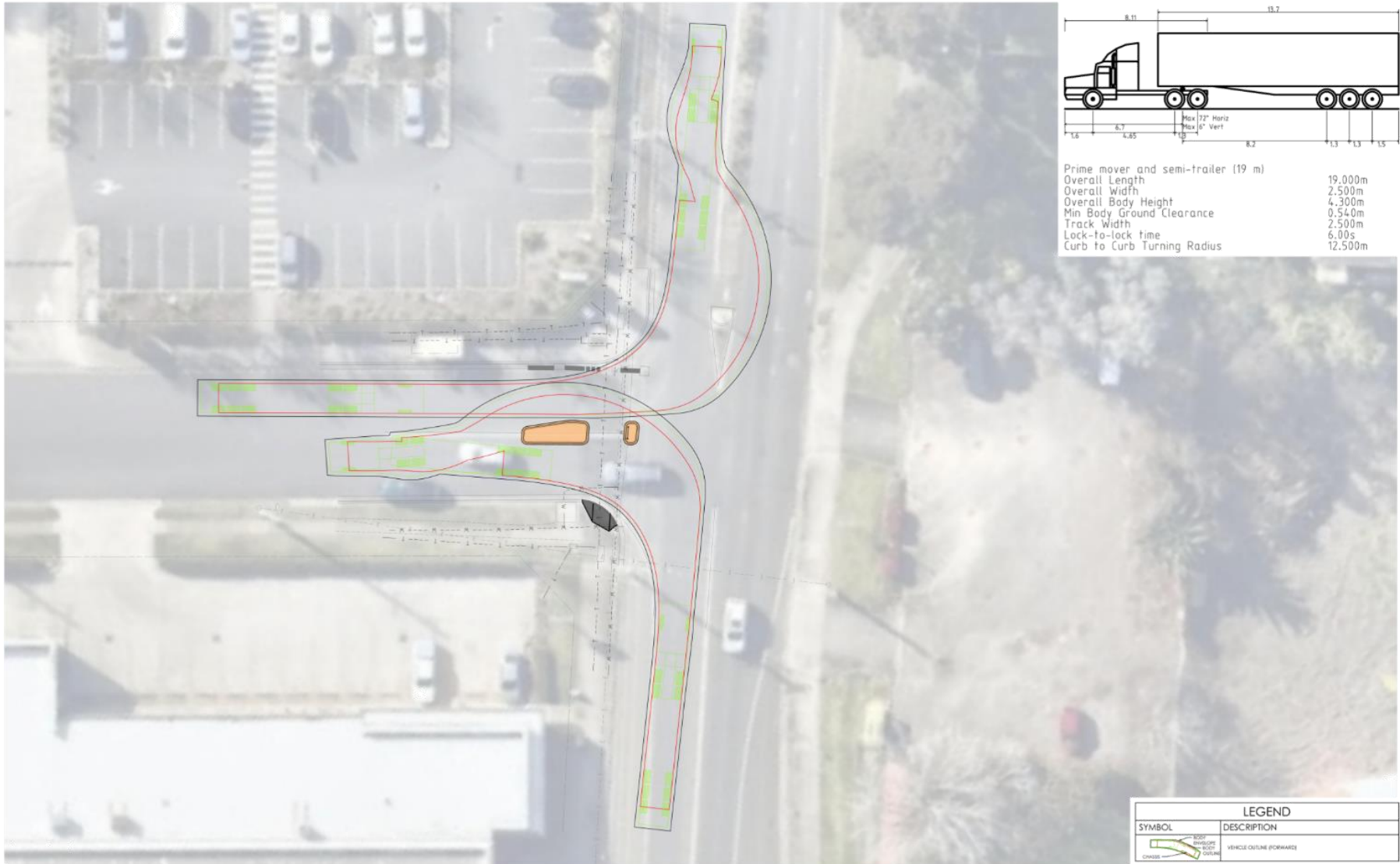
Please do not hesitate to contact me if you require any further information on 02 8783 3170.

Yours sincerely

ALDI Stores

A handwritten signature in blue ink, appearing to read 'Brendan Smith', written over a light blue grid background.

Brendan Smith
Director - Property



EMMETT STREET VEHICLE SWEEP PATHS PLAN
SCALE 1:150

NOT TO BE USED FOR CONSTRUCTION

AMCT	DATE	DESCRIPTION	BY



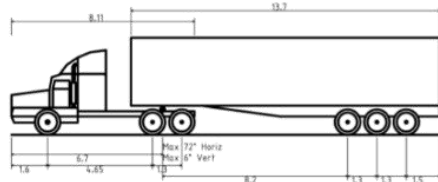
CLIENT
VIVACITY PROPERTY PTY LTD
STATUS
PRELIMINARY

DISCIPLINE
CIVIL DESIGN
DRAWING TITLE
EMMETT STREET VEHICLE SWEEP

PROJECT
TAHMOOR PUBLIC
DOMAIN WORKS
ADDRESS
TAHMOOR, NSW, 2573



PROJECT DETAILS
DRAWING NO: N0210873
DATE: 11/07/22
SCALE: 1:150
PROJECT: SA



Prime mover and semi-trailer (19 m)
 Overall Length 19.000m
 Overall Width 2.500m
 Overall Body Height 4.300m
 Min Body Ground Clearance 0.540m
 Track Width 2.500m
 Lock-to-lock time 6.00s
 Curb to Curb Turning Radius 12.500m

EMMETT STREET ALTERNATE CROSSING PLAN
 SCALE 1:150



NOT TO BE USED FOR CONSTRUCTION

AMDT	DATE	DESCRIPTION	BY



CLIENT
 VIVACITY PROPERTY PTY LTD
 STATUS
 PRELIMINARY

DISCIPLINE
 CIVIL DESIGN
 DRAWING TITLE
 EMMETT STREET ALTERNATE

PROJECT
 TAHMOOR PUBLIC
 DOMAIN WORKS
 ADDRESS
 TAHMOOR, NSW, 2573

PROJECT DETAILS
 DRAWN BY
 DATE MAY 2022
 SCALE 1:150
 SHEET 1 OF 1
 N0210873
 SK 402

Chris Hanlon

From: Kyle, Belinda (PRE/EMPROP) <Belinda.Kyle@aldi.com.au>
Sent: Friday, 10 June 2022 4:09 PM
To: Chris Hanlon
Cc: Rodriguez, Joseph (PRE/EMSO); Smith, Brendan (PRE/DP)
Subject: RE: #47 Tahmoor Aldi - Proposed Pedestrian Refuge Island - Emmett Street

Categories: APM-CP327 Stratford Gardens Tahmoor

Hi Chris

Thanks for the additional information.

Let me know if you require anything further during your application.

Kind regards,
Belinda

Belinda Kyle
Executive Manager - Property

ALDI Stores (A Limited Partnership)
Property

10 Burando Road
Prestons, NSW 2170 Australia
Tel: 0427 193 787
Fax: +61 2 8783-3299

This email is sent by ALDI Stores (A Limited Partnership) ABN 90 196 565 019 whose registered address is 1 Sargents Rd, Minchinbury, NSW 2770, Australia. This message including the enclosures is intended exclusively for the recipient(s) stated and can contain privileged, confidential or otherwise protected information. Should you receive this message in error, it is strictly prohibited for you to use, disseminate, forward, print or copy this message. Please inform the sender mentioned above and delete the message received.

 Save paper - think before you print

From: Chris Hanlon <chris.hanlon@avidpm.com.au>
Sent: Friday, 10 June 2022 9:53 AM
To: Kyle, Belinda (PRE/EMPROP) <Belinda.Kyle@aldi.com.au>
Cc: Rodriguez, Joseph (PRE/EMSO) <joseph.rodriguez@aldi.com.au>; Smith, Brendan (PRE/DP) <Brendan.Smith@aldi.com.au>
Subject: RE: #47 Tahmoor Aldi - Proposed Pedestrian Refuge Island - Emmett Street

Hi Belinda.

I've asked the Civil Engineer to confirm. He has provided the following:

- The remaining width of 6.91m between the two islands is sufficient to allow a 19m semi-trailer traveling north-west along Emmett Street and a bus travelling south-east along Emmett to pass through side by side.
- The inverse of this would not be possible as the truck leaving Aldi crosses the centreline of Emmett when it turns left out of their site. I note this is no different in the proposed compared to the existing though and the kerb blisters have a negligible impact on this.
- If buses do not pull up flush as expected along the Emmett kerb line and leave their rear end in the travel lane then it may be difficult for a semi-trailer to pass through without crossing the centreline. Whilst the new kerb median may increase this risk it is still a risk in the existing situation though and ultimately depends on the bus driver

With the above information I would say it's reasonable to assume there is minimal impact on the delivery capabilities for the Tahmoor store. There may be additional hazard perception requirements for the truck driver, but in my experience most drivers are very capable in confined urban streets similar to Emmett Street, so this shouldn't be a difficult arrangement for them.

I would say the frequency of a delivery truck and a bus trying to use this road simultaneously is quite low, so the risk is negligible.

If you have any additional concerns please let me know.

Thanks, Belinda.

Chris Hanlon
Avid Project Management Pty Ltd

PO Box 206, Carrington NSW 2294

T 02 4961 0635 M 0432 167 266 W avidpm.com.au



PROJECT MANAGEMENT SERVICES

From: Kyle, Belinda (PRE/EMPROP) <Belinda.Kyle@aldi.com.au>
Sent: Thursday, 9 June 2022 2:05 PM
To: Chris Hanlon <chris.hanlon@avidpm.com.au>
Cc: Rodriguez, Joseph (PRE/EMSO) <joseph.rodriguez@aldi.com.au>; Smith, Brendan (PRE/DP) <Brendan.Smith@aldi.com.au>
Subject: RE: #47 Tahmoor Aldi - Proposed Pedestrian Refuge Island - Emmett Street

Hi Chris

That seems to be a better option. Is it wide enough to allow an ALDI truck and school bus to pass each other at the same time? It is hard to tell in the attachment.

Kind regards,
Belinda

Belinda Kyle
Executive Manager - Property

ALDI Stores (A Limited Partnership)
Property

10 Burando Road
Prestons, NSW 2170 Australia
Tel: 0427 193 787
Fax: +61 2 8783-3299

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From: Chris Hanlon <chris.hanlon@avidpm.com.au>
Sent: Thursday, 9 June 2022 1:12 PM
To: Kyle, Belinda (PRE/EMPROP) <Belinda.Kyle@aldi.com.au>
Cc: Rodriguez, Joseph (PRE/EMSO) <joseph.rodriguez@aldi.com.au>; Smith, Brendan (PRE/DP) <Brendan.Smith@aldi.com.au>
Subject: RE: #47 Tahmoor Aldi - Proposed Pedestrian Refuge Island - Emmett Street

Hi Belinda.

Thanks for providing the objection letter for the previously proposed traffic island.

Attached is the current, Council preferred, design for the Emmett Street upgrades. This option does not obstruct delivery vehicle access to/from the Aldi delivery dock.

I'll be in Tahmoor next Tuesday (14/06) if you or anyone at the store would like to discuss the current proposed design.

Chris Hanlon
Avid Project Management Pty Ltd

PO Box 206, Carrington NSW 2294

T 02 4961 0635 M 0432 167 266 W avidpm.com.au



PROJECT MANAGEMENT SERVICES

From: Kyle, Belinda (PRE/EMPROP) <Belinda.Kyle@aldi.com.au>
Sent: Tuesday, 24 May 2022 5:56 PM
To: Chris Hanlon <chris.hanlon@avidpm.com.au>
Cc: Rodriguez, Joseph (PRE/EMSO) <joseph.rodriguez@aldi.com.au>; Smith, Brendan (PRE/DP) <Brendan.Smith@aldi.com.au>
Subject: RE: #47 Tahmoor Aldi - Proposed Pedestrian Refuge Island - Emmett Street

Hi Chris

Please see our letter attached. I hope you don't mind me using your swept paths.

Thanks.

Kind regards,
Belinda

Belinda Kyle
Executive Manager - Property

ALDI Stores (A Limited Partnership)
Property

10 Burando Road
Prestons, NSW 2170 Australia
Tel: 0427 193 787
Fax: +61 2 8783-3299

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From: Chris Hanlon <chris.hanlon@avidpm.com.au>

Sent: Tuesday, 24 May 2022 8:58 AM

To: Kyle, Belinda (PRE/EMPROP) <Belinda.Kyle@aldi.com.au>; Rodriguez, Joseph (PRE/EMSO) <joseph.rodriguez@aldi.com.au>

Subject: RE: #47 Tahmoor Aldi - Proposed Pedestrian Refuge Island - Emmett Street

Hi Belinda.

We have the meeting with Council's traffic department next Wednesday but require all drawings, documents, and letter for discussion in the meeting to be submitted by this Friday.

Apologies for the short notice – we only received the request late yesterday afternoon.

Chris Hanlon
Avid Project Management Pty Ltd

PO Box 206, Carrington NSW 2294

T 02 4961 0635 M 0432 167 266 W avidpm.com.au



PROJECT MANAGEMENT SERVICES

From: Kyle, Belinda (PRE/EMPROP) <Belinda.Kyle@aldi.com.au>

Sent: Monday, 23 May 2022 3:54 PM

To: Chris Hanlon <chris.hanlon@avidpm.com.au>

Subject: RE: #47 Tahmoor Aldi - Proposed Pedestrian Refuge Island - Emmett Street

Hi Chris

Thank you for the drawing. When do you require the letter for submission to Council?

Kind regards,
Belinda

Belinda Kyle
Executive Manager - Property

ALDI Stores (A Limited Partnership)
Property

10 Burando Road
Prestons, NSW 2170 Australia
Tel: 0427 193 787
Fax: +61 2 8783-3299

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From: Chris Hanlon <chris.hanlon@avidpm.com.au>
Sent: Monday, 23 May 2022 2:48 PM
To: Kyle, Belinda (PRE/EMPROP) <Belinda.Kyle@aldi.com.au>
Cc: Sallustio, Joseph (NSC AUS/EMP) <Joseph.Sallustio@aldi.com.au>
Subject: RE: #47 Tahmoor Aldi - Proposed Pedestrian Refuge Island - Emmett Street

Hi Belinda.

Thanks for getting back to me.

I've had our project engineers run the turning path for a delivery truck leaving the Aldi driveway, turning left on to Emmett Street. The attached drawing – SK403 – shows the delivery vehicle would not be able to exit the driveway without collision with the refuge island.

Then previous proposed location – attached drawing SK402 – demonstrates that a delivery vehicle coming from the south, turning left on to Emmett Street would also collide with the refuge island.

These two items are still in discussion with Wollondilly Shire Council, specifically with Ben Gibbons. We have requested feedback from them a number of times but have not received anything to date. I think a letter of objection to the proposed refuge islands from you would go a long way in pushing the process along with Council.

If you would like to discuss this or need any additional information, please let me know.

Thanks, Belinda.

Chris Hanlon
Avid Project Management Pty Ltd

PO Box 206, Carrington NSW 2294

T 02 4961 0635 **M** 0432 167 266 **W** avidpm.com.au



From: Kyle, Belinda (PRE/EMPROP) <Belinda.Kyle@aldi.com.au>
Sent: Thursday, 19 May 2022 1:35 PM
To: Chris Hanlon <chris.hanlon@avidpm.com.au>
Cc: Sallustio, Joseph (NSC AUS/EMP) <Joseph.Sallustio@aldi.com.au>
Subject: FW: #47 Tahmoor Aldi - Proposed Pedestrian Refuge Island - Emmett Street

Hi Chris

Joseph has provided me with your below email in relation to the proposed pedestrian island in Emmett Street. Thank you for reaching out to us in this regard.

We are currently reviewing this internally, but from initial review it seems that neither option is viable due to impeding the truck path. If you could provide the exit swept path drawing that would be great. The original drawing from our construction would be in archives.

Could you please let me know when you require our letter? Thanks.

Kind regards,
Belinda

Belinda Kyle
Executive Manager - Property

ALDI Stores (A Limited Partnership)
Property

10 Burando Road
Prestons, NSW 2170 Australia
Tel: 0427 193 787
Fax: +61 2 8783-3299

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From: Rodriguez, Joseph (PRE/EMSO) <joseph.rodriguez@aldi.com.au>
Sent: Wednesday, 18 May 2022 9:11 PM
To: Kyle, Belinda (PRE/EMPROP) <Belinda.Kyle@aldi.com.au>
Subject: #47 Tahmoor Aldi - Proposed Pedestrian Refuge Island - Emmett Street

Hi Belinda,

I hope you're well.

I've been contacted by a representative from AVID Project Management Chris Hanlon in regards to a proposed pedestrian refuge island to be built at Emmett Street in front of ALDI Tahmoor #47 (see below email).

Are you able to please confirm if this would impact ALDI negatively in particular the ability for deliveries to be made to the store if this were to proceed? If so is there some standard type of letter/correspondence that ALDI could use to address to the council to prevent this from occurring?

Kind regards,

Joseph Rodriguez
Executive Manager - Store Operations

ALDI Stores (A Limited Partnership)
Store Operations

10 Burando Road
Prestons, NSW 2170 Australia
Tel: 0419 321 750
Fax: +61 2 8783-3199

 Save paper - think before you print

 [Chat with me](#)

From: Chris Hanlon <chris.hanlon@avidpm.com.au>
Sent: Wednesday, 18 May 2022 2:02 PM
To: Rodriguez, Joseph (PRE/EMSO) <joseph.rodriguez@aldi.com.au>
Subject: Tahmoor Aldi - Proposed Pedestrian Refuge Island - Emmett Street

Hi Joe.

Thanks for your time yesterday to discuss the proposed pedestrian refuge island at Emmett Street.

At present we are still negotiating the design with Wollondilly Shire Council. Our initial proposal (attached), as per Council's request, is for the orange islands to be constructed. However, this will stop delivery trucks from turning left from Remembrance when arriving from the south and also impact their capacity to turn left onto when leaving from Emmett Street heading north.

An alternative design has been proposed, which Council are yet to provide comment on, for a pedestrian island further along Emmett Street (grey and red in the attached drawing). However, we have concerns the departing delivery vehicles will be impacted by the traffic island in this location also. I have asked our engineering team to check the truck turning circles for vehicles leaving the Aldi driveway and can provide a copy of this drawing once received.

As we discussed yesterday, if you or someone from the Aldi Property team can provide a letter or written response indicating the pedestrian islands, if constructed in either location, would significantly impede Aldi's capacity to receive deliveries and have a negative impact on the operation of the business then we can include this in our negotiations with Council.

Given the nature of Aldi as a major supplier to the community and a large employer, I am confident the objections from you would carry a reasonable level of weight with Council. My concern is if we are unable to demonstrate the negative impact of the pedestrian island then Council will force us to construct it and Aldi will be left to deal with the situation.

If you, or anyone from your team, has any questions, please let me know.

Chris Hanlon
Avid Project Management Pty Ltd

PO Box 206, Carrington NSW 2294

T 02 4961 0635 M 0432 167 266 W avidpm.com.au



1.2 PROPOSED ROUNDABOUT - INTERSECTION OF MORETON PARK ROAD AND STATION STREET, MENANGLE

File Number: 10623#239

EXECUTIVE SUMMARY

As part of the development by Mirvac P/L at Menangle, Mirvac has been successful in obtaining approval to undertake Stage 2 which incorporates the intersection of Moreton Park Road and Station Street with the installation of a roundabout.

Council is seeking endorsement from the Local Traffic Committee to implement linemarking and road signage in line with the new roundabout update.

RECOMMENDATION

That the Local Traffic Committee endorse the below recommendation:

That Council:

1. Endorse the linemarking and road signage for the new roundabout upgrade at the intersection of Moreton Park Road and Station Street, Menangle.

REPORT

The approval of the proposed roundabout at the intersection of Moreton Park Road and Station Street Menangle was completed as part of the Development Application approval. The approval was completed taking into consideration the Traffic Impact Assessment.

The following considerations were undertaken:

1. That the existing bridge at Station Street is not owned by Council;
2. That the roundabout is designed to current standards as outlined in Austroads;
3. That Moreton Park Road is re-aligned so that sight distances are improved for motorists and pedestrians; and
4. That the proposed signage and linemarking is to current standards.

Consultation

1. Refer to DA/2020/401/1; and
2. Traffic Impact Assessment (*Attachment 1*).

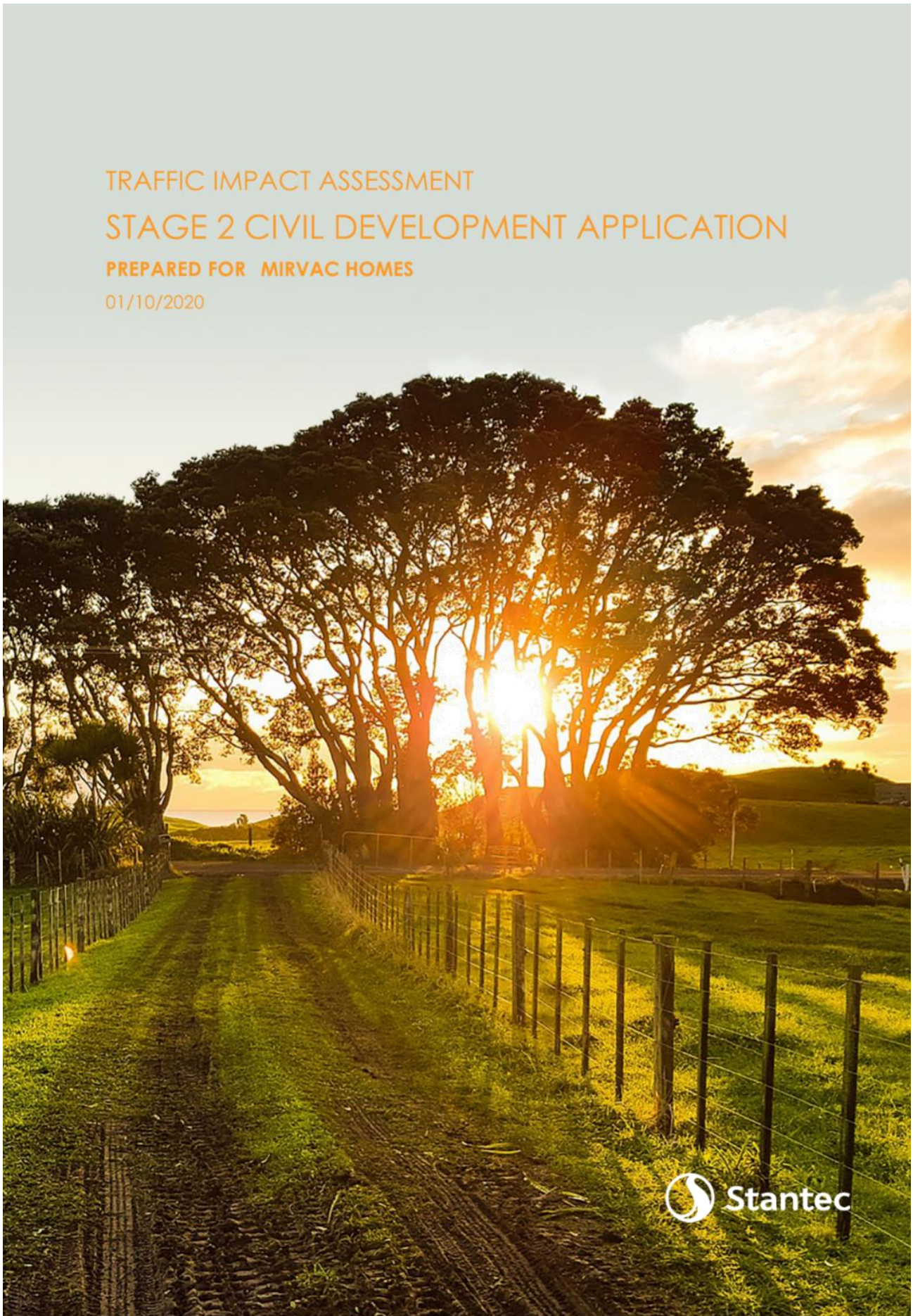
Financial Implications

This matter has no financial impact on Council's adopted budget or forward estimates.

ATTACHMENTS

1. **Traffic Impact Assessment**
2. **Signage Linemarking Plan**

TRAFFIC IMPACT ASSESSMENT
STAGE 2 CIVIL DEVELOPMENT APPLICATION
PREPARED FOR MIRVAC HOMES
01/10/2020



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QUALITY STATEMENT

PROJECT MANAGER

Alexandra Kavanagh

PROJECT TECHNICAL LEAD

Alexandra Kavanagh

PREPARED BY

Karan Khanna



01/10/2020

CHECKED BY

Fred Gennaoui



01/10/2020

REVIEWED BY

Fred Gennaoui



01/10/2020

APPROVED FOR ISSUE BY

Fred Gennaoui



01/10/2020

SYDNEY

Level 4, 99 Walker Street, NORTH SYDNEY, NSW 2060
 TEL +61 2 9493 9700, FAX +61 2 9493 9799

REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
01		Draft Submission	KK	AK	FG	AK
02		Final Submission	KK	FG	FG	FG

Mirvac Homes

Stage 2 Civil Development Application

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APPENDICES

- Appendix A Civil Plans
- Appendix B Bridge and Roundabout Memo
- Appendix C Traffic Survey Results
- Appendix D SIDRA Movement Summaries
- Appendix E Concepts of Level of Service and Delay

1. Introduction

Stantec has been commissioned by Mirvac Homes to assess the traffic implications of the Stage 2 residential subdivision located on the corner of Moreton Park Road and Station Street in Menangle, NSW.

Stage 2 of the proposed subdivision comprises 117 residential lots varying in area between 450m² and 1317m², with vehicle access via the intersection of Station Street and Moreton Park Road. Stantec has previously completed a Traffic Impact Assessment of Stage 1 (DA/2019/093) of this development, comprising of a 97-lot residential subdivision to the west of the Stage 2 site and to be accessed via both Station Street and Menangle Road. The cumulative traffic impacts of the later Stages 3 and 4 as well as the two planned neighbourhood centres have been considered in this report.

The scope of this Traffic Impact Assessment is to assess the capacity of both the existing and proposed road network to accommodate the proposed residential subdivision in its entirety based on the latest plans and identify any elements of the surrounding road network that may require improvements or upgrades. Particular attention has been given to the intersections of Menangle Road with Station Street as well as Station Street with Moreton Park Road.

By way of summary, it is determined that Stage 2 of the proposed residential subdivision can be accommodated by the existing road network and that the traffic generation associated with the development will have no more than a minor impact on these two intersections.

2. Existing Conditions

2.1 Site Location

The subject site is located south of Station Street, bound by Moreton Park Road to the west, the Hume Hwy to the east, Rural lands to the south and future stages to the north. **Figure 2-1** below shows the location of the site in relation to the surrounding transport network, while **Figure 2-2** shows the indicative location of the surrounding developments in relation to Stage 2.

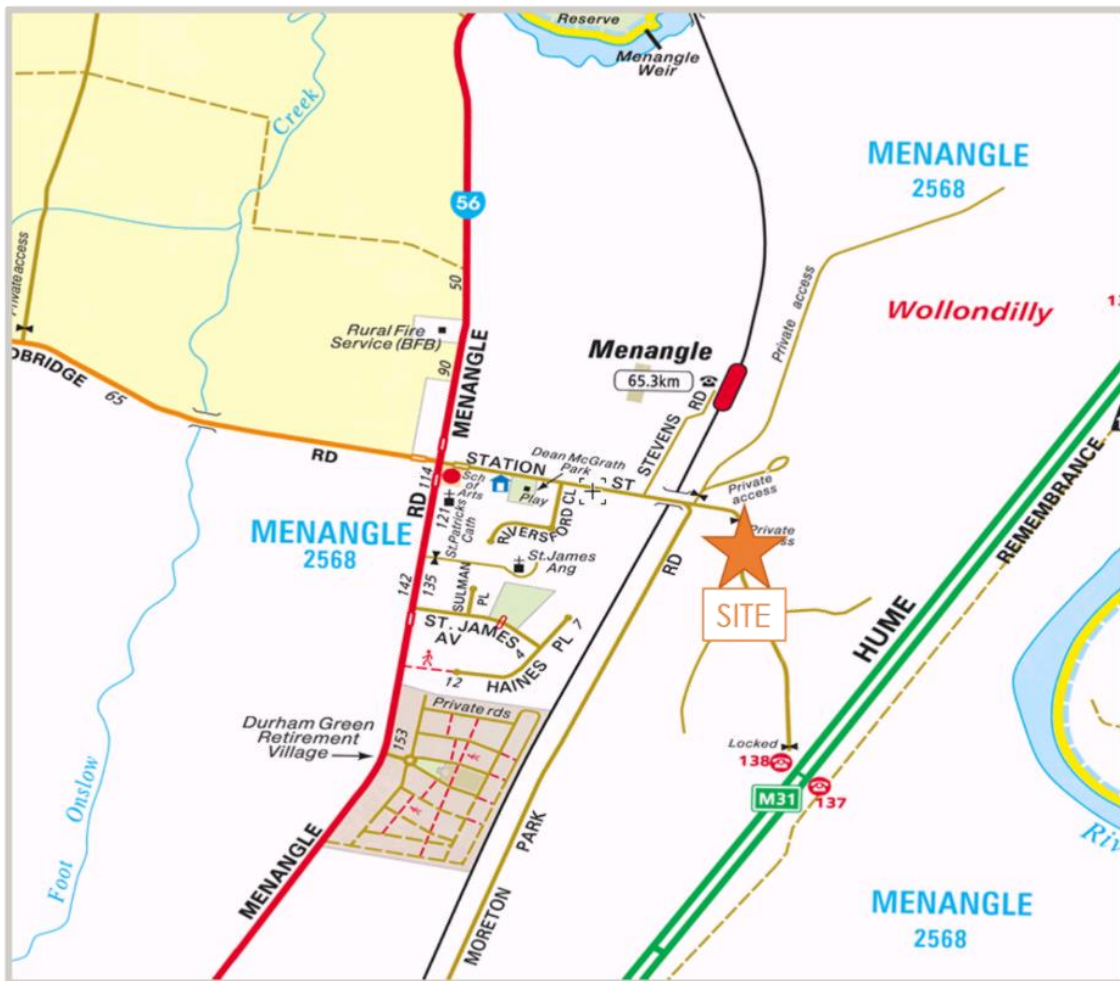


Figure 2-1: Site Location¹

The majority of the site is currently private land with two existing buildings accessed via one driveway connecting to Station Street. Most of the site is covered in vegetation and a small creek passes through it. The building located at the northern part of the site has been designated a heritage building.

Notable facilities in the vicinity of the site include the Menangle Railway Station, accessed via Stevens Road approximately 370 metres from the subdivision, and the Menangle Store, located on the south-eastern corner of the Menangle Road / Station Street intersection.

¹ Source: www.street-directory.com.au



Figure 2-2: Indicative Staging Plan

2.2 Land Use Zoning

The subject site has recently been rezoned from RU1 to R2 (Low Density Residential) and is shown below in **Figure 2-3**.

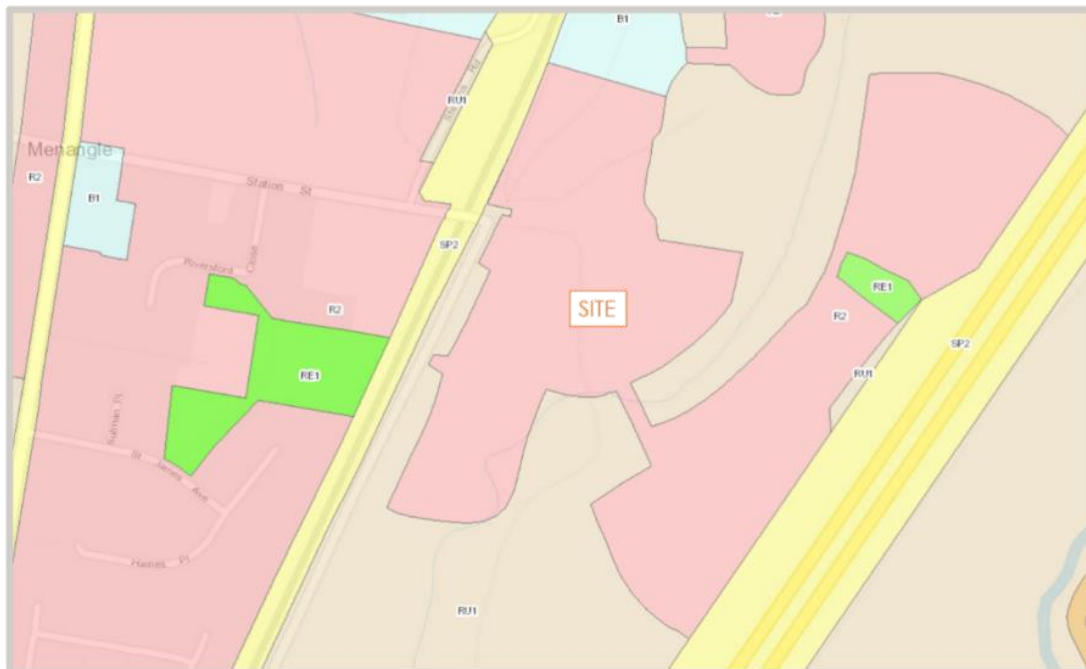


Figure 2-3: Land Use Zoning²

2.3 Local Road Network

Menangle Road is classified as a Regional Road and is under the control and maintenance of Wollondilly Shire Council (Council). It runs in a general northeast-southwest alignment between Picton Road in Maldon and its terminus in Campbelltown. In the vicinity of Menangle township, Menangle Road is a two-lane, two-way road, with each traffic lane being approximately 3.5 metres wide, and has a total carriageway width of approximately 8.9 metres. Menangle Road has a speed limit of 50km/h through Menangle township, and a speed limit of 80km/h to the north and south of Menangle.

Station Street is a local road under the care and maintenance of Council. It runs in an east-west alignment, extending west from Menangle Road to its intersection with Moreton Park Road where it terminates. In the vicinity of Menangle township, Station Street is a two-lane, two-way road, with a total carriageway width of approximately 9.5 metres. At the intersection of Menangle Road / Station Street, it widens to approximately 13 metres, with on-street parking on both sides of the road, and an approximate 2.0-metre-wide painted median.

Stevens Road is a local road, extending north from the northern side of Station Street. It runs parallel to the Southern Highlands Railway line and provides public access to the Menangle Railway Station. It has an approximate sealed width of 5.2 metres near Station Street, narrowing to approximately 4.0 metres further north.

Moreton Park Road is a local road extending from Douglas Park to Menangle, where it terminates at the intersection with Station Street. Near the subject site, Moreton Park Road runs in parallel to Menangle Road and provides service access to the Southern Highlands Railway line. Near Station Street, the posted speed limit is 50 km/h and increases to 80 km/h further south. It has an approximate road width of 7 metres along its length.

² www.planningportal.nsw.gov.au

2.4 Sustainable Transport

The site has good access to sustainable transport modes primarily due to it being located in close proximity to the Menangle Railway Station, which services the Southern Highlands Line.

Bus stops are located on Menangle Road and Station Street within vicinity of the site. The bus routes that service the bus stops include:

- Route 49 - Camden to Menangle and Razorback (Loop Service);
- Route 899 - Menangle to Campbelltown via Menangle Park; and
- Route 900 - Picton to Campbelltown via Narellan.

The bus network maps for these bus routes are shown in **Figure 2-4** and **Figure 2-5**.

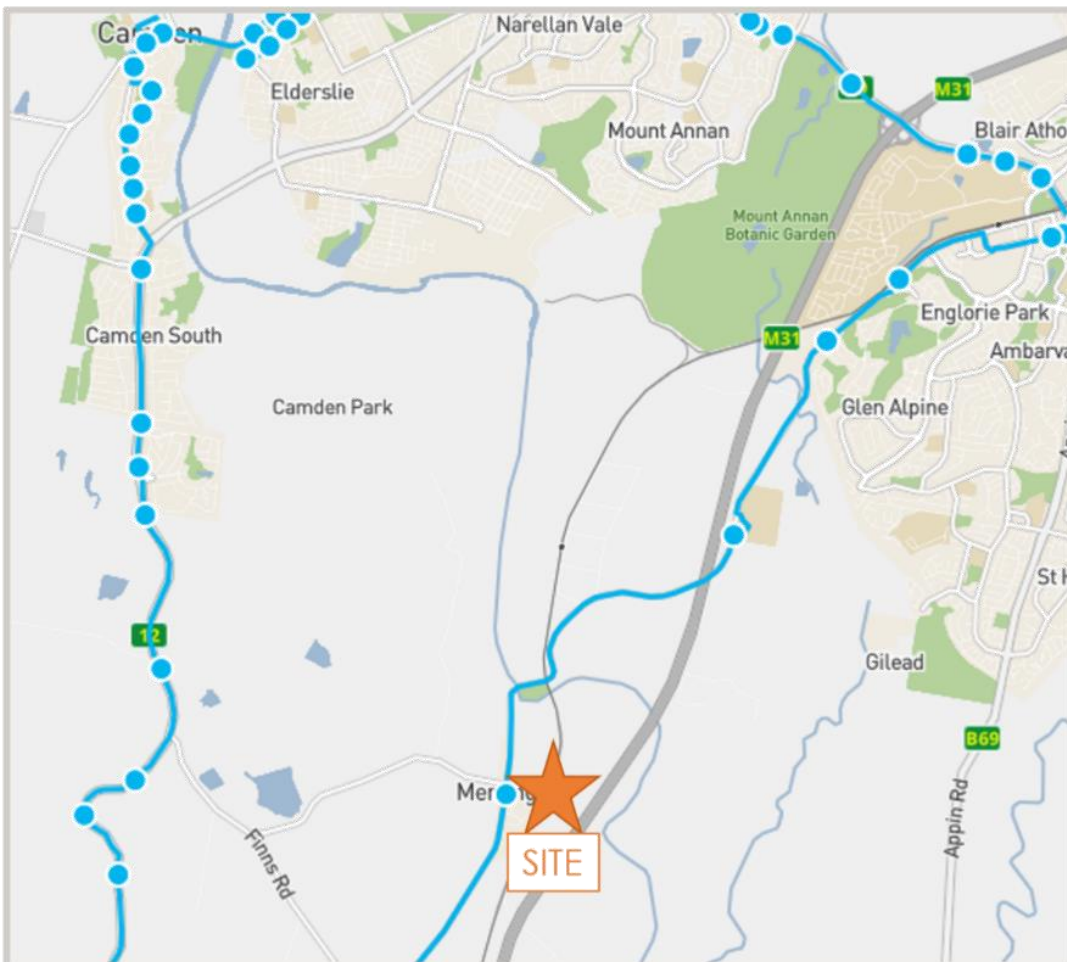


Figure 2-4: Bus Route 900³

³ Source: <https://transportnsw.info/routes/details/private-bus-services/900/08900>

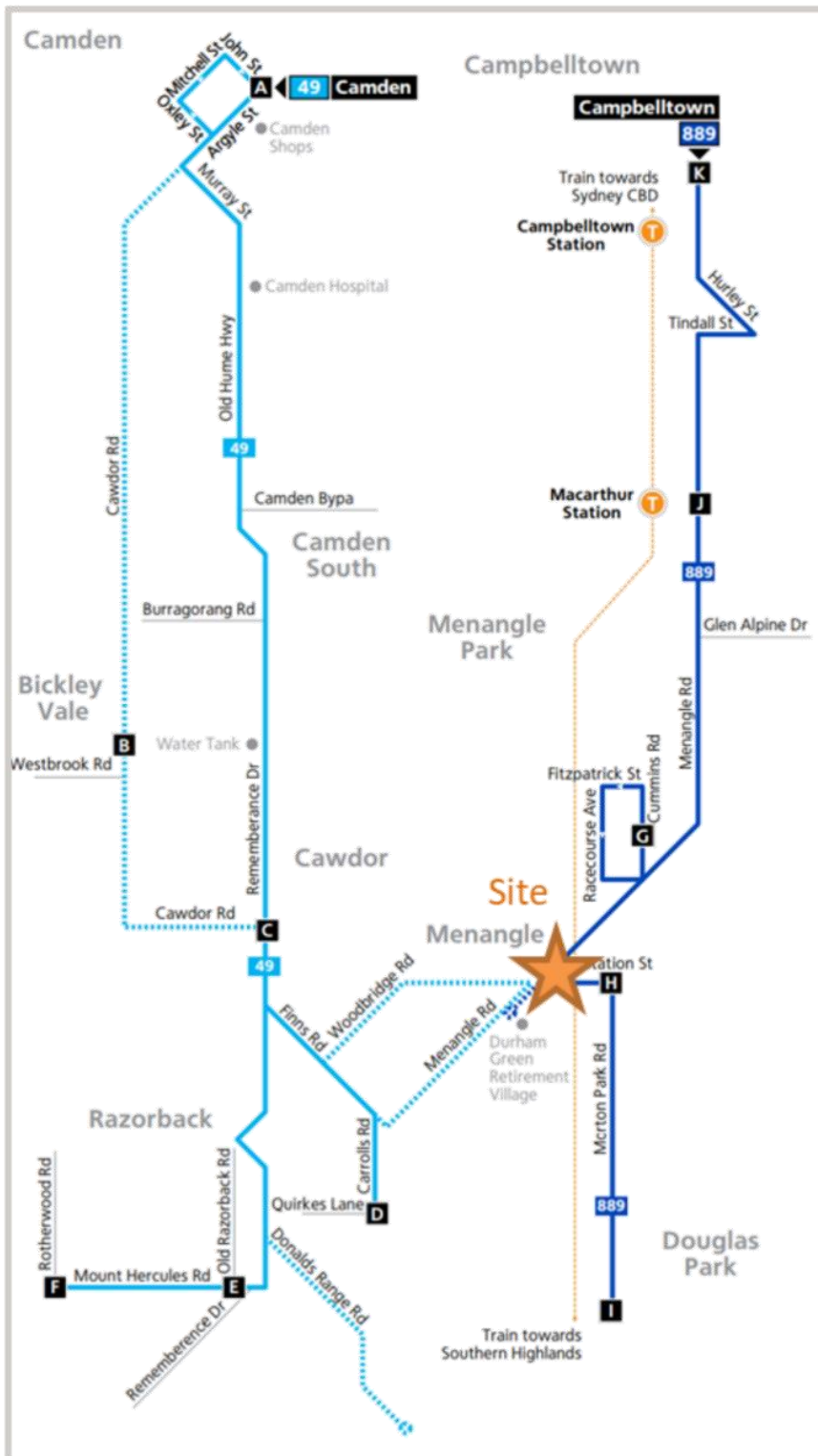


Figure 2-5: Bus Routes 49 and 889⁴

⁴ Source: https://busabout.com.au/pdf/timetables/49_889_timetable.pdf

2.5 Walking and Cycling

Pedestrian footpaths are established along Menangle Road in the vicinity of the Menangle Local Store. Wide grassed berms are provided on both sides of the roads in the wider area. No dedicated cycle facilities are provided in the vicinity of the site.

2.6 Road Safety

A search of the Road Safety Crash and Casualty Statistics Portal has been undertaken for the most recent five-year period 2014 to 2018 inclusive. A search area fronting the subject site up to the intersection of Station Street / Menangle Road has been assessed.

A total of two crashes have been identified within the crash area over the five-year period. The crashes are summarised below:

- Both crashes were cross-traffic crashes involving collisions between vehicles on perpendicular approaches at the intersection of Menangle Road, Station Street and Woodbridge Road as follows:
 - One serious injury during daylight hours; and
 - One non-casualty during darkness.
- No crashes occurred at the intersection of Station Street and Moreton Park Road;
- There were zero crashes recorded along Moreton Park Road within the search area; and
- No fatalities were recorded over the five-year period.

Figure 2-6 below shows the location of the recorded crashes between 2014 and 2018.

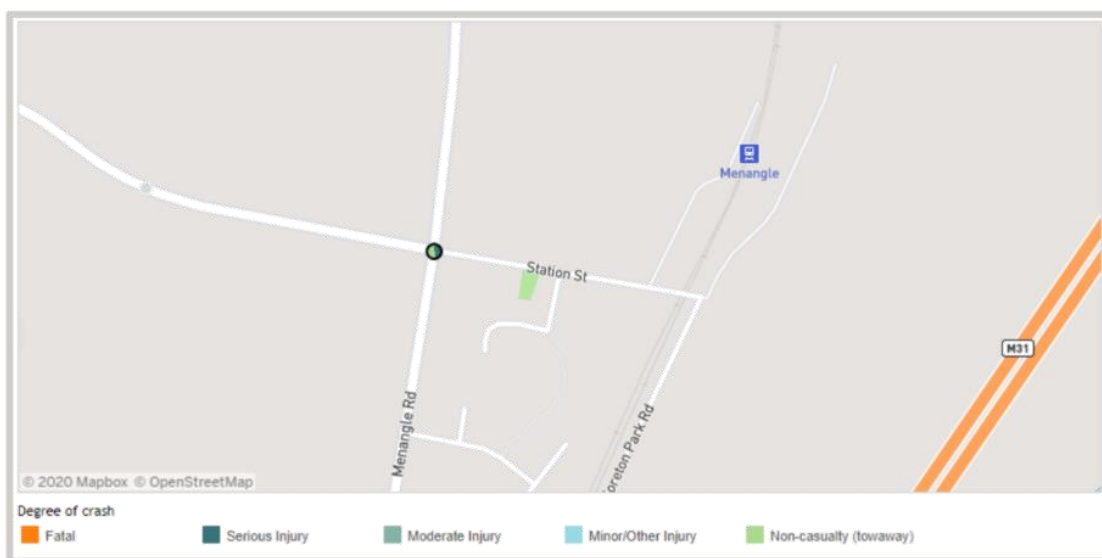


Figure 2-6: Crash Locations⁵

Accordingly, it is considered that there is no apparent evidence of a recurrent, persistent or adverse road crash history within the vicinity of the site that would raise a particular local road safety concern.

⁵ Source: NSW Transport for NSW – Centre for Road Safety (<http://roadsafety.transport.nsw.gov.au/index.html>)

3. The Proposal (Stage 2)

It is proposed to develop the subject site on the south-eastern corner of the Station Street / Moreton Park Road intersection into a 117-lot residential subdivision. More specifically, the proposal comprises the following

- 117 residential lots, ranging in lot area between 450m² and 1317m²;
- Relocation of the existing Station Street / Moreton Park Road intersection to the east and installation of a new roundabout at this location;
- 6 x internal roads, with road reserve widths between 15 metres and 18.5 metres; and
- A new culvert crossing over the creek passing through the subject site.

Stage 2 is proposed to be developed in two sub-stages (2A and 2B). The two sub-stages are summarised as follows:

- 2A: 62 lots between 450m² and 1317m² in lot area and the upgrade of the Station Street / Moreton Park Road intersection; and
- 2B: 55 lots between 450m² and 817m² in lot area and the construction of the new culvert crossing.

Civil plans are shown in **Figure 3-1** and are shown in more detail in **Appendix A**.

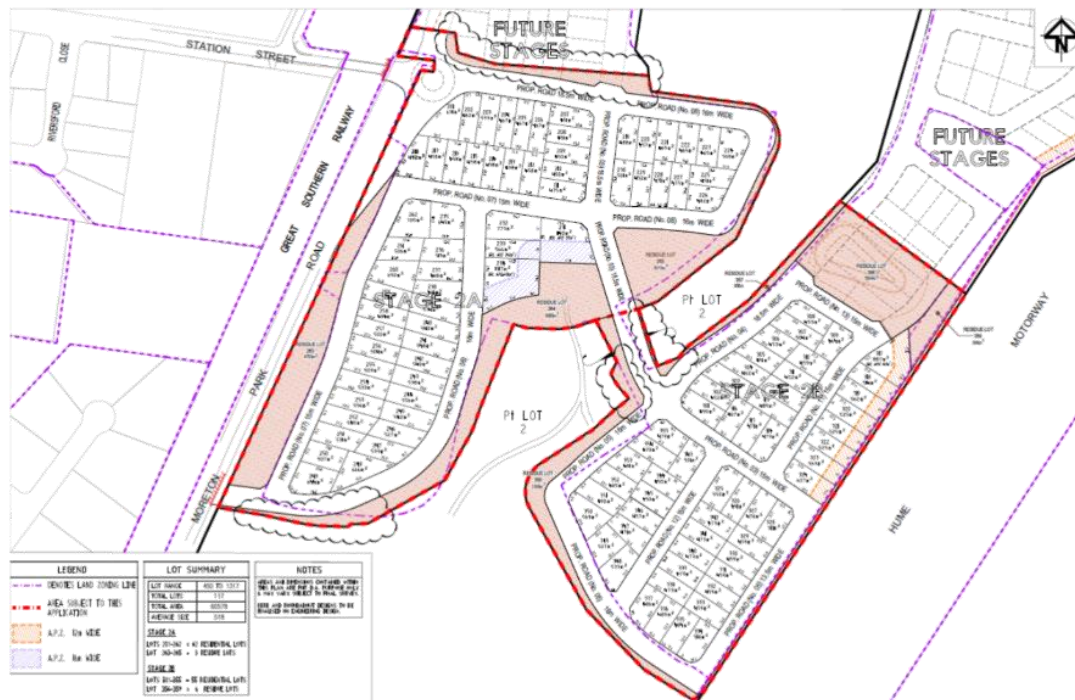


Figure 3-1: Stage 2 Civil Plans

4. Site Access

The primary site access proposed for the subdivision, comprises a roundabout with four approaches located at the intersection of Station Street / Moreton Park Road. The roundabout is proposed to be installed as part of the Stage 2 subdivision works. As discussed above, Moreton Park Road has a speed limit to the south of 80 km/h, reducing to 50 km/h near the site access. The western approach of the Station Street / Moreton Park Road comprises the Station Street Bridge which crosses over the Southern Highlands Railway line.

An assessment of the appropriateness of the Station Street Bridge to cater for the expected development traffic has previously been undertaken by Stantec in the Memo dated February 12, 2020 and provided in **Appendix B** for reference.

4.1 Station Street Bridge

The existing Station Street bridge provides a two-lane two-way vehicle access over the railway line at Menangle. The Station Street bridge has a carriageway width of approximately 6.6 metres, accommodating one lane of traffic in each direction. There is currently no provision for pedestrians on either side the bridge. **Photograph 1** shows the current state of the bridge, looking west from the eastern side.



Photograph 1: Existing Station Street Bridge

The Station Street Bridge is capable of supporting up to two 12.5m trucks travelling in opposite directions and can also support up to one 19m articulated vehicle. Swept paths are provided in **Appendix B**, along with an assessment of the bridge loading capacity undertaken by Bridge Design in 2017.

4.2 Station Street / Moreton Park Road Roundabout

The Station Street and Moreton Park Road intersection is currently priority controlled. It is proposed to provide a new single-lane roundabout. The proposed roundabout will have an island diameter of 16m and a circulating road width of 8m. The concept plan for the proposed roundabout is shown in **Figure 4-1**.

5. Subdivision Layout

5.1 Internal Road Network

The proposed subdivision plans have been considered against Wollondilly Shire Council's Design Specification *Subdivision & Engineering Standard 2016* (SES) document and are discussed below.

The internal roads are proposed to serve slightly different functions, and accordingly have differing road reserve widths. The road reserve widths range from 15m to 18.5m, and in accordance with the SES, the roads would likely fall under Category D1 (Minor Local Street), or D2 (Local Street). Dimensions from Table D1.5 in the SES are summarised below.

Category	Road Reserve Width (m)	Proposed Reserve Width (m)	Carriageway Width (m)	Verge Width (m)
D1	15.0	15.0	8.0	4.0
D2	18.0	18.5	10.0	4.5

All internal roads align with the above classifications with the exception of Road 05 and the proposed site access road as shown in Appendix A. Road 05 has a carriageway width of 8m as per Category D1 and a reduced road reserve of 13.5m. The verge width on one side of Road 05 has been reduced to 2m as it adjoins with the Hume Highway. The proposed road at the site access has a road reserve of 18.5m, with an additional 0.5m carriageway width to account for the proposed shared path.

All intersections within the subdivision are proposed to be unsignalised, with traffic from the minor roads either be subject to the T-junction rule or controlled by give-way or stop signs.

5.2 Walking and Cycling

Footpaths are proposed to be provided on one side of all new roads. As shown in Figure 3 of the Wollondilly DCP Volume 3 and in **Figure 5-1**, shared pedestrian and cyclist paths will be provided along Station Street, extending into Stage 2 and across the culvert to the south. A shared path will be provided on Station Street and Central Creamery Avenue, allowing cyclists from Stage 2 to join the broader road network.

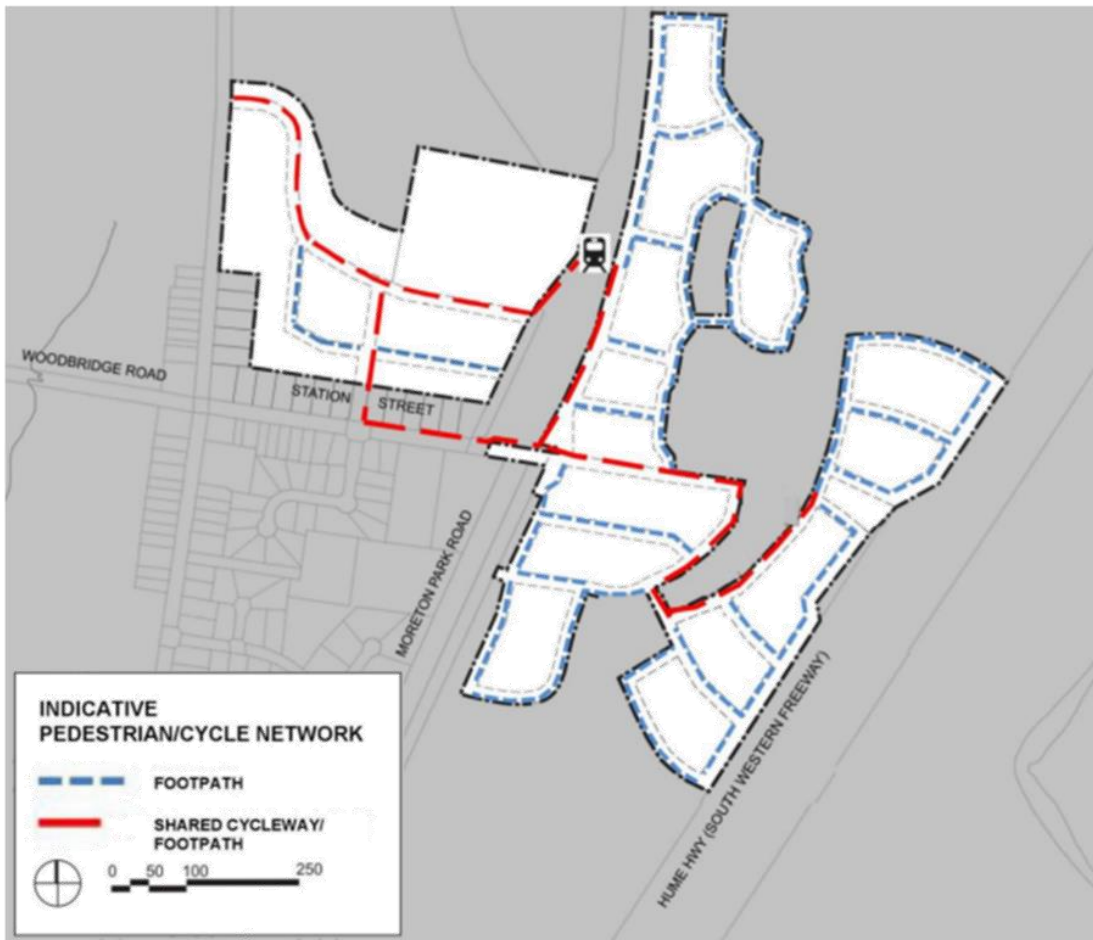


Figure 5-1: Indicative Pedestrian and Cycling Network

6. Traffic Assessment

6.1 Existing Traffic Volumes

Weekday peak period turning movement counts were commissioned by Stantec on Thursday 3 May 2018 at the Station Street / Menangle Road intersection and the Station Street / Moreton Park Road intersection. Full results are included for reference in **Appendix C**. The peak hours for the nearby road network were found to occur from 7:30am to 8:30am during the AM period, and 4:30pm to 5:30pm during the PM period. The peak hour volumes for both intersections are shown in **Figure 6-1**.

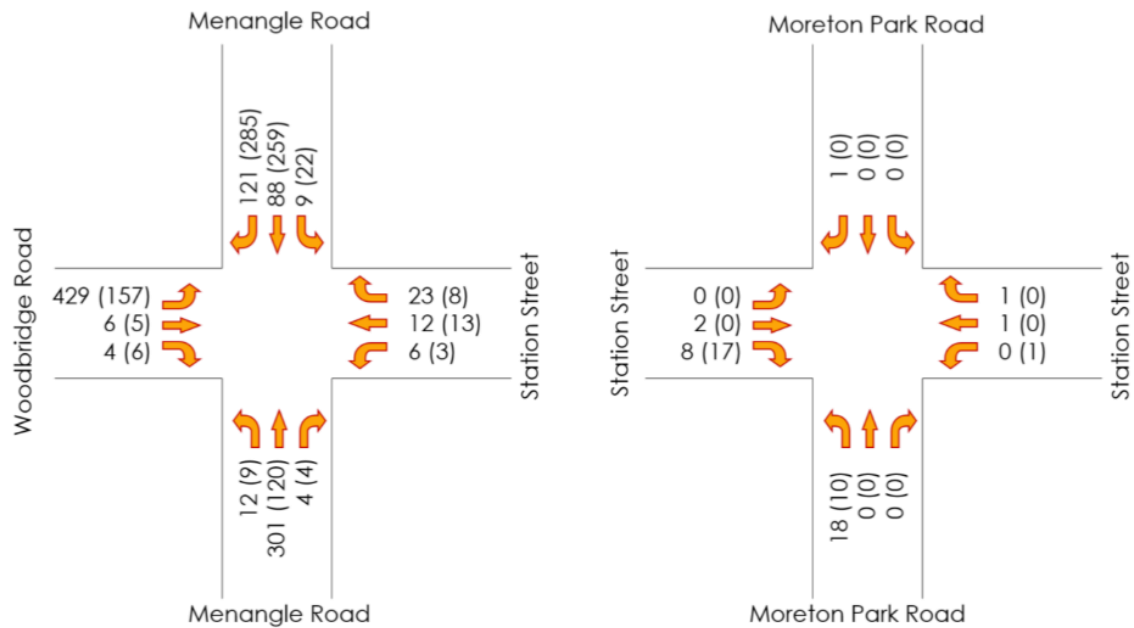


Figure 6-1: Existing Peak Hour Traffic Volumes

As can be seen from the volumes, there are relatively low numbers of vehicles passing through both intersections during typical weekday peak hours. The largest traffic volumes were observed travelling from Woodbridge Road to Menangle Road northbound in the AM peak and the reverse in the PM peak. Traffic volumes northbound and southbound on Menangle Road are large in both peak periods. Additionally, there was only one heavy vehicle movement recorded passing through the Station Street / Moreton Park Road intersection during each peak hour, travelling from Station Street to Moreton Park Road during the AM peak hour and in the reverse during the PM peak hour.

6.2 Stage 2 Trip Generation

RMS' *Guide to Traffic Generation Developments – Technical Direction 2013 04a* (TDT 2013/04a) specifies traffic generation rates for different land uses. For low density residential dwellings in regional areas, as is being considered for the proposed subdivision, TDT 2013/04a recommends trip rates of 0.71 trips per dwelling per hour during the morning peak, and 0.78 trips per dwelling per hour during the evening peak. It is noted that these trips are the trips made external to the subdivision, and do not include the internal trips.

As such, the expected trip generation for the subdivision is shown below in **Table 6-1** based on an estimated 117 dwellings.

Table 6-1: Trip Generation for Proposed Subdivision

Proposed Development	Trip Generation Rate (vph per dwelling)		Estimated Subdivision Trip Generation (vph)	
	AM Peak	PM Peak	AM Peak	PM Peak
117 Low Density Residential Dwellings	0.71	0.78	83	91

As can be seen from above, a 117-dwelling residential subdivision could be expected to generate 83 vph and 91 vph in the AM and PM peak hours respectively.

6.3 Stage 2 Trip Distribution

Traffic will access the site using the eastern arm of the proposed Station Street / Moreton Park Road roundabout. Existing traffic counts show limited usage of this intersection, with most local traffic travelling through the intersection of Station Street / Menangle Road. The majority of traffic generated by the site is therefore assumed to travel on Station Street and follow the existing trip distribution observed from the traffic counts at Station Street / Menangle Road.

For the purposes of this assessment, the following trip distribution percentages have been adopted at the intersection of Menangle Road and Station Street as shown in **Table 6-2**.

Table 6-2: Trip Distribution

Peak Hour	Traffic Distribution		To/From		
	Inbound	Outbound	Menangle Road (North)	Menangle Road (South)	Woodbridge Road (West)
AM Peak Hour	20%	80%	50% in / 55% out	20% in / 15% out	30% in / 30% out
PM Peak Hour	70%	30%	70% in / 30% out	15% in / 15% out	15% in / 55% out

Accordingly, the trips expected to be generated by the proposed development using the above distribution are shown in **Figure 6-2**. As shown in this figure, there is estimated to be a relatively low volume of trips associated with Stage 2 of the proposed residential subdivision during both the AM and PM peak hours.

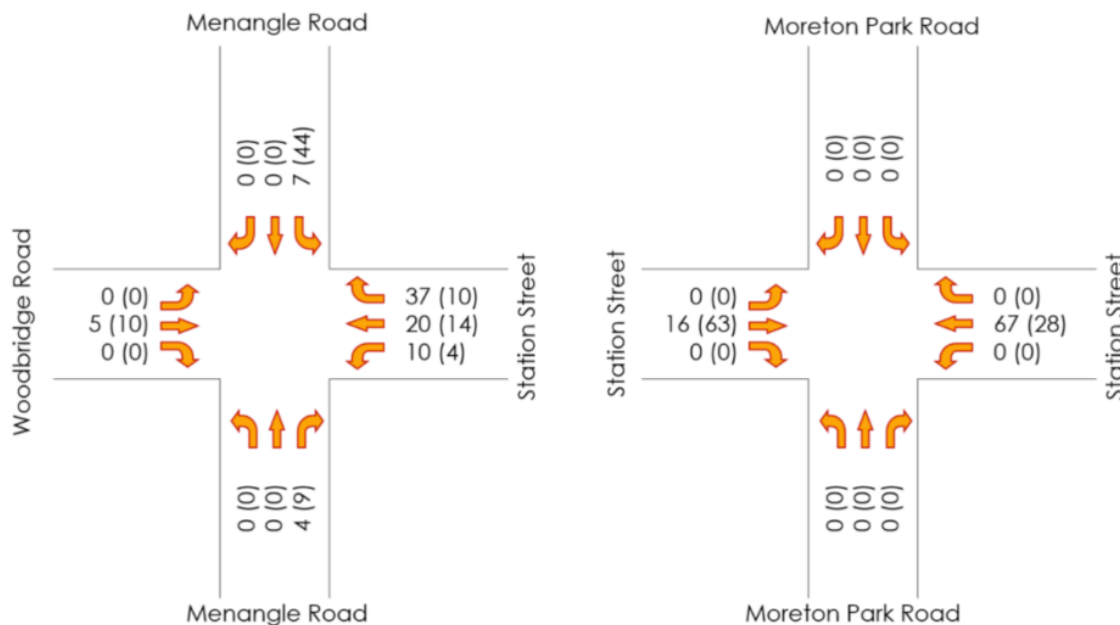


Figure 6-2: Proposed Stage 2 Development Peak Hour Traffic Volumes

6.4 Future Traffic Growth

A 2% annual growth rate has been adopted for future year traffic analyses along Menangle Road, which is considered to be conservative given the rural nature of the area. It is estimated that Stage 2 of the proposed development will be completed by the end of 2022. The peak hour traffic volumes at the completion of Stage 2 (inclusive of the Stage 1 development traffic) are shown in **Figure 6-3**.

Although Stages 1, 3 and 4 of the subdivision do not form part of this Development Application, they are being considered for future traffic analyses to ensure that the Moreton Park Road / Station Street intersection has capacity to handle future development. The intersection of Menangle Road / Station Street was also assessed at the time of completion of Stage 2 to ensure that this stage of development does not introduce the need for an intersection upgrade.

Stages 1-4 represent a total of around 350 residential lots for the subdivision. Stage 1 (DA/2019/093) is proposed to be located east of Stage 2, with construction estimated to be completed by mid-2021. Stages 3 and 4 are to be located north of Stage 2 as shown in **Figure 2-2** and are expected to be completed by the end of 2024. These numbers are based on the recently approved planning proposal and are also subject to further assessment in future Development Applications.

Preliminary traffic analysis has been undertaken for two neighbourhood centres in the vicinity of the Stage 2 residential subdivision. One neighbourhood centre is proposed to be included in Stage 4 of the Mirvac subdivision and north of Stage 2 (the Mirvac neighbourhood centre), with around 11,570m² of retail floor space. Another neighbourhood centre is proposed to be located north of the Stage 1 (DA/2019/093) subdivision (The Creamery neighbourhood centre). The first stage of The Creamery neighbourhood centre is expected to be completed by the end of 2023. All stages are proposed to be completed by the end of 2028. A separate Development Application has been submitted which further details the expected traffic generation of this development.

A 2028 model scenario has been analysed to represent a post-development scenario of all stages of the Mirvac residential subdivision, the Mirvac neighbourhood centre and all stages of The Creamery neighbourhood centre. This analysis has been undertaken to ensure that the proposed roundabout design will function satisfactorily after the completion of these developments. The completed neighbourhood centres in combination are estimated to generate in the order of 720 and 1300 vph in the AM and PM peak periods, respectively. The future 2028 traffic volumes at the intersection of Moreton Park Road / Station Street are shown in **Figure 6-4**.

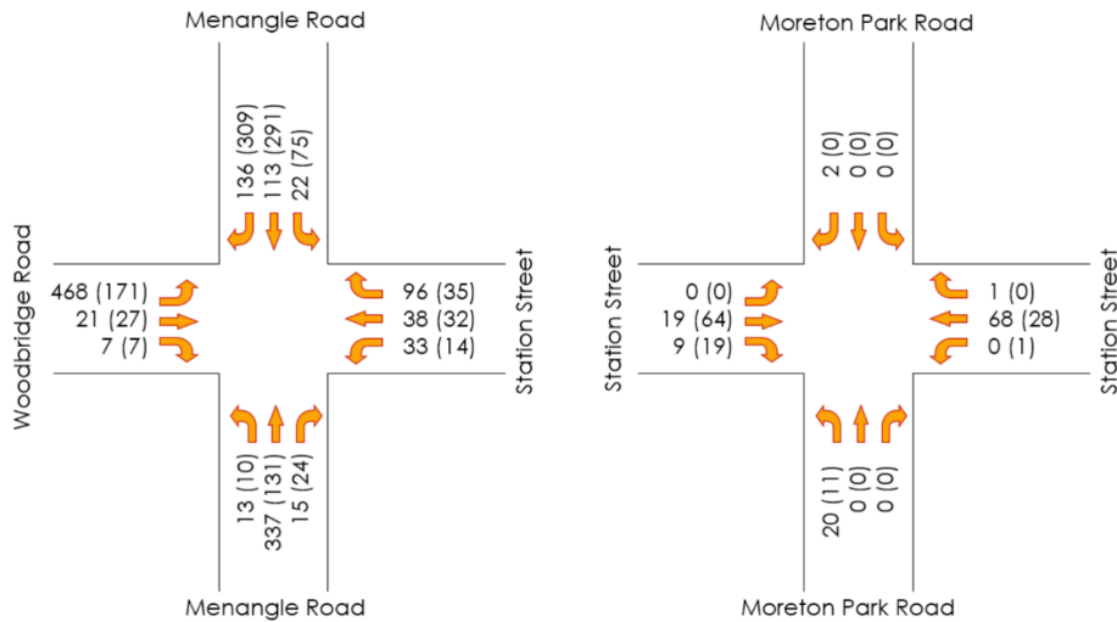


Figure 6-3: Proposed Future 2022 Peak Hour Traffic Volumes

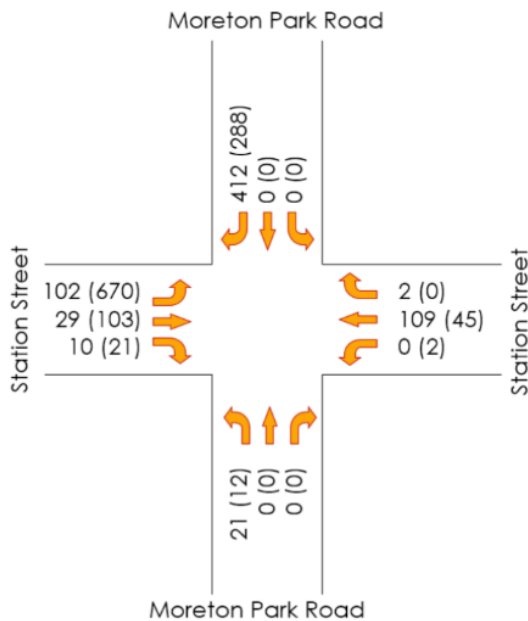


Figure 6-4: Proposed Future 2028 Peak Hour Traffic Volumes

It has been assumed that the current heavy vehicle percentages at each of the movements at the Menangle Road / Station Street intersection will stay the same in future modelling years. It is not expected that the proposed development will typically generate any heavy vehicle movements during the weekday AM and PM peak hours.

6.5 Intersection Impact Analysis

Intersection analysis for the Menangle Road / Station Street intersection and the proposed roundabout at the Station Street / Moreton Park Road intersection was undertaken for the modelling scenarios described in the following sections, using the software package SIDRA. The full SIDRA movement summaries have

been included for reference in **Appendix D**, while the concepts of intersection delay and level of service are included in **Appendix E**.

6.5.1 Operation of Existing Intersections

The intersections were analysed using the layout as shown in **Figure 6-5**.

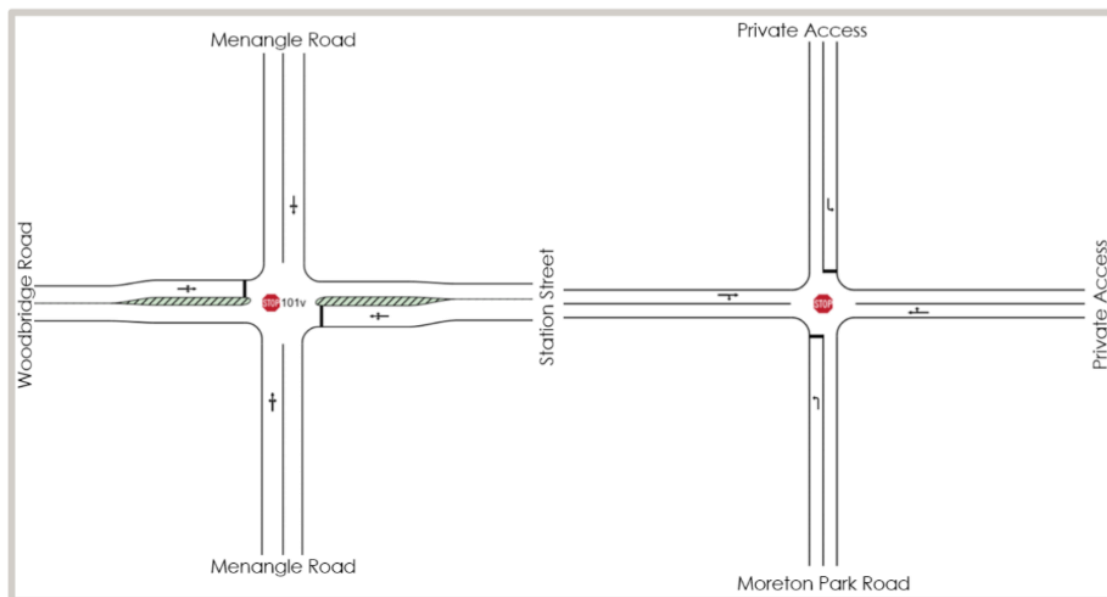


Figure 6-5: Adopted SIDRA Existing Intersection Layout

The intersections were analysed using single lanes on each approach to conservatively estimate a worst-case scenario, whereby vehicles wishing to turn in opposite directions of each other (e.g. left and right) on the same approach would be forced to queue, rather than being able to perform the manoeuvre simultaneously. The SIDRA results for the existing scenario are summarised in **Table 6-3**.

Table 6-3: Performance of Existing Intersections - SIDRA

Intersection	Approach Road	Worst Movement	AM Peak Hour			PM Peak Hour		
			Delay (sec)	Level of Service	95%ile Queue (m)	Delay (sec)	Level of Service	95%ile Queue (m)
Menangle Road / Station Street	Menangle Road (South)	Right	4.9	A	0.3	5.6	A	0.3
	Station Street (East)	Right	19.5	B	2.5	19.3	B	1.4
	Menangle Road (North)	Left	5.9	A	5.6	5.2	A	14.0
	Woodbridge Road (West)	Right	18.5	B	22.7	15.6	B	4.6
Moreton Park Road / Station Street	Moreton Park Road (South)	Left	7.4	A	0.4	7.4	A	0.2
	Station Street (East)	Right	4.6	A	0.0	4.6	A	0
	Moreton Park Road (North)	Left	5.8	A	0.1	5.8	A	0.1
	Station Street (West)	Right	4.6	A	0.2	4.6	A	0.3

As can be seen from Table 6.3, the Menangle Road / Station Street intersection currently operates at an excellent level of service, with most movements achieving an LoS 'A' during both peak periods. The largest 95%ile queue length occurs on Woodbridge Road in the AM peak and Menangle Road (north) in the PM peak, with lengths of 22.6m and 14.0m respectively. These queue lengths are relatively small and represent

two to three vehicles attempting to either left turn (merge) onto Menangle Road from Woodbridge Road, or perform a right turn from Menangle Road onto Woodbridge Road across traffic.

In reality, the queue lengths observed on Woodbridge Road in the AM period were larger than those reflected in the existing scenario SIDRA model shown in **Table 6-3**. It is believed that this was due to one or two vehicles showing hesitation to take gaps in the northbound vehicle flow which would be considered to be acceptable, thereby causing longer than normal queues to form. In some cases, the queues are not at rest, but more moving at slow speeds while each vehicle navigates the 90 degree turn onto Menangle Road.

Due to the small traffic volumes passing through the intersection of Moreton Park Road and Station Street as presented in **Figure 6-1**, the intersection performance is excellent. A LoS result of 'A' was modelled for all turning movements at this intersection and queue lengths were negligible.

6.5.2 Stage 2 Completion (2022)

As discussed in Section 6.4 of this report, Stages 1 and 2 are expected to be completed by the end of 2022 and a 2% annual growth rate was applied for three and a half years for the existing light vehicle volumes on Menangle Road. The intersection of Menangle Road and Station Street is assumed to remain as existing at the end of 2022, and the layout used in the 2022 model is identical to the existing model.

The intersection of Moreton Park Road and Station Street is proposed to be upgraded to include a roundabout as part of the Stage 2 works. The upgraded intersection layout of Moreton Park Road and Station Street as modelled in SIDRA is shown in **Figure 6-6** and **Table 6-4** summarises the SIDRA analysis for the 2022 model year.

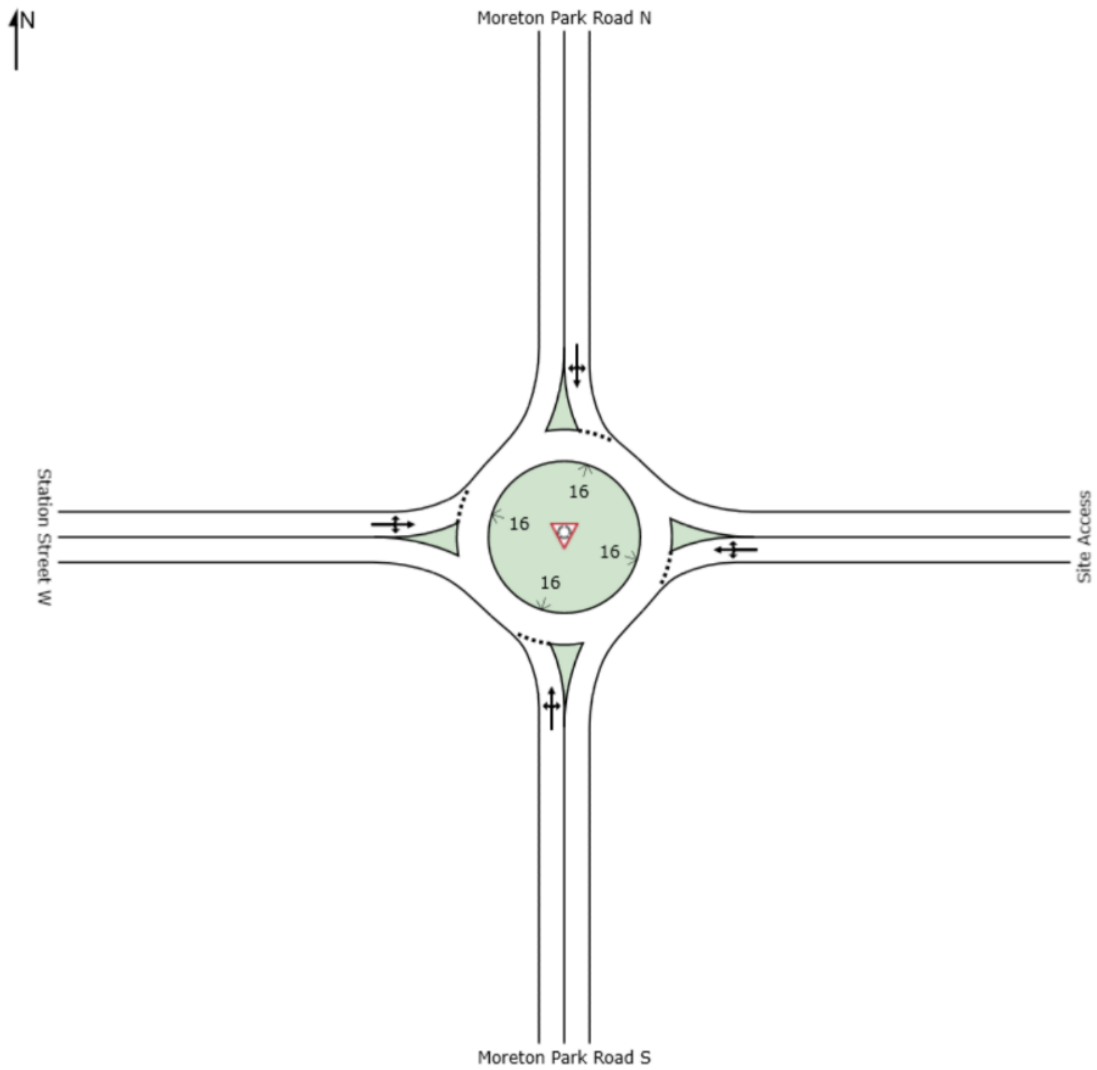


Figure 6-6: SIDRA Layout for the Future Moreton Park Road / Station Street Intersection

Table 6-4: Performance of Intersections after Stage 2 Completion (2022)

Intersection	Approach Road	Worst Movement	AM Peak Hour			PM Peak Hour		
			Delay (sec)	Level of Service	95%ile Queue (m)	Delay (sec)	Level of Service	95%ile Queue (m)
Menangle Road / Station Street (Unsignalised)	Menangle Road (South)	Right	5.1	A	1.1	6.0	A	1.8
	Station Street (East)	Right	30.5	C	16.7	24.3	B	6.0
	Menangle Road (North)	Left	6.1	A	6.9	5.3	A	17.7
	Woodbridge Road (West)	Right	26.7	B	31.6	18.7	B	7.0
Moreton Park Road / Station Street (Roundabout)	Moreton Park Road (South)	Left	7.6	A	0.5	7.5	A	0.3
	Station Street (East)	Right	7.2	A	1.5	7.3	A	0.7
	Moreton Park Road (North)	Left	8.2	A	0.1	8.4	A	0.1
	Station Street (West)	Right	7.2	A	0.6	7.2	A	1.7

As can be seen from the table above, most movements at the Menangle Road and Station Street intersection continue to operate at their levels of service, apart from the Woodbridge Road and Station Street approaches during both peak hours. At these locations, the average vehicle delay increases to provide results ranging from an excellent LoS 'A' to an acceptable LoS 'C' for individual turning movements.

The intersection of Moreton Park Road and Station Street operates with a very good LoS 'A' including the Stage 2 development traffic. Queuing modelled at the roundabout was minimal in both peak periods.

Accordingly, it is considered that Stage 2 of the development at completion (2022) would have a minor impact on the peak hour operations of the intersections at Menangle Road / Station Street and Moreton Park Road / Station Street.

6.5.3 Post-Development Scenario (2028)

As discussed previously in this report, the Mirvac residential subdivision, the Mirvac neighbourhood centre and The Creamery neighbourhood centre are expected to be completed by the end of 2028. The Mirvac residential subdivision is assumed to expand to around 350 lots at this time.

The capacity of the proposed roundabout at Station Street / Moreton Park Road was assessed under the ultimate development 2028 scenario using the same layout as in the 2022 scenario.

Table 6-5 below summarises the SIDRA analysis for the 2028 model year.

Table 6-5: Performance of Roundabout after Stages 1-4 Completion (2028)

Approach Road	Worst Movement	AM Peak Hour			PM Peak Hour		
		Delay (sec)	Level of Service	95%ile Queue (m)	Delay (sec)	Level of Service	95%ile Queue (m)
Moreton Park Road (South)	Right	9.9	A	0.8	8.9	A	0.4
Station Street (East)	Right	9.4	A	4.4	8.6	A	1.6
Moreton Park Road (North)	Right	7.4	A	11.7	7.8	A	8.9
Station Street (West)	Right	7.2	A	3.3	7.2	A	28.3

As can be seen from the table above, the roundabout at Moreton Park Road and Station Street would continue to operate at an excellent LoS of 'A' for all turning movements in the post development 2028 scenario, with queueing up to 28m. The 28m queue would extend onto the Station Street bridge and would not interact with any other traffic movements.

The results for this roundabout are quite favourable given the increased traffic volumes generated by the neighbourhood centre in Stage 4. The strong performance of this intersection is because the two turning movements with the highest traffic volumes do not conflict with each other as shown in **Figure 6-4**, and comprise most of the traffic at this intersection in both peak periods.

Accordingly, the proposed roundabout at the site access to the Stage 2 development will be more than capable of catering for the full development traffic, inclusive of the two nearby neighbourhood centres.

7. Conclusions

Stantec has been asked by Mirvac Homes to undertake an assessment of the proposed Stage 2 residential subdivision in Menangle, NSW which will include 117 low-density residential lots.

Turning movement count results from Thursday 3 May 2018 revealed that each intersection currently experiences a relatively low level of traffic during these peak hours at the intersections of Menangle Road with Station Street and Station Street with Moreton Park Road. SIDRA analysis suggests that the intersections operate very well with LoS results of 'A' for most approaches in both the weekday AM and PM peak hours.

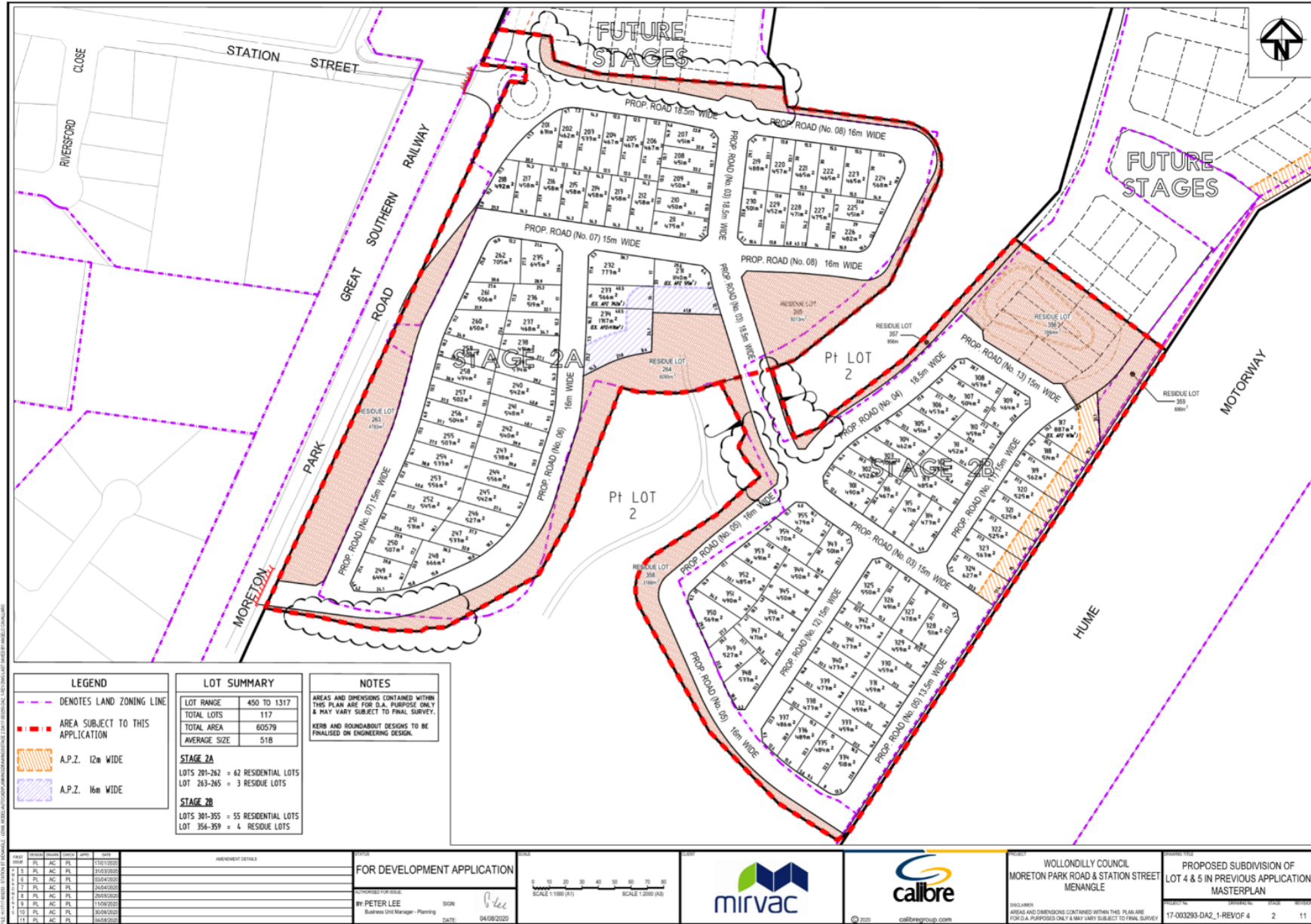
The proposed 117-lot residential subdivision is expected to generate in the order of 83 vph and 91 vph during the AM and PM peak hours, respectively.

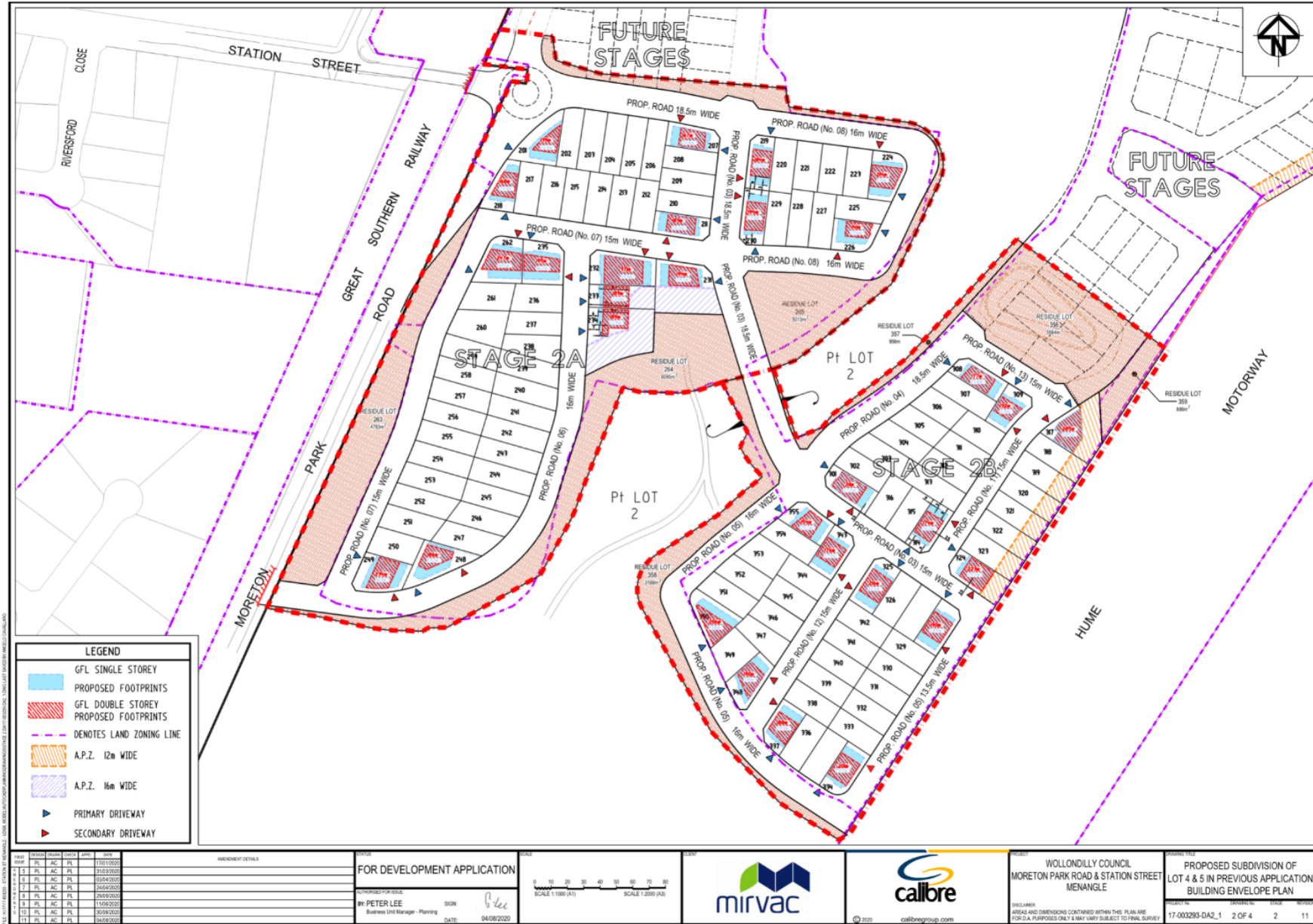
With the addition of this traffic to the existing intersection operations, approved Stage 1 (DA/2019/093) development, the two neighbourhood centres and allowing for an annual growth rate of 2%, it was found that the Station Street / Moreton Park Road intersection could be expected to remain operating at an excellent LoS 'A' following completion of the subdivision and the proposed roundabout. The intersection at Menangle Road / Station Street had LoS results of 'C' at the Woodbridge Road and Station Street approaches at the forecast year of 2022 after the completion of Stage 2. The consideration of the traffic associated with Stages 3 and 4 of the residential subdivision on the eastern side of the rail line and the completion of the neighbourhood centres still produced excellent LoS 'A' results at the proposed Station Street / Moreton Park Road roundabout.

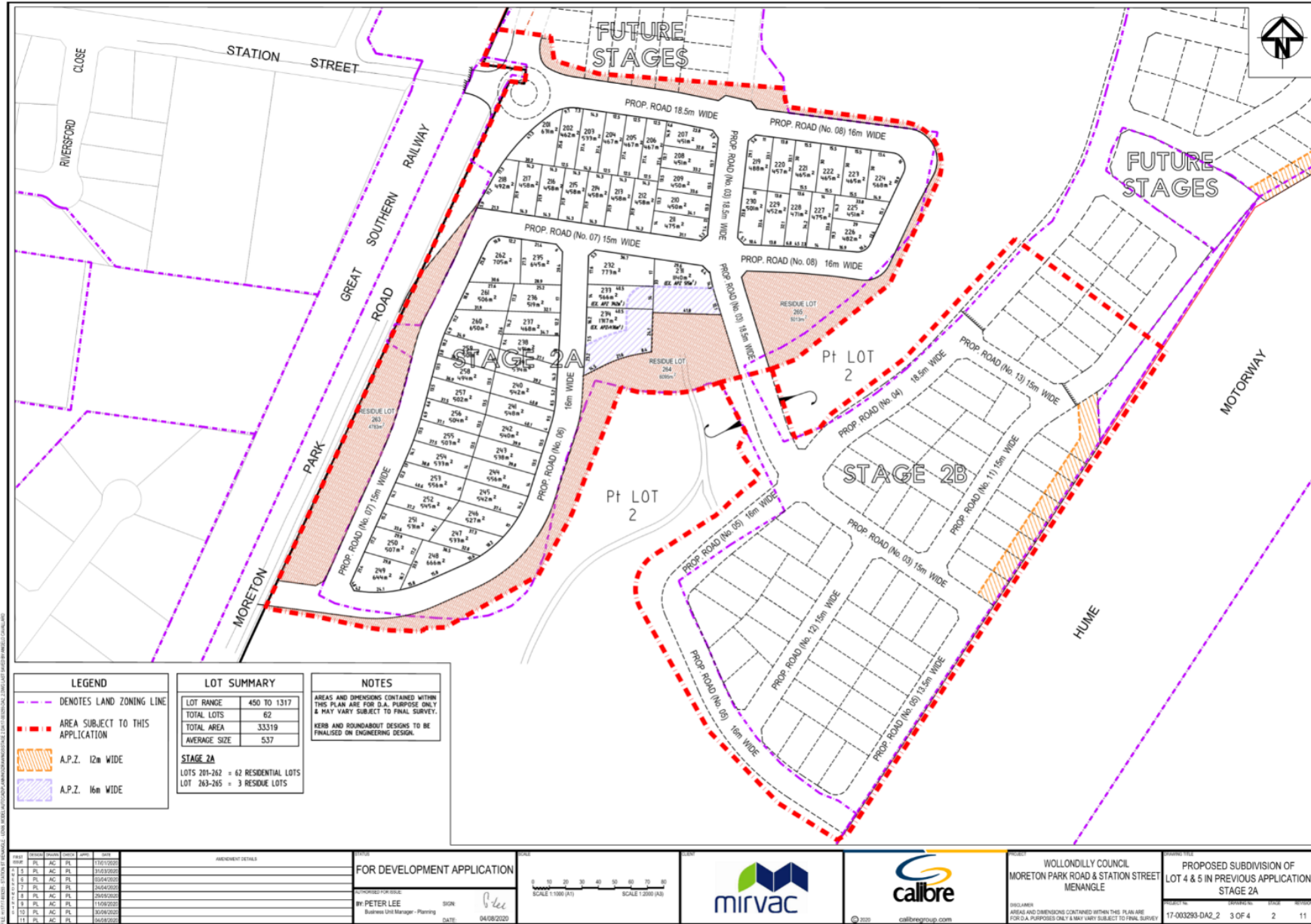
It is therefore concluded that Stage 2 of the proposed residential subdivision would not be expected to have any adverse impacts on the surrounding road network, and that there are no traffic engineering reasons that would preclude the proposed development to proceed.

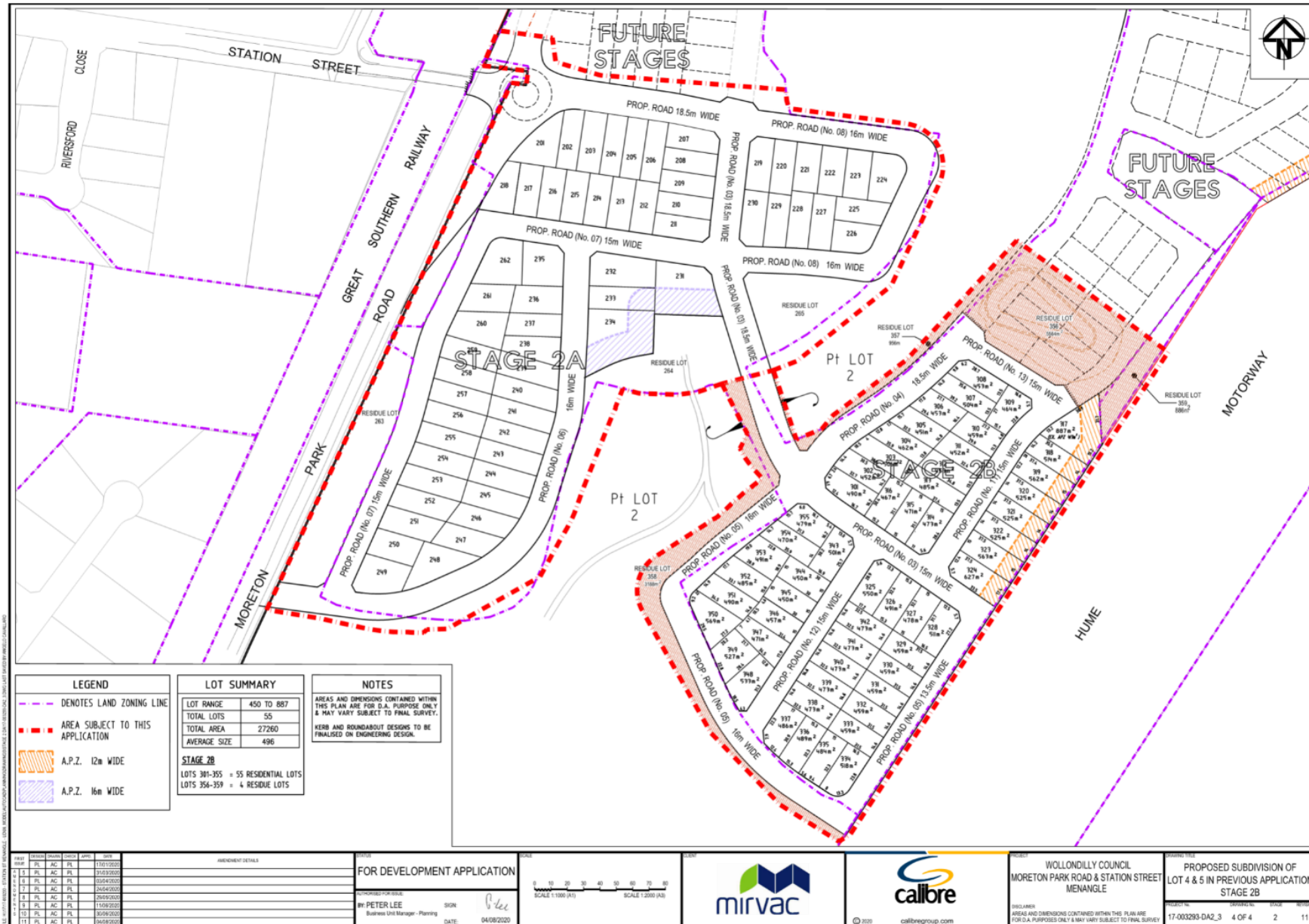


Appendix A Civil Plans









Appendix B Bridge and Roundabout Memo



19 June 2020

Mirvac
Level 28, 200 George Street
SYDNEY, NSW 2000
AUSTRALIA

Dear Aaron,

Station Street Railway Bridge and Moreton Park Road Roundabout Traffic Engineering Statement

Stantec has been asked by Mirvac to prepare a traffic engineering statement regarding the existing and future road network conditions on Station Street and Moreton Park Road in Menangle, NSW.

Background

Mirvac is planning a residential subdivision on the north-eastern side of the Menangle Road / Station Street intersection in Menangle, NSW. Stage 1 of the development comprises 97 homes and is located between Menangle Road and the Southern Highlands Railway Line. A neighbourhood centre, known as 'The Creamery Precinct', is also being planned for this area to the west of the railway line.

To the east of the railway line, Stages 2 to 4 of the Mirvac development are being planned, with vehicle access proposed to be via a new roundabout at Station Street / Moreton Park Road. A detailed layout of the proposed roundabout has been produced by Calibre Consulting Ltd (Calibre) and is provided in **Attachment A**. There is an existing two lane, two-way bridge on Station Street which passes over the railway line, and the existing intersection is currently unsignalised. The existing traffic volumes through the intersection are considered to be low given the level of development along Station Street and Moreton Park Road, and the cross-section of Moreton Park Road toward the south.

The intention of this statement is to provide a preliminary assessment of both the Station Street bridge as well as the appropriateness of a single lane roundabout at Station Street / Moreton Park Road.

Station Street Bridge

The existing Station Street bridge is a two lane, two-way bridge which provides vehicles with a crossing over the railway line in Menangle.

Weekday peak period turning movement counts were commissioned by Stantec on Thursday 3 May 2018 at the Station Street / Moreton Park Road intersection. The peak hours were found to occur from 7:30am to 8:30am during the AM period, and 4:30pm to 5:30pm during the PM period. The peak hour volumes are shown in **Table 1**.

Ref No.: 15444

15444 Bridge Letter 200619 final.docx

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Table 1: Station Street / Moreton Park Road Peak Hour Volumes

Road Name	Approach	AM Peak			PM Peak		
		Light Vehicles	Heavy Vehicles	Total	Light Vehicles	Heavy Vehicles	Total
Moreton Park Road	North	1	0	1	0	0	0
Station Street	East	2	0	2	1	0	1
Moreton Park Road	South	18	0	18	9	1	10
Station Street	West	9	1	10	17	0	17

As can be seen from the volumes, there are relatively low numbers of vehicles passing through the intersections during typical weekday peak hours. Noticeably, there was only one heavy vehicle movement recorded passing through the intersection during both peak hours, travelling from Station Street to Moreton Park Road during the AM peak hour, and in the reverse during the PM peak hour.

The Station Street bridge has a carriageway width of approximately 6.6 metres, accommodating one lane of traffic in each direction. There is currently no provision for pedestrians across the bridge on either side.

Photograph 1 shows the current state of the bridge, looking west from the eastern side. As can be seen from the photographs, there is a vertical element to the bridge that limits vertical sight distance. The Station Street / Moreton Park Road roundabout is proposed to be located approximately 30 metres to the east of the bridge.



Photograph 1: Existing Station Street Bridge

An analysis of the bridge loading capacity of the Station Street Bridge was undertaken by Bridge Design in 2017 and the associated report is given in **Attachment B**. The bridge was found to provide adequate capacity for the application of T44 and HML loads for the following typical vehicle configurations:

- 19m long Semi-trailer (HML 45 tonnes);
- 25/26m B-Double (HML 68 tonnes); and

- Double Road train (HML 85 tonnes).

As a result, it is evident that vehicle mass will not be the limiting factor for this bridge.

The design vehicle was determined by assessing the available space for vehicles to pass one another on the bridge. Vehicle swept paths were undertaken to determine the suitability of the 6.6m-wide bridge to carry two large vehicles travelling in opposite directions. 12.5m long heavy rigid vehicles were found to be the largest vehicles that were able to pass one another with while not overlapping the 300mm clearance boundaries as shown in **Figure 1**. 19m trucks would be able to pass over the bridge one vehicle at a time.

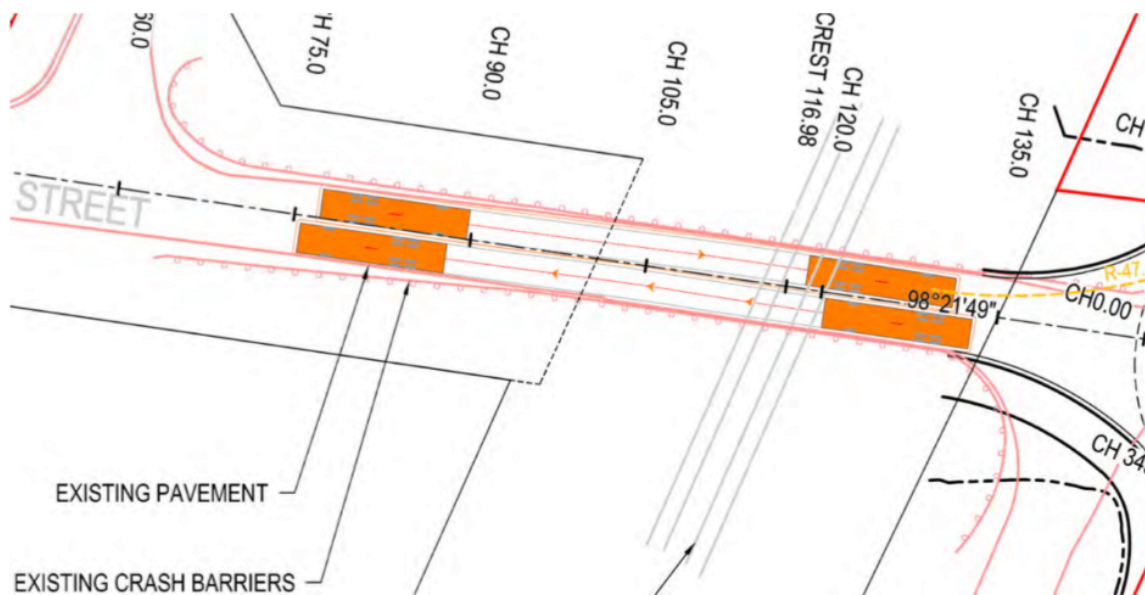


Figure 1: Heavy Rigid Vehicle Swept Paths

As shown previously in **Table 1**, the expected frequency for a heavy vehicle to pass over the bridge is once per peak hour. Swept paths are provided for the design vehicle in **Attachment C**.

Sight Distance Assessment

A desktop vertical sight distance assessment was carried out for vehicles travelling over the Station Street bridge using the longitudinal section centreline provided in **Attachment A**. This assessment considered the proposed roundabout at the intersection of Moreton Park Road / Station Street at a raised level and shifted further east as well as the design level for the Station Street / Stevens Road intersection. Austroads' *Guide to Road Design – Part 4A – Unsignalised and Signalised Intersections* (Austroads part 4A) prescribes the minimum approach sight distance (ASD) to an intersection with the following formula:

$$ASD = \frac{R_T * V}{3.6} + \frac{V^2}{254 * (d + 0.01 * a)}, \text{ where:}$$

ASD = Approach Sight Distance (m);

R_T = Reaction time (seconds);

V = 85th percentile speed (km/h);

d = coefficient of deceleration; and

a = longitudinal grade along the approach(%), with a positive value for uphill grades and a negative value for downhill grades.

The analysis is performed from a driver eye-level of 1.1m for cars and 2.4m for trucks to the stop line (0.0m). Detailed diagrams as well as calculations of all vertical sight distance assessments undertaken are provided in **Attachment D**.

Eastbound Approach to Station Street / Moreton Park Road

The assessment assumptions and minimum ASD values along the eastbound approach to Station Street / Moreton Park Road are summarised in **Table 2**.

Table 2: Eastbound Approach ASD Assessment

Vehicle	R (seconds)	V (km/h)	d	A (%)	Minimum ASD (m)	Available ASD (m)
Car	2	40	0.46	-0.11	35.95	46.63
Truck	2	40	0.29	-0.49	44.31	59.15

As can be seen above, the vertical sight distance from the Station Street bridge to the proposed roundabout meet the minimum values prescribed by Austroads Part 4A.

Westbound Approach to Station Street / Stevens Street

The assessment assumptions and minimum ASD values along the westbound approach to Station Street / Stevens Street are summarised in **Table 3**.

Table 3: Westbound Approach ASD Assessment

Vehicle	R (seconds)	V (km/h)	d	A (%)	Minimum ASD (m)	Available ASD (m)
Car	2	40	0.46	-4.45	37.38	48.63
Truck	2	40	0.29	-2.53	46.02	60.76

As can be seen above, the vertical sight distance from the Station Street bridge to the proposed roundabout meet the minimum values prescribed by Austroads Part 4A.

Signage and Linemarking

An assessment of the existing signage and line marking at the Station Street bridge was made with reference to the *Australian Standards 1742.2 – Traffic Control Devices for General Use* (AS1742.2). Section 4.6.2 states that

edge lines are to be provided along both sides of the roadway on the bridge and in advance of the bridge to guide motorists away from the narrowing kerb along each approach.

The approaches to the bridge should also include width markers in pairs (D4-3 (L) and D4-3 (R)) where the roadway narrows as well as Narrow Bridge signs (W4-1). These signs are shown below in **Figure 2**.



Figure 2: Bridge Signage

Conclusion

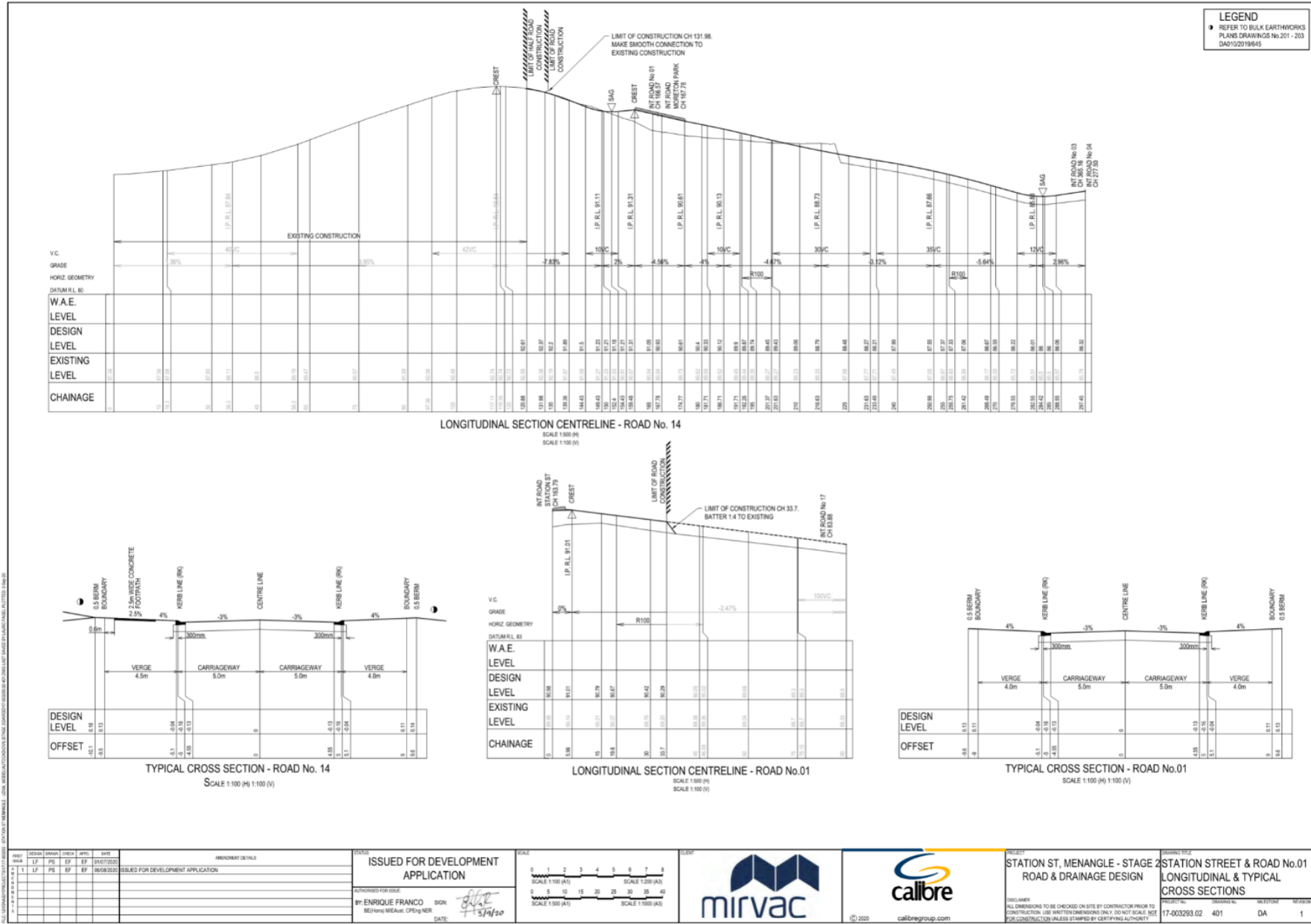
The proposed roundabout at the Station Street / Moreton Park Road intersection is appropriate for the purpose of facilitating the future traffic volumes in the area. Appropriate sight distances have been provided to drivers in the eastbound and westbound directions approaching and departing the roundabout.

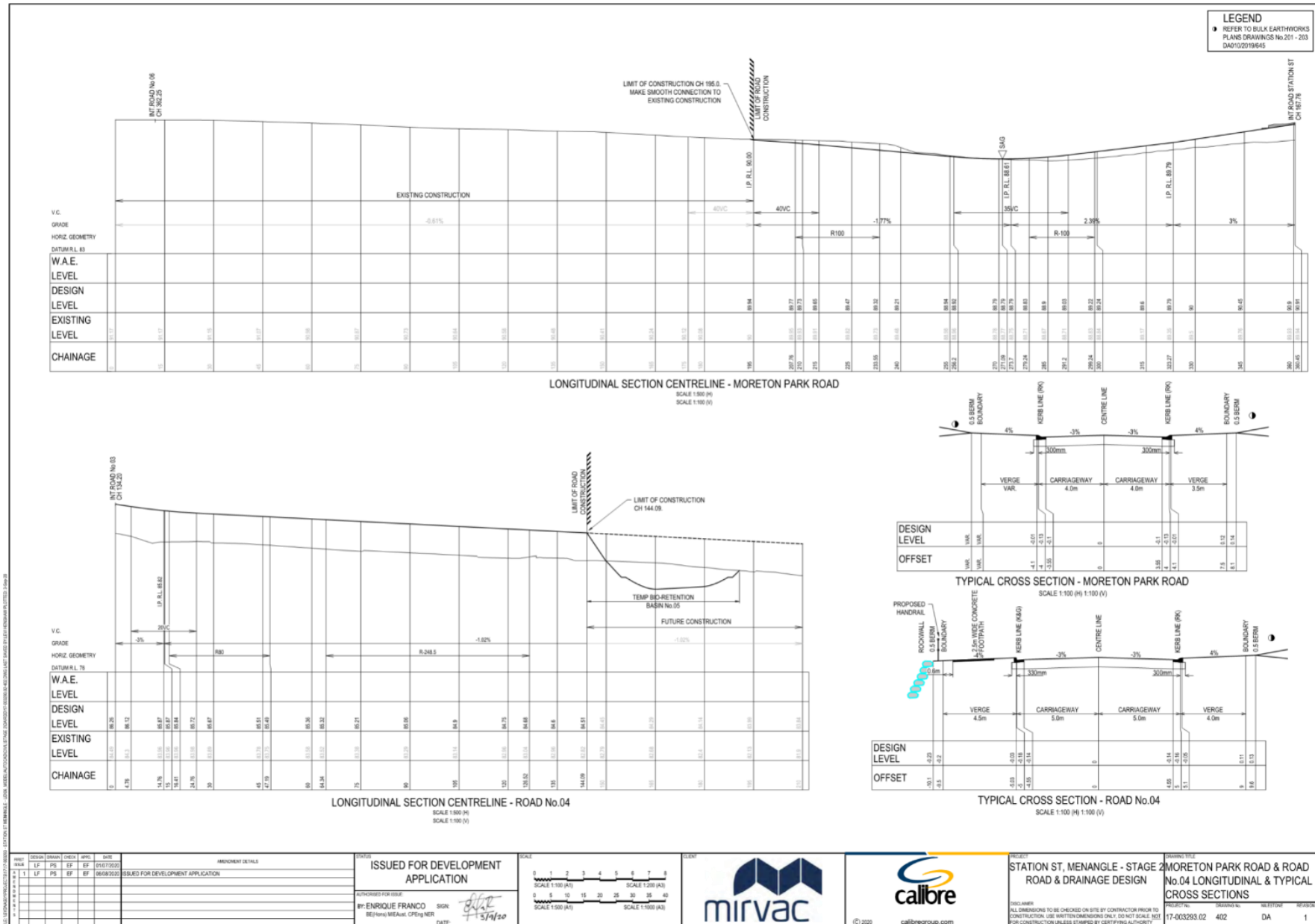
From a traffic engineering perspective, there are no adverse impacts associated with the proposed design. Should you have any further questions, please do not hesitate to contact the undersigned.
Yours sincerely

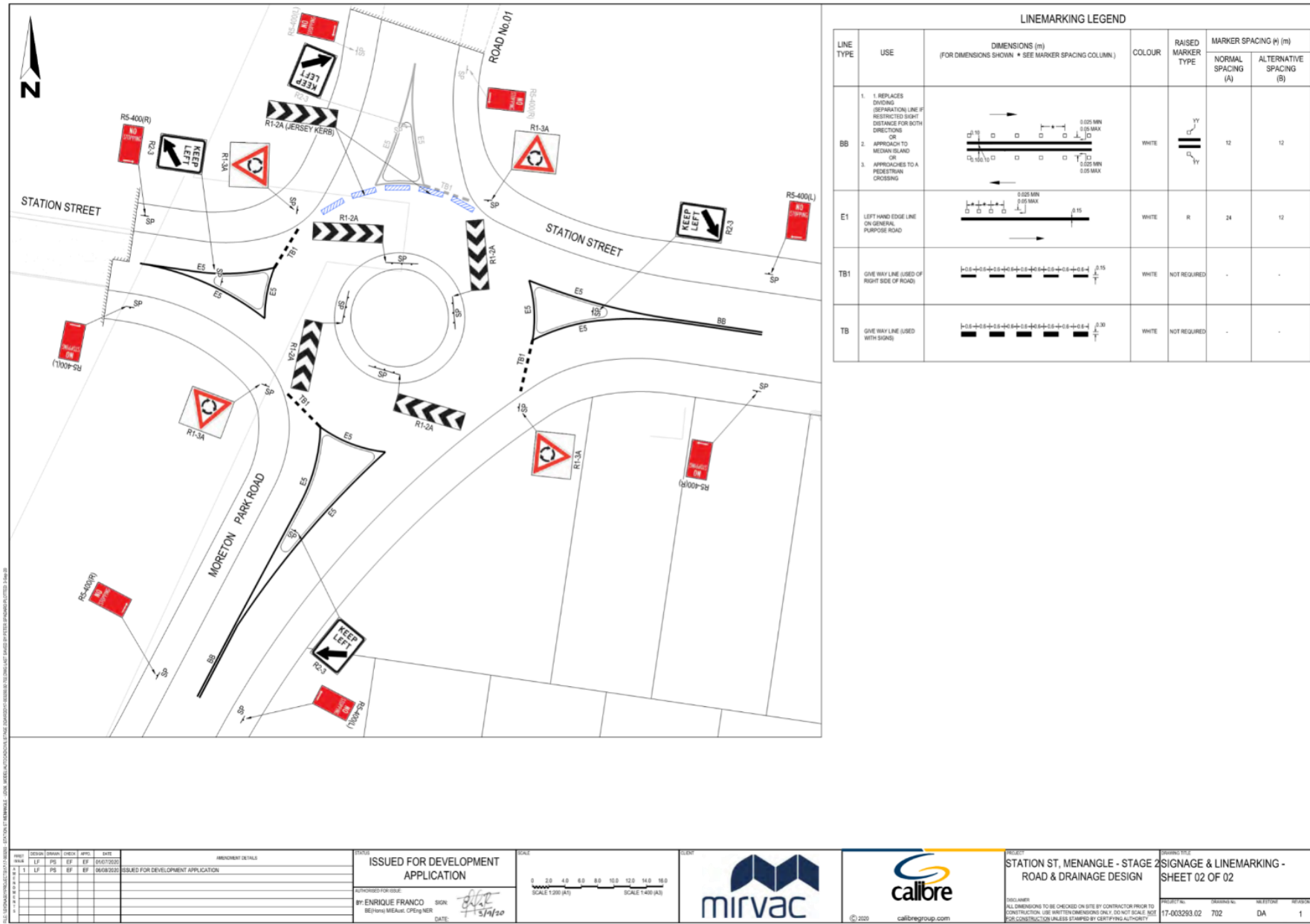
Karan Khanna
Traffic Engineer
Stantec Australia Pty Ltd

Alexandra Kavanagh
Senior Traffic Engineer
Stantec Australia Pty Ltd

Attachment A Roundabout Concept Design Plans







Attachment B Station Street Bridge, Menangle Loading Report

**Station Street Bridge, Menangle
Load Rating Report**

Report no B1716-R-01

Date 13th September 2017



Suite 6, Level 2,
120 Erina Street
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**Station Street Bridge, Menangle
Load Rating Report**

Report no B1716-R-01

Date 13th September 2017

Author: Douglas Anabalon

Station Street Bridge, Menangle Load Rating Report

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3 Site Inspection.....2
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Appendix C: Summary of load ratingA7

1 Summary

This report has been prepared to assist Mirvac developments in the assessment and management of the existing road bridge located on Station street, Menangle to enable the approval of Higher Mass Limits(HML) loads on nominated routes.

A site inspection was undertaken to identify potential defects, which may hinder the performance of the assets under heavier loads. Subject to condition, age and maintenance of structures, several defects were identified during inspection. An inspection report was submitted by Bridge Design for review and used in providing an overall condition assessment of the structural elements. Defects identified included:

- Local exposure of kerb reinforcement
- Spalled concrete on deck surface elements
- Small to fine surface cracks.

Load rating of the structure was undertaken with the use of drawings provided by Wollondilly Shire Council. The drawings confirm the construction age of 1969 and design loading of H20-S16-44 in accordance with the old NAASRA load configuration.

The type of structure consists a three span bridge of an overall length of 29.565m (97'-0") which spans over the Main South railway corridor. Each span consists of 14no. - continuous prestressed precast concrete inverted T-shape girders, commonly used at the time of construction, with in situ concrete cast around the infill to form the running surface. The deck is supported off in situ concrete piers and abutments designed to bear on firm shale foundations.

The load assessment of the existing structure identified no restrictions on the application of T44 loading configuration and no restrictions on the application of HML loads. The bridge was not analysed for SM1600 loading based on current approved loading configurations. Capacity ratios associated with critical members are listed below:

- Girders - 1.23 in positive bending (Span 2)
- Abutment - 1.19 in shear
- Piers - 1.18 in negative bending

2 Background and Description

Bridge Design were engaged by Mirvac to undertake an assessment and load rating of the existing bridge located on Station street, Menangle as part of the consent associated with the Station Street planning proposal for the development of new housing estate.

The existing bridge was constructed in 1969 for Wollondilly Shire Council in order to replace the original bridge which was set at a lower surface level and was also limited to a single lane bridge. The new bridge was designed to cater for increased clearances below the deck soffit, allow for wider rolling stock adopted in the rail network and also allow for increased deck width to cater for two lanes.

The existing bridge is a 25.565m (97'-0") long three span bridge consisting of 8.229m (27'-0") long approach spans and a central span 13.106m (43'-0") long which spans over the main railway tracks. The road alignment is set straight on plan with a vertical

3 Site Inspection

Inspection of the bridge site was undertaken on 18th August 2017 by Douglas Anabalon, experienced in the inspection and assessment of bridge structures. Inspection of the bridge was carried out to conform to a Level 2 condition assessment. Following the inspection on site below is a summary of the defects identified on site. Common defects included:

- Surface corrosion to pedestrian members
- Wearing of the asphalt surface
- Minor surface cracking on deck (Hairline to fine)
- Worn and blocked deck joints.
- Efflorescence through deck joints
- Minor impact damage on kerbs
- Poor back fill compaction and erosion to fill on abutment B

Overall none of the defects identified were considered to effect the behaviour and load performance of the existing bridge.

Significant loss of material material was identified below abutment B. Although not critical to the stability of the bridge, it is considered that ongoing settlement behind the abutment may lead to lateral impact loads applied to the back of the abutment. Observation noted several attempts to repair settlement at road level however it appears that backfill material is being lost from from under the abutment. Part of the problem is the loss of spill through on the front face of the abutment. It is considered that this be rectified by improving the retention and compaction of material behind the abutment.

A report of the condition assessment is located in Appendix A.

4 Load Assessment

This section provides a brief description of the methodology adopted in the assessment of the existing structure followed by the outcome identified in the assessment process of each member.

Station Street Bridge, Menangle Load Rating Report

Methodology

Analysis of the bridge structures was based on existing “Work as Executed” drawings. Member capacities were calculated using limit state design principles, adopting the section and reinforcement properties identified on the drawings. Due to the overall condition of structures being good, no capacity reduction of members was considered due to time in service.

The following material properties were adopted in the analysis:

- Concrete Strength, f'_c : 21 MPa (In situ)
- Pre-stressed plank girders – 40 MPa
- Reinforcement yield stress f_y : 230MPa
- 1/2” (12.7mm) strands, f_{pu} : 37 000lb

The design of the superstructure comprises two span arrangements with identical inverted T-shape profiles of pre-stressed concrete beams however the pre-stress layout within the beams differ to accommodate the requirements of each span. Both approach spans (Span 1 and 3) include a total of 9 – 1/2” diameter strands while the central span (Span 2) includes a total of 15 – 1/2” strands. Minimum shear reinforcement is adopted through the length of the beams and was designed to confirm design codes at the time of design.

The deck thickness varies from 2” at supports to 5-1/2” at midspan of each span with mesh reinforcement near the top surface. A 19mm diameter bar spaced longitudinal at 457mm centres provides minimal lateral connection between adjacent beams at a depth of 485mm from deck surface.

Analysis of the structure was undertaken to assess the impact of T44 loading configuration as a Standard Mass Limit (SML) and HML loads for the potential impacts of construction work over the bridge. The three typical vehicle configurations comprising of HML loads adopted in the analysis included :

- 19m Semi-trailer (HML: 45tonnes)
- 25/26m B-Double (HML: 68 tonnes)
- Double Road train (HML: 85 tonnes)

A diagram showing the configuration of the vehicles is attached in Appendix B.

The above loading configurations were analysed using a grillage model distribution model with each beam element modelled over an effective width of composite properties. Design actions were obtained through design envelopes for the application of each load scenario with trucks modelled on for single lane or dual lane loading. A load case for two lanes loaded centrally with T44 configuration was also modelled to assess for internal design action.

Section members were analysed using current design principles for moment and shear using spreadsheet analysis and assessed against ultimate factored design actions estimated from the modelling tool. Load factors adopted in design of ultimate design actions were in accordance with AS5100.7.

Station Street Bridge, Menangle Load Rating Report

Elements excluded from load rating included:

- Pedestrian barriers
- Elastomeric strip bearings
- wing walls
- Piles and foundations

Results

The table below identifies the load capacity ratios identified for principal members assessed against the load configurations noted above. The table outlines the scenario for both single lane and dual lane scenarios for T44 loads. The third line provides the lowest capacity ratio obtained for HML loads with their respective axle configuration listed below.

Member	Deck (Span 1 and 3)		Deck (Span 2)		Abutments Headstock			Pier Headstock		
	M_+	V	M_+	V	M_+	M_-	V	M_+	M_-	V
1 x T44	3.8	1.4	2.94	1.25	2.31	1.47	1.35	1.83	1.4	2.31
2 x T44	3.35	1.38	2.63	1.23	2.1	1.38	1.18	1.42	1.13	1.78
HML	3.64 (2 x T68)	1.48 (2 x T68)	2.94 (2 x T45)	1.3 (2 x T68)	2.69 (2 x T68)	1.62 (2 x T45)	1.41 (2 x T45)	1.83 (2 x T68)	1.23 (2 x T68)	2.31 (2 x T45)

Note –

- M_+ denotes positive bending capacity ratio
- M_- denotes negative bending capacity ratio
- V – denotes shear capacity ratio, 1.2m from end

Assessment of the structural elements confirmed all members to be structurally adequate to carry T44 and HML loads. The critical members in the structure are identified in the table above. It is noted that the configuration of T44 is more detrimental to short span structures than HML loads due to the separation of axle loads and thus T44 loads can be commonly found to govern.

Considering the current allowable loading configuration approved on the road network analysis of SM1600 load configurations was not undertaken.

5 Conclusion

Based on the details identified through the site inspection and load rating carried out in accordance with the details identified in the construction drawings, the existing structure is considered to provide adequate capacity for the application of T44 and HML loads.

Minor defects identified during the inspection process such as surface rust of pedestrian barriers, impact damage on approach barriers and broken precast panels are considered serviceable issues that should be rectified over the maintenance of the bridge.

Existing settlement and erosion issues identified behind the eastern abutment is considered to cause minor impact issues on the back face of the abutment resulting from lateral impact forces on approach. It is recommended to improve the compaction of material behind the abutment to ensure the prevention of ongoing settlement. Material behind the abutment should be excavated and upgraded using compacted granular material with adequate drainage placed behind the abutment. Fill should be re-instated below the existing abutment with front face sealed using rock or concrete apron.

Station Street Bridge, Menangle Load Rating Report

Appendix A: Load Condition Assessment

- Inspection report
- Site Pictures



Level 3 Condition Assessment Report

Bridge Name	Station St. Overbridge	Road Name	Station Street	Suburb	Menangle	Job no.	B1716
From	To	Descripton		Last inspection	Next Inspection	Latitude	-34.127711
Menangle Road	Moreton Park Rd	road bridge over Main south Railway		unknown		Longitude	150.743139
LGA	Wollondilly	Inspector	D. Anabalon	Inspection type			
Weather	Fine, Windy	Date	18/08/2017	Equipment		Visual Binoculars hand tools	
Constructed	1970	Structure type		Prestressed concrete girder			
Overall length	29.5 m	Bridge details		Spans	Piers	Walkway	Barriers
Overall width	8.5 m	Number off		3	2	0	2
Deck width	6.7 m	Material		Concrete	Concrete	0	steel
Skew	15 deg.	Length		8.23/13.1/8.23	8.5	-	59.15
Crossfall	2% Each way	Height		0.675	0.76	-	1.1
No of lanes	2	Width		m	0.61	-	

Condition Rating Report

Element Type	RMS Code	Description	Environment	Quantity <i>*estimated</i>	Units	Condition rating (%)			
						1	2	3	4
Concrete	CPRG	Concrete - Pretensioned girders	L	1017	m ²	98	2		
	CPHS	Concrete- pier headstock	L	144	m ²	100	0		
	CPIR	Concrete- Pier columns	L	61	m ²	98	2		
	CABW	Concrete - Abutments and Wing walls	L	54	m ²	100			
	CPIL	Concrete - piles	-	0	m ²	100			
Joints	CDSL	Concrete - deck slab (top & btm)	M	252	m ²	85	15		
	JPOS	Pourable seal	M	18	lin. M		15	65	20
Bearings	BELA	Elastomeric bearing strip	M	53	lin.m	90	10		
	RMET	Metal railing - Guardrail	M	100	lin. m	80	10	10	
Bridge Railing	RCON	Concrete Bridge End posts	L	4	each	50	25		25
	RMET	Metal railing - Pedestrian	M	59	lin. m		80	20	
Miscellaneous	RPNT	Railing paint work	M	59	lin. m		65	35	
	MAPP	approach carriageway	M	2	no. off	10	40	40	10
	MATT	Misc. attachments - signage	L	2	item	90	10		
	MATT	Misc. attachments - Precast concrete lids	M	39	each	90		10	
	MGCL	Misc. - General cleaning	L	3	span	75	10	5	10
	MWES	Wearing Surface	M	198	m ²	85	15		



Condition Assessment - Detailed Inspection Notes

Bridge Name Station St. Overbridge **Road Name** Station Street **Suburb** Menangle

From Menangle Road **To** Moreton Park Rd **Description** road bridge over Main south Railway

Detailed inspection Notes

Span	Member	Location	Material	Defects	Condition	Image
Abutment A	Approach road	20m from abutment A, Both lanes	Asphalt	Road surface displays several pot holes up to 150mm in diameter 30mm deep	2	104
		5m behind Abutment A	Asphalt	Previous repairs have failed and pot holes are have re-appeared Road surface is cracked and displays minor settlement	2 2	102 104
	Service Duct	Country end, immediately behind abutment	PVC	Duct is dislodged and exposing communications cable.	3	106
	General	Wingwall ends of Abutment	General	Overgrown vegetaion around abutments.	1	96
Span 1	Deck	Top surface, overall	asphalt	10% Surface loss of asphalt exposing deck concrete slab	1	128
	Deck	Construction Joint	Concrete	Efflorescence noted from underside along full length of joint.	1	93
	Ped. Barriers	Southern barrier panel	Steel	Minor loss of paintwork.	1	108
				Low level of surface rust on base of balusters	1	
Ped. Barriers	Northern Barrier panel	Steel	Nuts on base plate display low level of surface rust	1	112	
			Minor loss of paintwork.	1	154	
Pier 1	Columns	Base of columns No. 1	Concrete	Nuts on base plate display low level of surface rust	1	
				Fine Cracks, <1.0mm wide observed on country side and side facing railway line	2	86
	Columns	Base of Column No. 2	Concrete	Loose concrete and evidence of potential spalling observed around the base. Fine Cracking observed on north face of surface concrete	2 1	87 88
Span 2	Deck	Top surface, overall Construction Joint	asphalt	5% Surface loss of asphalt exposing deck concrete slab	1	129
			Concrete	Efflorescence noted from underside of deck along full length of joint.	1	79
	Deck Joint	Between Span 1 and 2	seal	joint seal is worn, sealed with dirt and non functional.	3	132



Condition Assessment - Detailed Inspection Notes

Bridge Name Station St. Overbridge **Road Name** Station Street **Suburb** Menangle

From Menangle Road **To** Moreton Park Rd **Description** road bridge over Main south Railway

Detailed inspection Notes

Span	Member	Location	Material	Defects	Condition	Image
	Ped. Barriers	Southern barrier panel	Steel	Moderate degree of surface rust (35%) with loss of paintwork.	2	114
				Cracking of grout pads on Post No. 8 and 9	1	
	Ped. Barriers	Northern Barrier panel	Steel	Moderate degree of surface rust (20%) with loss of paintwork.	1	153
				4 midspan balusters display high degree of local rust	2	151
				Mispan post (no.8 from deck end) displays local damage	2	152
				Local cracking of grout pads	1	
Pier 2	Column	Column No. 3	Concrete	Fine cracking noticed near base of column.	1	
Span 3	Deck	Top surface, overall	asphalt	45% Surface loss of asphalt exposing deck concrete slab	1	136
		Construction Joint	Concrete	Efflorescence noted from underside along full length of joint, between girders 7 and 8	1	63
		Edge kerb, south side	concrete	East end of kerb cracked and damaged. Loose with exposed reinforcement	3	127
Deck Joint	End post, north face Between Span 2 and 3	Concrete seal	Concrete seal	Missing concrete end post	4	146
				joint seal is worn, sealed with dirt and non functional.	3	135
	Ped. Barriers	Southern barrier panel	Steel	15% surface rust with loss of paintwork. minor cracking of grout pads.	1	
	Ped. Barriers	Northern Barrier panel	Steel	50% to 60% surface rust with significant loss of paintwork.	3	145
	Guardrail	South East corner	Steel	Barrier frame has minor bend near the end of the bridge. rail damaged from impact and bolts dislodged from kerb	4	149 125
Abutment B	Embankment	Spill through embankment.	Earthwork	Moderate scour located under the northern end of existing abutment 150mm to 300mm of exposure below the soffit of abutment	3	66 82
				Minor surface tension crack of spill through around pile No. 2	2	
Approach road	North East corner, immediately behind abutment		asphalt	Road surface displays moderate settlement. Possibly associated with scour occurring below abutment	3	141 142
				rough and uneven transition onto bridge	1	141
				Impact on post and rail. Minor displacement	2	143
	Guardrail	North East corner, 2nd post from end of bridge	Steel	Duct is dislodged and exposing communications cable.	1	118
	Service Duct	South East corner	PVC			



Condition Assessment - Detailed Inspection Notes

Bridge Name Station St. Overbridge **Road Name** Station Street **Suburb** Menangle

From Menangle Road **To** Moreton Park Rd **Description** road bridge over Main south Railway

Detailed inspection Notes

Span	Member	Location	Material	Defects	Condition	Image
General	Precast panel	Over service ducts	concrete	3 precast lids , No. 5, 29 and 35 broken. No. 39 chipped.	1	107
General	Overall	abutments and under deck	Concrete	Minor degree of graffiti, not of offensive nature on concrete members.	1	66
				Out of direct sight		

Station Street Bridge, Menangle Load Rating Report

Site Images



Plate 1 - General view of bridge



Plate 2 - Surface view of deck

Station Street Bridge, Menangle Load Rating Report



Plate 3 - Approach to Abutment B



Plate 4 - Erosion below abutment



Plate 5 - Depth of erosion (300mm)



Plate 6 - Impact damage to rail and kerb



Plate 7 - Cracked kerb with exposed reinforcement

Station Street Bridge, Menangle Load Rating Report

Appendix B: HML load Configurations

- 19m Semi-trailer (HML: 45tonnes)
- 25/26m B-Double (HML: 68 tonnes)
- Double Road train (HML: 85 tonnes)

Higher Mass Limits (HML) Vehicle Axle Spacings and Vertical Loads

Vehicle	Description	Sketch not to scale
Semi-trailer HML	Restricted Access Vehicle (45.5t gross mass)	<p style="text-align: right;">Length 11.0m</p>
B-Double HML	Restricted Access Vehicle (68t gross mass)	<p style="text-align: right;">Length 21.0m</p>
Road Train HML	Restricted Access Vehicle (85t gross mass)	<p style="text-align: right;">Length 27.24m</p>

Station Street Bridge, Menangle Load Rating Report

Appendix C: Summary of load rating



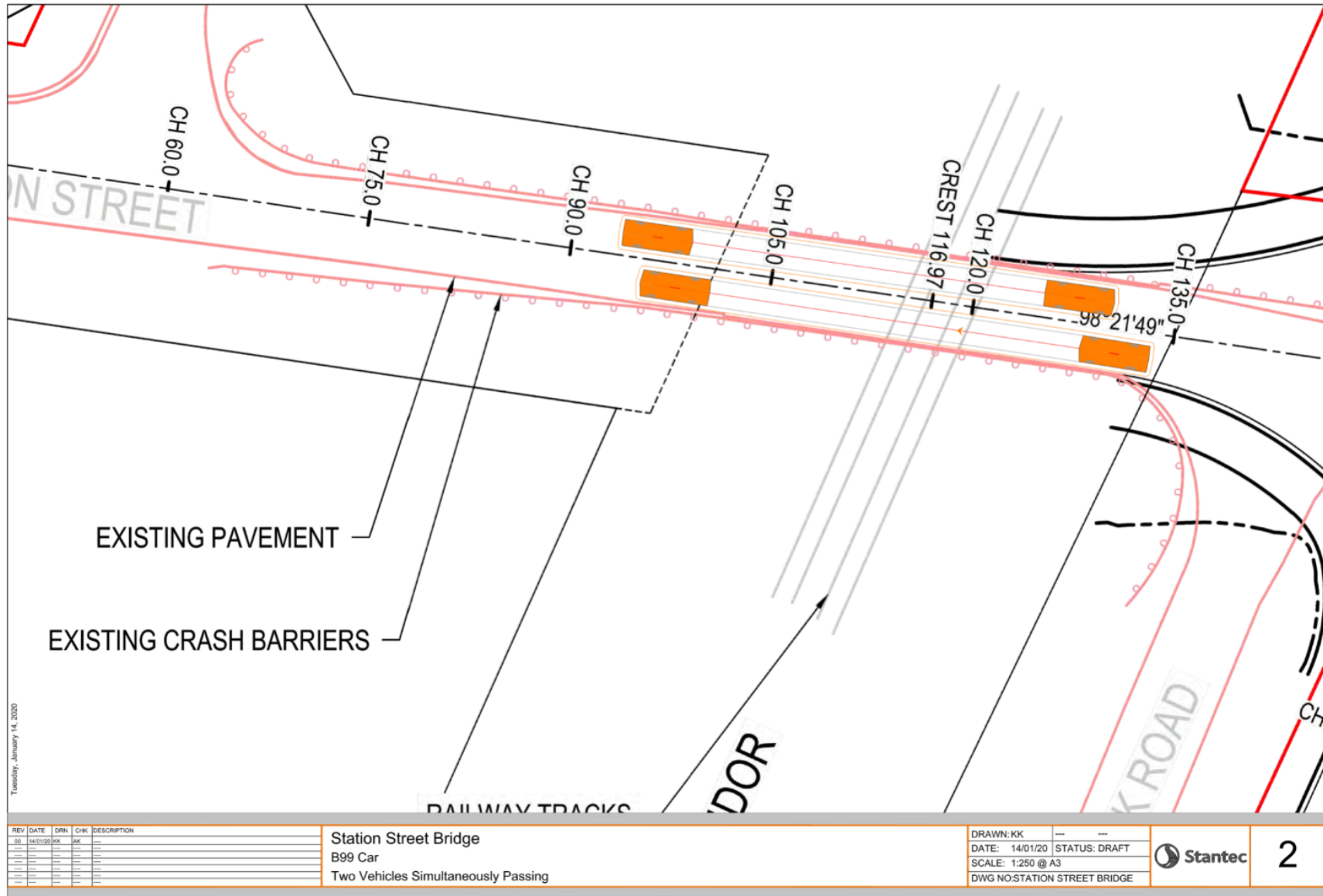
Load Rating Capacity Ratios

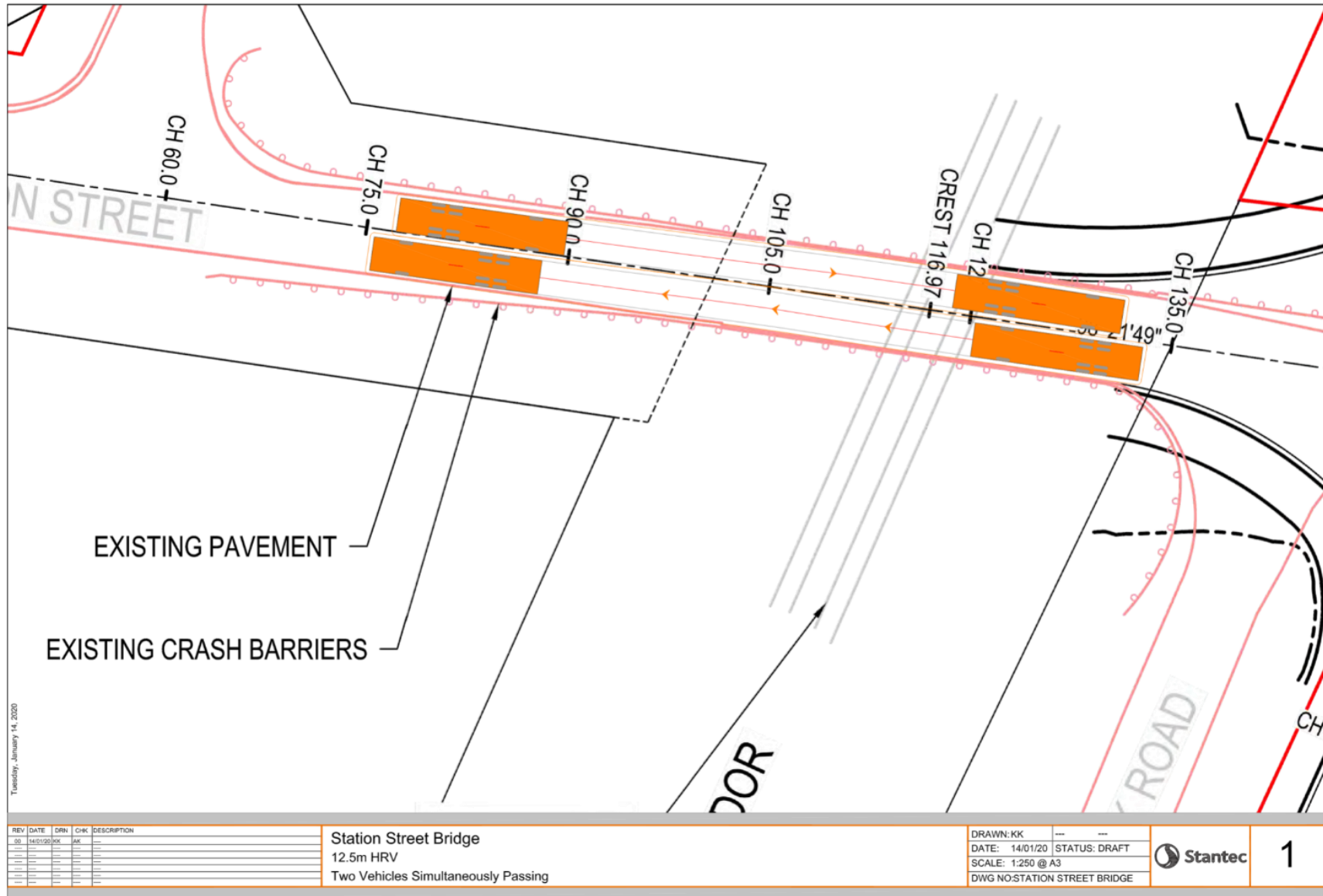
Bridge Station Street bridge
Site Station Street, Menangle
Structure Type Prestressed Precast inverted T beams with cast in situ slab
Assessment Capacity ratios under T44 and HML loading

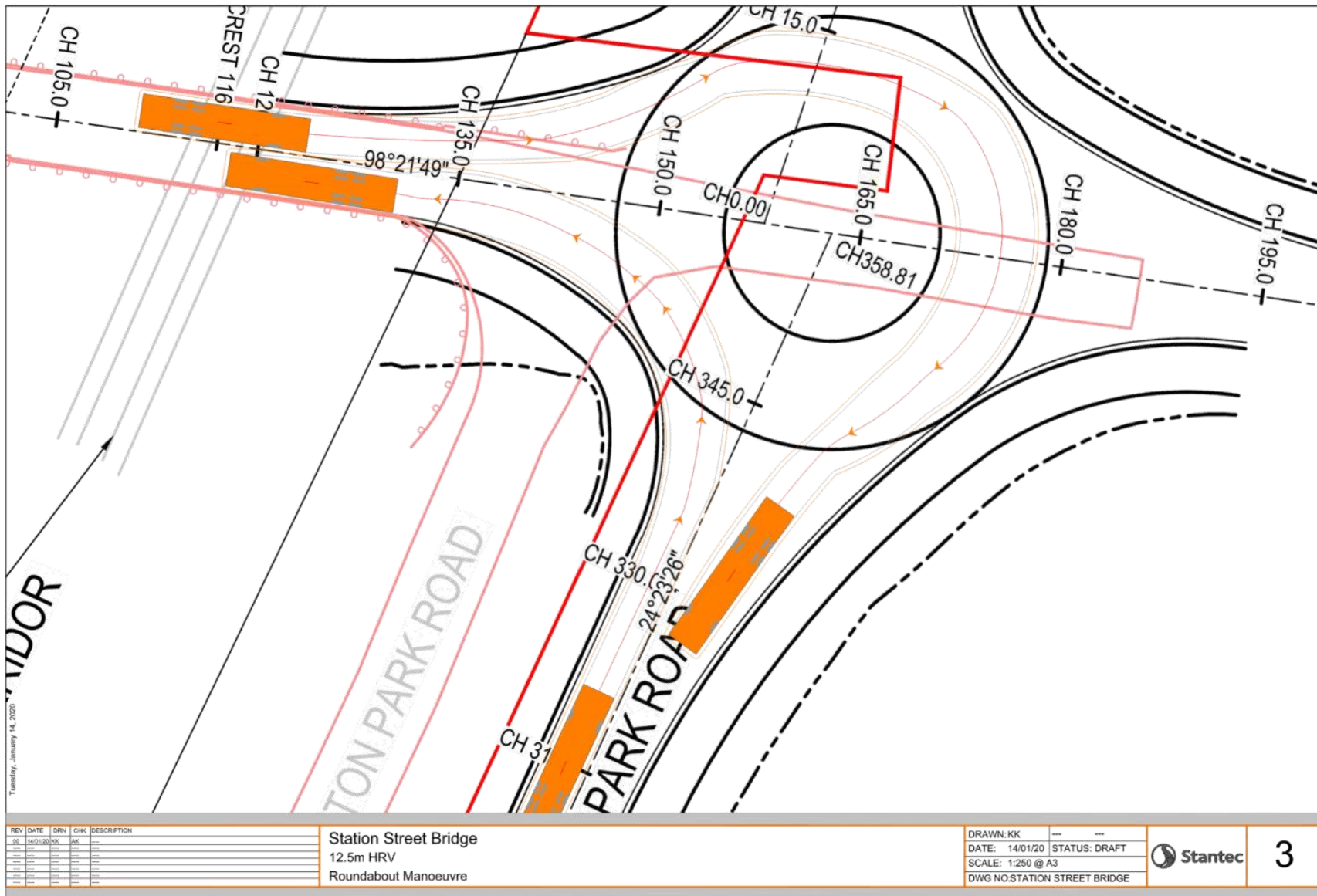
Load Configuration	Deck Span 1 and 3		Deck Span 2		Abutment Headstock			Pier Headstocks		
	M+	V	M+	V	M+	M-	V	M+	M-	V
1 x T44	3.80	1.41	2.94	1.25	2.31	1.47	1.35	1.83	1.4	2.31
1 x T44 edge	3.52	1.38	2.67	1.23	2.4	1.47	1.35	1.73	1.2	2.22
1 x T44 Centrally	3.35	1.38	2.63	1.25	2.1	1.36	1.19	1.77	1.18	2.18
1 x T45.5	4.12	1.56	3.25	1.34	2.76	1.78	1.48	1.91	1.43	2.38
1 x T45.5	3.68	1.48	2.94	1.34	2.75	1.62	1.41	1.85	1.23	2.31
1 x T68	4.17	1.56	3.44	1.39	2.89	2.03	1.6	1.98	1.44	2.48
1 x T68	3.64	1.48	3.09	1.30	2.69	1.73	1.54	1.83	1.23	2.39
1 x T85	4.12	1.60	3.44	1.42	2.98	2.02	1.59	1.95	1.44	2.47
1 x T85	3.64	1.48	3.09	1.32	2.69	1.72	1.54	1.83	1.23	2.39
<i>Min Cap Ratios</i>	3.35	1.38	2.63	1.23	2.10	1.36	1.19	1.73	1.18	2.18

Attachment C

Swept Paths







REV	DATE	DRN	CHK	DESCRIPTION
00	14/01/20	KK	AK	

Station Street Bridge
 12.5m HRV
 Roundabout Manoeuvre

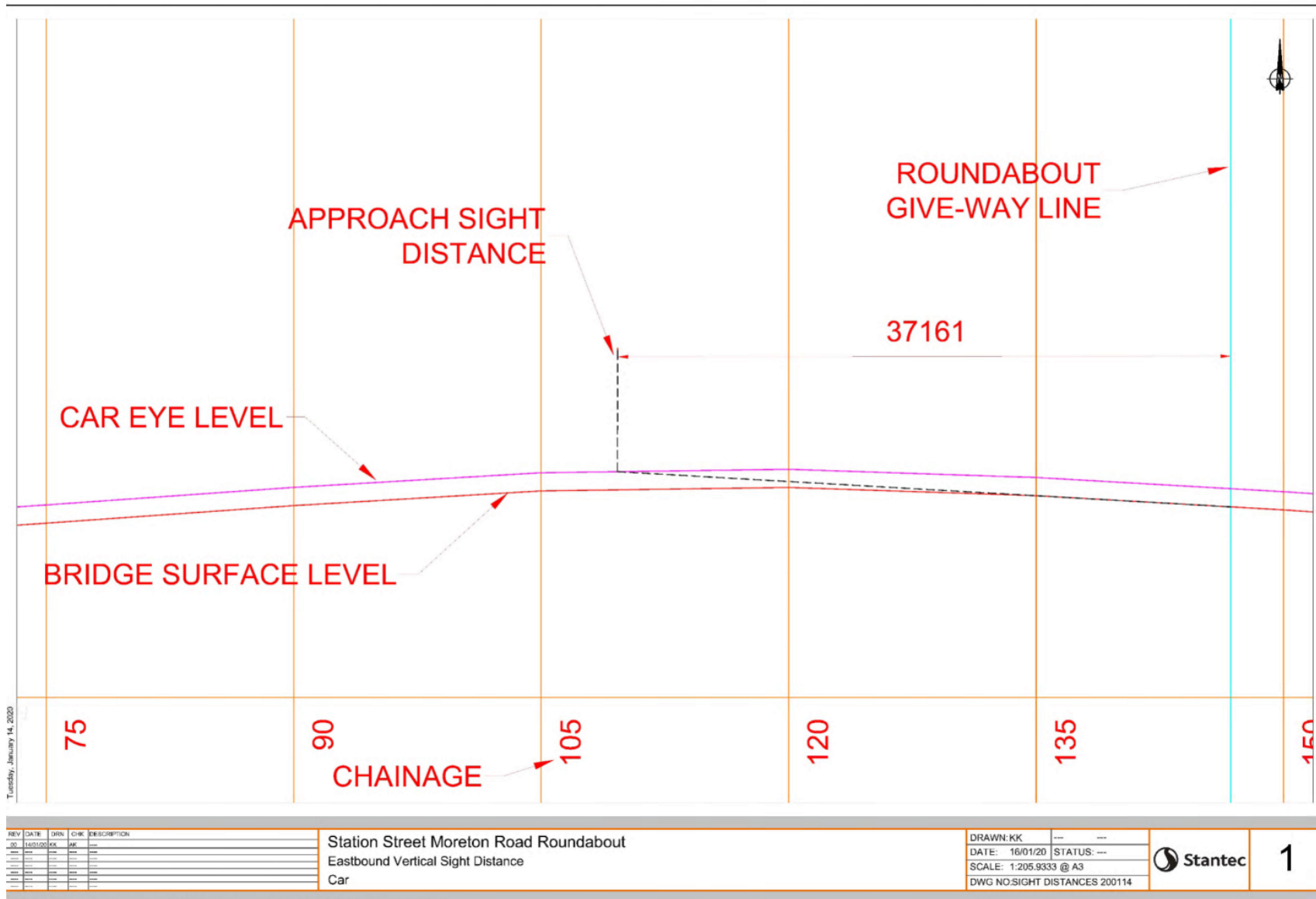
DRAWN: KK
 DATE: 14/01/20
 SCALE: 1:250 @ A3
 DWG NO: STATION STREET BRIDGE

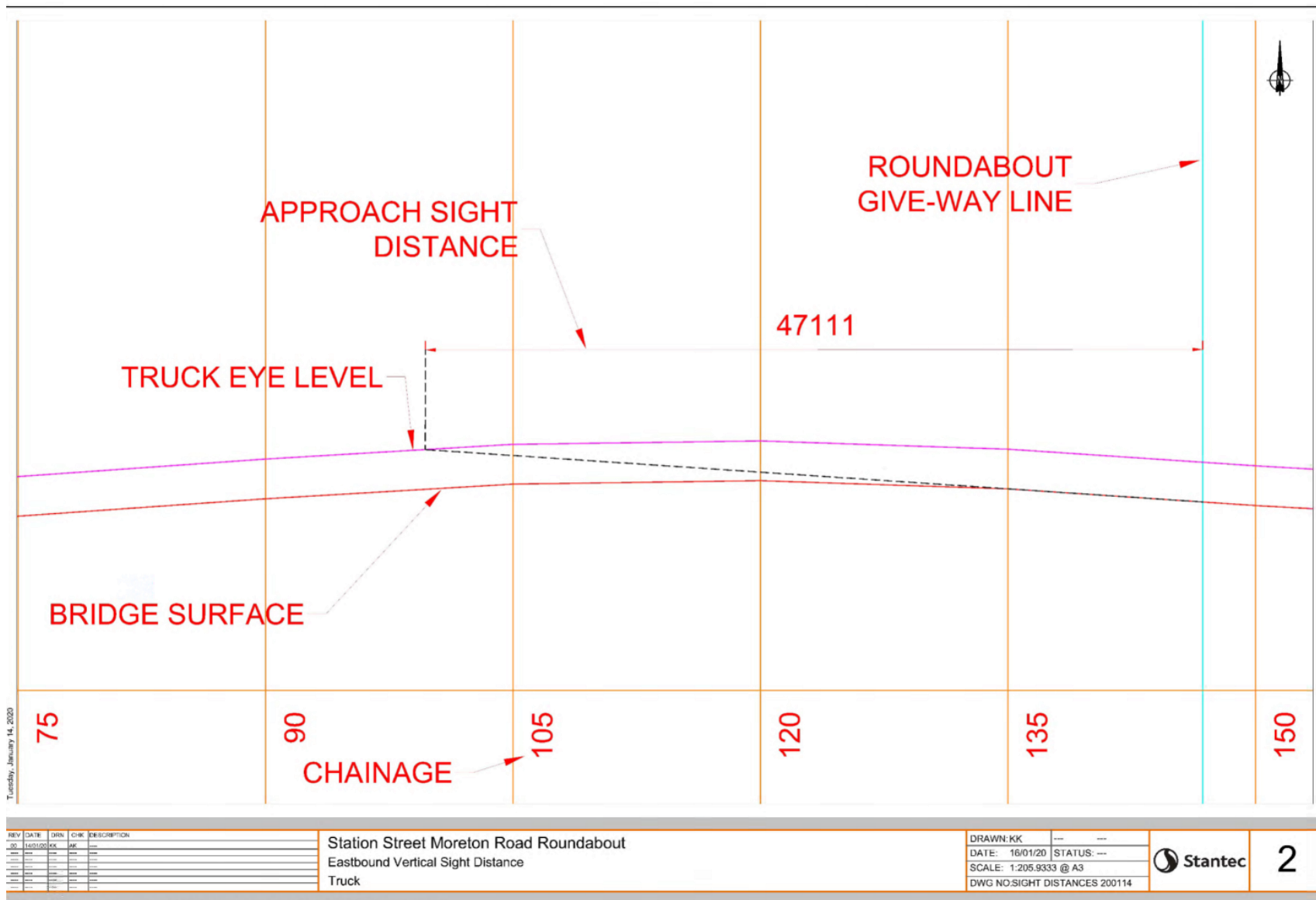

3

P:\Projects\... Projects 2019 Onwards\300303007 - Mirvac Menangle\DWGs\STANTEC\Station Street Bridge.dwg

Attachment D

Sight Distance Assessment





Appendix C Traffic Survey Results

TRANS TRAFFIC SURVEY

TURNING MOVEMENT SURVEY
 Intersection of Mengangle Rd and Station St, Menangle

Date:	Thu 03/05/18
Weather:	Fine
Suburban:	Menangle
Customer:	TDG

North:	Mengangle Rd
East:	Station St
South:	Mengangle Rd
West:	Woolbridge Rd

Survey Start	AM: 7:00	PM: 16:00
Vehicular Peakhour	Pedestrians Peakhour	
AM:	7:30 AM-8:30 AM	AM: N/A
PM:	4:30 PM-5:30 PM	PM: N/A

All Vehicles		North Approach Mengangle Rd				East Approach Station St				South Approach Mengangle Rd				West Approach Woolbridge Rd				Hourly Total	
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	Hour	Peak
7:00	7:15	0	23	16	1	0	4	0	1	0	1	42	4	0	1	1	75	809	
7:15	7:30	0	15	10	1	0	4	4	1	0	1	51	2	0	0	0	71	904	
7:30	7:45	0	24	13	2	0	5	2	0	0	0	66	5	0	0	0	101	1015	Peak
7:45	8:00	0	25	22	3	0	4	2	0	0	1	81	3	0	3	1	117	1014	
8:00	8:15	0	26	19	2	0	6	4	4	0	3	86	1	0	0	2	111	893	
8:15	8:30	0	46	34	2	0	8	4	2	0	0	68	3	0	1	3	100	775	
8:30	8:45	0	45	24	3	0	7	1	0	0	1	59	2	0	1	4	70	646	
8:45	9:00	0	30	13	1	0	5	0	2	0	2	45	3	0	3	2	35	552	
9:00	9:15	0	24	19	5	0	4	2	0	0	3	41	5	0	2	1	40	514	
9:15	9:30	0	20	15	4	0	2	2	0	0	1	42	3	0	4	3	46		
9:30	9:45	0	20	21	2	0	4	5	1	0	1	39	3	0	3	1	23		
9:45	10:00	0	16	14	2	0	2	1	0	0	0	32	3	0	2	3	28		
16:00	16:15	0	69	46	7	0	3	4	2	0	0	25	3	0	3	2	35	848	
16:15	16:30	0	75	56	6	0	3	5	0	0	1	31	1	0	2	0	32	871	
16:30	16:45	0	68	57	5	0	2	2	0	0	1	45	5	0	3	2	42	891	Peak
16:45	17:00	0	70	52	4	0	1	0	1	0	1	25	1	0	0	2	48	878	
17:00	17:15	0	70	75	4	0	2	10	2	0	2	25	1	0	1	1	29	884	
17:15	17:30	0	77	75	9	0	3	1	0	0	0	25	2	0	2	0	38	825	
17:30	17:45	0	55	72	6	0	3	1	2	0	1	30	2	0	2	0	45	748	
17:45	18:00	0	72	55	6	0	4	0	0	0	0	33	3	0	3	0	35	659	
18:00	18:15	0	64	40	6	0	1	3	1	0	1	18	5	0	3	0	21	565	
18:15	18:30	0	70	41	7	0	3	0	0	0	0	16	1	0	0	0	17		
18:30	18:45	0	46	35	3	0	1	1	0	0	0	18	1	0	2	0	23		
18:45	19:00	0	37	31	3	0	1	1	0	0	0	16	1	0	6	2	19		

Peak Time		North Approach Mengangle Rd				East Approach Station St				South Approach Mengangle Rd				West Approach Woolbridge Rd				Peak total	
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L		
7:30	8:30	0	121	88	9	0	23	12	6	0	4	301	12	0	4	6	429	1015	
16:30	17:30	0	285	259	22	0	8	13	3	0	4	120	9	0	6	5	157	891	

TRANS TRAFFIC SURVEY 

TURNING MOVEMENT SURVEY

trafficsurvey.com.au

Intersection of Moreton Park Rd and Station St, Menangle

Date:	Thu 03-05-18
Weather:	Fine
Suburban:	Menangle
Customer:	TDG

North:	Moreton Park Rd
East:	Station St
South:	Moreton Park Rd
West:	Station St

Survey Start	AM: 7:00	PM: 16:00
Vehicular Peakhour	Pedestrians Peakhour	
AM: 7:30 AM-8:30 AM	AM: N/A	
PM: 4:30 PM-5:30 PM	PM: N/A	

All Vehicles

Time		North Approach Moreton Park Rd				East Approach Station St				South Approach Moreton Park Rd				West Approach Station St				Hourly Total	
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	Hour	Peak
7:00	7:15	0	0	0	0	0	0	0	0	0	0	0	6	0	2	0	0	28	
7:15	7:30	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	27	
7:30	7:45	0	0	0	0	0	1	0	0	0	0	0	5	0	2	1	0	31	Peak
7:45	8:00	0	1	0	0	0	0	0	0	0	0	0	4	0	2	0	0	29	
8:00	8:15	0	0	0	0	0	0	0	0	0	0	0	6	0	1	0	0	29	
8:15	8:30	0	0	0	0	0	0	1	0	0	0	0	3	0	3	1	0	25	
8:30	8:45	0	0	0	0	0	0	2	0	0	0	0	2	0	2	1	0	25	
8:45	9:00	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	21	
9:00	9:15	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	20	
9:15	9:30	0	0	0	0	0	0	0	0	0	0	0	3	0	5	0	0		
9:30	9:45	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0		
9:45	10:00	0	0	0	0	0	0	0	0	0	0	0	2	0	4	0	0		
16:00	16:15	0	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	24	
16:15	16:30	0	1	0	0	0	0	0	0	0	0	0	3	0	4	0	0	27	
16:30	16:45	0	0	0	0	0	0	0	0	0	0	0	1	0	5	0	0	28	Peak
16:45	17:00	0	0	0	0	0	0	0	1	0	0	0	3	0	2	0	0	26	
17:00	17:15	0	0	0	0	0	0	0	0	0	0	0	4	0	3	0	0	23	
17:15	17:30	0	0	0	0	0	0	0	0	0	0	0	2	0	7	0	0	24	
17:30	17:45	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	18	
17:45	18:00	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	16	
18:00	18:15	0	0	0	0	0	0	0	0	0	0	0	3	0	5	0	0	17	
18:15	18:30	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0		
18:30	18:45	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0		
18:45	19:00	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0		

Peak Time		North Approach Moreton Park Rd				East Approach Station St				South Approach Moreton Park Rd				West Approach Station St				Peak total
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	
7:30	8:30	0	1	0	0	0	1	1	0	0	0	0	18	0	8	2	0	31
16:30	17:30	0	0	0	0	0	0	0	1	0	0	0	10	0	17	0	0	28

Appendix D SIDRA Movement Summaries

MOVEMENT SUMMARY

Site: 101v [Menangle Road - Station Street - Existing - AM Peak]

Menangle Road / Station Street
Existing AM Peak
7:30am - 8:30am
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Menangle Road											
1	L2	13	0.0	0.162	4.7	LOS A	0.0	0.3	0.01	0.03	49.3
2	T1	317	4.3	0.162	0.0	LOS A	0.0	0.3	0.01	0.03	49.8
3	R2	4	0.0	0.162	4.9	LOS A	0.0	0.3	0.01	0.03	49.4
Approach		334	4.1	0.162	0.2	NA	0.0	0.3	0.01	0.03	49.8
East: Station Street											
4	L2	6	0.0	0.005	7.8	LOS A	0.0	0.1	0.19	0.87	45.0
5	T1	13	0.0	0.112	10.9	LOS A	0.4	2.5	0.70	0.99	41.0
6	R2	24	0.0	0.112	19.5	LOS B	0.4	2.5	0.70	0.99	41.1
Approach		43	0.0	0.112	15.3	LOS B	0.4	2.5	0.62	0.97	41.6
North: Menangle Road											
7	L2	9	11.1	0.150	5.9	LOS A	0.8	5.6	0.41	0.35	46.5
8	T1	93	8.0	0.150	1.1	LOS A	0.8	5.6	0.41	0.35	47.1
9	R2	127	0.8	0.150	5.9	LOS A	0.8	5.6	0.41	0.35	46.7
Approach		229	4.1	0.150	4.0	NA	0.8	5.6	0.41	0.35	46.9
West: Woodbridge Road											
10	L2	452	1.6	0.463	10.4	LOS A	3.2	22.7	0.54	0.99	44.0
11	T1	6	0.0	0.463	13.6	LOS A	3.2	22.7	0.54	0.99	43.9
12	R2	4	25.0	0.463	18.5	LOS B	3.2	22.7	0.54	0.99	43.7
Approach		462	1.8	0.463	10.5	LOS A	3.2	22.7	0.54	0.99	44.0
All Vehicles		1068	3.0	0.463	6.1	NA	3.2	22.7	0.35	0.55	46.2

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.

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Organisation: MWH NEW ZEALAND LIMITED | Processed: Wednesday, February 5, 2020 9:50:31 AM

Project: P:\Projects_Projects 2019 Onwards\300303007 - Mirvac Menangle\SIDRA\15444 SIDRA - November 2019.sip7

MOVEMENT SUMMARY

Site: 101v [Menangle Road - Station Street - Existing - PM Peak]

Menangle Road / Station Street
 Existing PM Peak
 4:30pm - 5:30pm
 Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Menangle Road											
1	L2	9	0.0	0.068	4.9	LOS A	0.0	0.3	0.04	0.05	49.1
2	T1	126	0.8	0.068	0.1	LOS A	0.0	0.3	0.04	0.05	49.6
3	R2	4	0.0	0.068	5.6	LOS A	0.0	0.3	0.04	0.05	49.2
Approach		140	0.8	0.068	0.5	NA	0.0	0.3	0.04	0.05	49.5
East: Station Street											
4	L2	3	0.0	0.003	8.5	LOS A	0.0	0.1	0.35	0.82	44.8
5	T1	14	0.0	0.060	12.9	LOS A	0.2	1.4	0.67	1.00	41.7
6	R2	8	12.5	0.060	19.3	LOS B	0.2	1.4	0.67	1.00	41.6
Approach		25	4.2	0.060	14.5	LOS A	0.2	1.4	0.63	0.97	42.0
North: Menangle Road											
7	L2	23	0.0	0.334	5.1	LOS A	2.0	14.0	0.28	0.28	47.2
8	T1	273	1.9	0.334	0.5	LOS A	2.0	14.0	0.28	0.28	47.6
9	R2	300	0.0	0.334	5.2	LOS A	2.0	14.0	0.28	0.28	47.3
Approach		596	0.9	0.334	3.0	NA	2.0	14.0	0.28	0.28	47.4
West: Woodbridge Road											
10	L2	165	0.6	0.157	8.0	LOS A	0.7	4.6	0.25	0.89	44.7
11	T1	5	0.0	0.157	14.0	LOS A	0.7	4.6	0.25	0.89	44.7
12	R2	6	0.0	0.157	15.6	LOS B	0.7	4.6	0.25	0.89	44.8
Approach		177	0.6	0.157	8.5	LOS A	0.7	4.6	0.25	0.89	44.7
All Vehicles		938	0.9	0.334	4.0	NA	2.0	14.0	0.25	0.38	47.0

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

MOVEMENT SUMMARY

Site: 101v [Menangle Road - Station Street - Future 2022 - Existing Layout AM Peak]

Menangle Road / Station Street
 Future 2021 AM Peak with Creamery Stage 1
 7:30am - 8:30am
 Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
		Total veh/h	HV %				Vehicles veh	Distance m				
South: Menangle Road												
1	L2	14	0.0	0.182	4.9	LOS A	0.1	1.1	0.03	0.04	49.2	
2	T1	340	4.6	0.182	0.0	LOS A	0.1	1.1	0.03	0.04	49.6	
3	R2	16	0.0	0.182	5.1	LOS A	0.1	1.1	0.03	0.04	49.2	
Approach		369	4.3	0.182	0.4	NA	0.1	1.1	0.03	0.04	49.6	
East: Station Street												
4	L2	35	0.0	0.027	7.8	LOS A	0.1	0.7	0.22	0.87	45.0	
5	T1	40	0.0	0.544	17.5	LOS B	2.4	16.7	0.85	1.15	36.9	
6	R2	101	0.0	0.544	30.5	LOS C	2.4	16.7	0.85	1.15	37.0	
Approach		176	0.0	0.544	23.0	LOS B	2.4	16.7	0.73	1.09	38.3	
North: Menangle Road												
7	L2	21	10.0	0.179	6.1	LOS A	1.0	6.9	0.43	0.35	46.5	
8	T1	111	7.6	0.179	1.2	LOS A	1.0	6.9	0.43	0.35	47.1	
9	R2	141	1.5	0.179	6.1	LOS A	1.0	6.9	0.43	0.35	46.7	
Approach		273	4.6	0.179	4.1	NA	1.0	6.9	0.43	0.35	46.8	
West: Woodbridge Road												
10	L2	484	1.7	0.547	11.4	LOS A	4.4	31.6	0.60	1.07	43.4	
11	T1	22	0.0	0.547	15.9	LOS B	4.4	31.6	0.60	1.07	43.3	
12	R2	5	40.0	0.547	26.7	LOS B	4.4	31.6	0.60	1.07	42.9	
Approach		512	2.1	0.547	11.7	LOS A	4.4	31.6	0.60	1.07	43.4	
All Vehicles		1329	2.9	0.547	8.5	NA	4.4	31.6	0.43	0.64	44.8	

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

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

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

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

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

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

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

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Organisation: MWH NEW ZEALAND LIMITED | Processed: Thursday, August 13, 2020 1:52:10 PM

Project: P:\Projects_Projects 2019 Onwards\300303212 - Menangle RD August variation\SIDRA\Aug 2020 - Updated Volumes.sip7

MOVEMENT SUMMARY

 Site: 101v [Menangle Road - Station Street - Future 2022 - Existing Layout PM Peak]

Menangle Road / Station Street
 Future 2021 PM Peak with Creamery Stage 1
 4:30pm - 5:30pm
 Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Menangle Road											
1	L2	11	0.0	0.091	5.8	LOS A	0.3	1.8	0.18	0.11	48.4
2	T1	136	1.6	0.091	0.4	LOS A	0.3	1.8	0.18	0.11	48.8
3	R2	25	0.0	0.091	6.0	LOS A	0.3	1.8	0.18	0.11	48.4
Approach		172	1.2	0.091	1.5	NA	0.3	1.8	0.18	0.11	48.7
East: Station Street											
4	L2	15	0.0	0.014	8.7	LOS A	0.1	0.4	0.37	0.84	44.7
5	T1	34	0.0	0.245	16.1	LOS B	0.8	6.0	0.79	1.03	39.5
6	R2	35	6.1	0.245	24.3	LOS B	0.8	6.0	0.79	1.03	39.6
Approach		83	2.5	0.245	18.2	LOS B	0.8	6.0	0.71	1.00	40.4
North: Menangle Road											
7	L2	79	0.0	0.393	5.2	LOS A	2.5	17.7	0.31	0.29	47.0
8	T1	300	2.1	0.393	0.5	LOS A	2.5	17.7	0.31	0.29	47.4
9	R2	325	0.0	0.393	5.3	LOS A	2.5	17.7	0.31	0.29	47.1
Approach		704	0.9	0.393	3.2	NA	2.5	17.7	0.31	0.29	47.2
West: Woodbridge Road											
10	L2	178	1.2	0.242	8.1	LOS A	1.0	7.0	0.30	0.89	44.1
11	T1	28	0.0	0.242	17.3	LOS B	1.0	7.0	0.30	0.89	44.0
12	R2	7	0.0	0.242	18.7	LOS B	1.0	7.0	0.30	0.89	44.1
Approach		214	1.0	0.242	9.7	LOS A	1.0	7.0	0.30	0.89	44.1
All Vehicles		1173	1.1	0.393	5.2	NA	2.5	17.7	0.32	0.43	46.3

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.

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MOVEMENT SUMMARY

 Site: 101 [Moreton Park Road - Station Street - Existing - AM Peak]

Existing
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moreton Park Road S											
1	L2	18	0.0	0.014	7.4	LOS A	0.1	0.4	0.01	1.00	42.0
2	T1	1	0.0	0.014	7.2	LOS A	0.1	0.4	0.01	1.00	40.7
3	R2	1	0.0	0.014	7.0	LOS A	0.1	0.4	0.01	1.00	40.8
Approach		20	0.0	0.014	7.4	LOS A	0.1	0.4	0.01	1.00	41.9
East: Station Street E											
4	L2	1	0.0	0.002	4.6	LOS A	0.0	0.0	0.02	0.36	45.8
5	T1	1	0.0	0.002	0.0	LOS A	0.0	0.0	0.02	0.36	39.6
6	R2	1	0.0	0.002	4.6	LOS A	0.0	0.0	0.02	0.36	9.7
Approach		3	0.0	0.002	3.0	NA	0.0	0.0	0.02	0.36	29.7
North: Moreton Park Road N											
7	L2	1	0.0	0.003	5.8	LOS A	0.0	0.1	0.02	1.03	9.1
8	T1	1	0.0	0.003	5.6	LOS A	0.0	0.1	0.02	1.03	42.7
9	R2	1	0.0	0.003	5.5	LOS A	0.0	0.1	0.02	1.03	28.3
Approach		3	0.0	0.003	5.6	LOS A	0.0	0.1	0.02	1.03	26.2
West: Station Street W											
10	L2	1	0.0	0.006	4.6	LOS A	0.0	0.2	0.02	0.45	23.0
11	T1	2	0.0	0.006	0.0	LOS A	0.0	0.2	0.02	0.45	37.7
12	R2	8	0.0	0.006	4.6	LOS A	0.0	0.2	0.02	0.45	44.5
Approach		12	0.0	0.006	3.7	NA	0.0	0.2	0.02	0.45	43.0
All Vehicles		38	0.0	0.014	5.8	NA	0.1	0.4	0.01	0.78	40.4

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

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

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

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

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

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

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

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MOVEMENT SUMMARY

 Site: 101 [Moreton Park Road - Station Street - Existing - PM Peak]

Existing
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total	HV %	v/c	sec		Vehicles	Distance		per veh	km/h
South: Moreton Park Road S											
1	L2	11	0.0	0.009	7.4	LOS A	0.0	0.2	0.01	1.00	42.1
2	T1	1	0.0	0.009	7.2	LOS A	0.0	0.2	0.01	1.00	40.7
3	R2	1	0.0	0.009	7.0	LOS A	0.0	0.2	0.01	1.00	40.8
Approach		13	0.0	0.009	7.4	LOS A	0.0	0.2	0.01	1.00	41.8
East: Station Street E											
4	L2	1	0.0	0.002	4.6	LOS A	0.0	0.0	0.01	0.36	45.8
5	T1	1	0.0	0.002	0.0	LOS A	0.0	0.0	0.01	0.36	39.6
6	R2	1	0.0	0.002	4.6	LOS A	0.0	0.0	0.01	0.36	9.7
Approach		3	0.0	0.002	3.0	NA	0.0	0.0	0.01	0.36	29.8
North: Moreton Park Road N											
7	L2	1	0.0	0.003	5.8	LOS A	0.0	0.1	0.01	1.03	9.1
8	T1	1	0.0	0.003	5.6	LOS A	0.0	0.1	0.01	1.03	42.7
9	R2	1	0.0	0.003	5.5	LOS A	0.0	0.1	0.01	1.03	28.2
Approach		3	0.0	0.003	5.6	LOS A	0.0	0.1	0.01	1.03	26.1
West: Station Street W											
10	L2	1	0.0	0.011	4.6	LOS A	0.0	0.3	0.02	0.52	22.3
11	T1	1	0.0	0.011	0.0	LOS A	0.0	0.3	0.02	0.52	36.4
12	R2	17	0.0	0.011	4.6	LOS A	0.0	0.3	0.02	0.52	44.0
Approach		19	0.0	0.011	4.3	NA	0.0	0.3	0.02	0.52	43.3
All Vehicles		38	0.0	0.011	5.3	NA	0.0	0.3	0.01	0.71	40.7

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

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

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

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

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

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

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

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MOVEMENT SUMMARY

 **Site: 101 [Moreton Park Road - Station Street Future 2022 - AM Peak]**

Proposed Roundabout
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moreton Park Road S											
1	L2	18	0.0	0.015	3.5	LOS A	0.1	0.5	0.19	0.43	46.1
2	T1	1	0.0	0.015	3.6	LOS A	0.1	0.5	0.19	0.43	52.1
3	R2	1	0.0	0.015	7.6	LOS A	0.1	0.5	0.19	0.43	51.9
Approach		20	0.0	0.015	3.7	LOS A	0.1	0.5	0.19	0.43	46.9
East: Site Access											
4	L2	1	0.0	0.048	3.2	LOS A	0.2	1.5	0.06	0.35	51.0
5	T1	72	0.0	0.048	3.2	LOS A	0.2	1.5	0.06	0.35	47.9
6	R2	1	0.0	0.048	7.2	LOS A	0.2	1.5	0.06	0.35	51.9
Approach		74	0.0	0.048	3.2	LOS A	0.2	1.5	0.06	0.35	48.0
North: Moreton Park Road N											
7	L2	1	0.0	0.002	3.9	LOS A	0.0	0.1	0.11	0.50	52.5
8	T1	1	0.0	0.002	4.1	LOS A	0.0	0.1	0.11	0.50	53.7
9	R2	1	0.0	0.002	8.2	LOS A	0.0	0.1	0.11	0.50	31.0
Approach		3	0.0	0.002	5.4	LOS A	0.0	0.1	0.11	0.50	45.6
West: Station Street W											
10	L2	1	0.0	0.019	3.1	LOS A	0.1	0.6	0.03	0.45	45.2
11	T1	20	0.0	0.019	3.1	LOS A	0.1	0.6	0.03	0.45	46.8
12	R2	8	0.0	0.019	7.2	LOS A	0.1	0.6	0.03	0.45	46.9
Approach		29	0.0	0.019	4.3	LOS A	0.1	0.6	0.03	0.45	46.8
All Vehicles		126	0.0	0.048	3.6	LOS A	0.2	1.5	0.07	0.39	47.5

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

Roundabout LOS Method: SIDRA Roundabout LOS.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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MOVEMENT SUMMARY

 **Site: 101 [Moreton Park Road - Station Street Future 2022 - PM Peak]**

Proposed Roundabout
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moreton Park Road S											
1	L2	11	0.0	0.009	3.4	LOS A	0.0	0.3	0.12	0.44	46.6
2	T1	1	0.0	0.009	3.5	LOS A	0.0	0.3	0.12	0.44	52.5
3	R2	1	0.0	0.009	7.5	LOS A	0.0	0.3	0.12	0.44	52.3
Approach		13	0.0	0.009	3.7	LOS A	0.0	0.3	0.12	0.44	47.9
East: Site Access											
4	L2	1	0.0	0.022	3.2	LOS A	0.1	0.7	0.09	0.36	47.6
5	T1	29	0.0	0.022	3.2	LOS A	0.1	0.7	0.09	0.36	47.7
6	R2	1	0.0	0.022	7.3	LOS A	0.1	0.7	0.09	0.36	51.8
Approach		32	0.0	0.022	3.4	LOS A	0.1	0.7	0.09	0.36	47.9
North: Moreton Park Road N											
7	L2	1	0.0	0.002	4.1	LOS A	0.0	0.1	0.20	0.49	52.2
8	T1	1	0.0	0.002	4.3	LOS A	0.0	0.1	0.20	0.49	53.4
9	R2	1	0.0	0.002	8.4	LOS A	0.0	0.1	0.20	0.49	30.9
Approach		3	0.0	0.002	5.6	LOS A	0.0	0.1	0.20	0.49	45.4
West: Station Street W											
10	L2	1	0.0	0.052	3.1	LOS A	0.2	1.7	0.03	0.42	45.6
11	T1	67	0.0	0.052	3.1	LOS A	0.2	1.7	0.03	0.42	47.1
12	R2	17	0.0	0.052	7.2	LOS A	0.2	1.7	0.03	0.42	47.2
Approach		85	0.0	0.052	3.9	LOS A	0.2	1.7	0.03	0.42	47.1
All Vehicles		133	0.0	0.052	3.8	LOS A	0.2	1.7	0.06	0.41	47.3

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

Roundabout LOS Method: SIDRA Roundabout LOS.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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MOVEMENT SUMMARY

 Site: 101 [Moreton Park Road - Station Street - Future 2028 - AM Peak]

Proposed Roundabout
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moreton Park Road S											
1	L2	18	0.0	0.022	5.8	LOS A	0.1	0.8	0.56	0.57	44.3
2	T1	1	0.0	0.022	5.9	LOS A	0.1	0.8	0.56	0.57	50.7
3	R2	1	0.0	0.022	9.9	LOS A	0.1	0.8	0.56	0.57	50.6
Approach		20	0.0	0.022	6.0	LOS A	0.1	0.8	0.56	0.57	45.2
East: Site Access											
4	L2	1	0.0	0.117	5.3	LOS A	0.6	4.4	0.53	0.56	49.1
5	T1	115	0.0	0.117	5.3	LOS A	0.6	4.4	0.53	0.56	45.2
6	R2	1	0.0	0.117	9.4	LOS A	0.6	4.4	0.53	0.56	47.0
Approach		117	0.0	0.117	5.4	LOS A	0.6	4.4	0.53	0.56	45.2
North: Moreton Park Road N											
7	L2	1	0.0	0.285	3.3	LOS A	1.7	11.7	0.16	0.58	48.1
8	T1	1	0.0	0.285	3.3	LOS A	1.7	11.7	0.16	0.58	49.0
9	R2	434	0.0	0.285	7.4	LOS A	1.7	11.7	0.16	0.58	28.7
Approach		436	0.0	0.285	7.3	LOS A	1.7	11.7	0.16	0.58	28.8
West: Station Street W											
10	L2	107	0.0	0.087	3.1	LOS A	0.5	3.3	0.03	0.42	46.0
11	T1	31	0.0	0.087	3.1	LOS A	0.5	3.3	0.03	0.42	47.7
12	R2	8	0.0	0.087	7.2	LOS A	0.5	3.3	0.03	0.42	47.8
Approach		146	0.0	0.087	3.3	LOS A	0.5	3.3	0.03	0.42	46.5
All Vehicles		719	0.0	0.285	6.2	LOS A	1.7	11.7	0.21	0.55	33.7

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

Roundabout LOS Method: SIDRA Roundabout LOS.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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MOVEMENT SUMMARY

 Site: 101 [Moreton Park Road - Station Street - Future 2028 - PM Peak]

Proposed Roundabout
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moreton Park Road S											
1	L2	11	0.0	0.012	4.8	LOS A	0.1	0.4	0.46	0.50	45.2
2	T1	1	0.0	0.012	4.8	LOS A	0.1	0.4	0.46	0.50	51.4
3	R2	1	0.0	0.012	8.9	LOS A	0.1	0.4	0.46	0.50	51.3
Approach		13	0.0	0.012	5.1	LOS A	0.1	0.4	0.46	0.50	46.6
East: Site Access											
4	L2	1	0.0	0.046	4.5	LOS A	0.2	1.6	0.45	0.48	46.3
5	T1	47	0.0	0.046	4.5	LOS A	0.2	1.6	0.45	0.48	45.7
6	R2	1	0.0	0.046	8.6	LOS A	0.2	1.6	0.45	0.48	50.4
Approach		49	0.0	0.046	4.6	LOS A	0.2	1.6	0.45	0.48	45.8
North: Moreton Park Road N											
7	L2	1	0.0	0.231	3.7	LOS A	1.3	8.9	0.30	0.60	47.7
8	T1	1	0.0	0.231	3.8	LOS A	1.3	8.9	0.30	0.60	48.7
9	R2	303	0.0	0.231	7.8	LOS A	1.3	8.9	0.30	0.60	28.5
Approach		305	0.0	0.231	7.8	LOS A	1.3	8.9	0.30	0.60	28.7
West: Station Street W											
10	L2	705	0.0	0.476	3.1	LOS A	4.0	28.3	0.05	0.42	46.1
11	T1	108	0.0	0.476	3.1	LOS A	4.0	28.3	0.05	0.42	47.8
12	R2	17	0.0	0.476	7.2	LOS A	4.0	28.3	0.05	0.42	47.8
Approach		831	0.0	0.476	3.2	LOS A	4.0	28.3	0.05	0.42	46.4
All Vehicles		1198	0.0	0.476	4.4	LOS A	4.0	28.3	0.13	0.47	39.9

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

Roundabout LOS Method: SIDRA Roundabout LOS.

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

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

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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Appendix E Concepts of Level of Service and Delay



Concepts of Carriageway Capacity and Level of Service

The capacity of major streets within an urban area can be based on an assessment of their operating Level of Service.

Level of service is defined within Austroads' *Guide to Traffic Management Part 3: Traffic Studies and Analysis* as:

'... a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, and safety.'

Levels of service (LoS) are designated from 'A' to 'F' from best (free flow conditions) to worst (forced flow with stop start operation, long queues and delays) as follows:

LEVELS OF SERVICE

- A – Free flow (almost no delays)
- B – Stable flow (slight delays)
- C – Stable flow (acceptable delays)
- D – Approaching unstable flow (tolerable delays)
- E – Unstable flow (congestion; intolerable delays), and
- F – Forced flow (jammed)

A service volume, as defined by Austroads, is the maximum number of vehicles that can pass over a given section of roadway in one direction during one hour while operating conditions are maintained at a specified level of service. It is suggested that ideally arterial and sub-arterial roads should not exceed service volumes at LoS 'C'. At this level, whilst most drivers are restricted in their freedom to manoeuvre, operating speeds are still reasonable and acceptable delays experienced. However, in urban situations, arterial and sub-arterial roads operating at LoS 'D' are still considered adequate. Traffic volumes along urban roads with interrupted and uninterrupted flow conditions are included in **Table C1** and **Table C2** respectively.

Table C1: Level of Service of Interrupted Flow Conditions along Urban Roads (One Way Hourly Volumes)

Reference	Description	Level of Service					
		A	B	C	D	E	F
2U	2 Lane Undivided	540	630	720	810	900	-
4UP	4 Lane Undivided with two parking lanes	540	630	720	810	900	-
4U	4 Lane Undivided with some parking	900	1,050	1,200	1,350	1,500	-
4UC	4 Lane Undivided with clearways	1,080	1,260	1,440	1,620	1,800	-
4D	4 Lane Divided with clearways	1,140	1,330	1,520	1,710	1,900	-
6U	6 Lane Undivided	1,440	1,680	1,920	2,160	2,400	-
6D	6 Lane Divided with clearways	1,740	2,030	2,320	2,610	2,900	-



Table C2: Level of Service of Uninterrupted Flow Conditions along Urban Roads (One Way Hourly Volumes)

Reference	Description	Level of Service					
		A	B	C	D	E	F
2U	2 Lane Undivided	760	880	1,000	1,130	1,260	-
4UP	4 Lane Undivided with two parking lanes	1,260	1,470	1,680	1,890	2,100	-
4U	4 Lane Undivided with some parking	1,510	1,760	2,010	2,270	2,520	-
4UC	4 Lane Undivided with clearways	1,600	1,860	2,130	2,400	2,660	-
4D	4 Lane Divided with clearways	2,250	2,620	3,000	3,380	3,740	-
6U	6 Lane Undivided	2,440	2,840	3,250	3,660	4,060	-
6D	6 Lane Divided with clearways	3,375	3,930	4,500	5,070	5,610	-



Guidelines for Evaluation of Intersection Operation

The RTA Guide to Traffic Generating Developments (October 2002, Issue 2.2), details the assessment of intersections. The assessment of the level of service of an intersection is based on the evaluation of the following Measures of Effectiveness:

- (a) Average delay (seconds/veh) (all forms of control)
- (b) Delay to critical movement (seconds/veh) (all forms of control)
- (c) Degree of saturation (traffic signals and roundabouts)
- (d) Cycle length (traffic signals)

SIDRA was used to calculate the relevant intersection parameters. The SIDRA software is an advanced lane-based micro-analytical tool for design and evaluation of individual intersections and networks of intersections including modelling of separate movement classes (light vehicles, heavy vehicles, buses, cyclists, large trucks, light rail / trams and so on). It provides estimates of capacity, level of service and a wide range of performance measures, including; delay, queue length and stops for vehicles and pedestrians, as well as fuel consumption, pollution emissions and operating costs.

It can be used to analyse signalised intersections (fixed-time / pretimed and actuated), signalised and unsignalised pedestrian crossings, roundabouts (unsignalised), roundabouts with metering signals, fully-signalised roundabouts, two-way stop sign and give-way / yield sign control, all-way stop sign control, single point interchanges (signalised), freeway diamond interchanges (signalised, roundabout, sign control), diverging diamond interchanges and other alternative intersections and interchanges. It can also be used for uninterrupted traffic flow conditions and merge analysis.

The best indicator of the level of service at an intersection is the average delay experienced by vehicles at that intersection. For traffic signals, the average delay over all movements should be taken. For roundabouts and priority control intersections (with Stop and Give Way signs or operating under the T-junction rule), the critical movement for level of service assessment should be that with the highest average delay.

With traffic signals, delays per approach tend to be equalised, subject to any over-riding requirements of signal co-ordination as well as to variations within individual movements. With roundabouts and priority-controlled intersections, the critical criterion for assessment is the movement with the highest delay per vehicle. With this type of control, the volume balance might be such that some movements suffer high levels of delay while other movements have minimal delay. An overall average delay for the intersection of 25 seconds might not be satisfactory if the average delay on one movement is 60 seconds.

The average delay for LoS 'E' should be no more than 70 seconds. The accepted maximum practical cycle length for traffic signals under saturated conditions is 120 - 140 seconds. Under these conditions 120 seconds is near maximum for two and three phase intersections and 140 seconds near maximum for more complex phase designs. Drivers and pedestrians expect cycle lengths of these magnitudes and their inherent delays in peak hours. A cycle length of 140 seconds for an intersection which is almost saturated has an average vehicle delay of about 70 seconds, although this can vary. If the average vehicle delay is more than 70 seconds, the intersection is assumed to be at LoS 'F'.

Table C3 sets out average delays for different levels of service. There is no consistent correlation between definitions of levels of service for road links as defined elsewhere in this section, and the ranges set out in **Table C3**. In assigning a level of service, the average delay to the motoring public needs to be considered, keeping in mind the location of the intersection. For example, drivers in inner urban areas of Sydney have a higher tolerance of delay than drivers in country areas. **Table C3** provides a recommended baseline for assessment.



Table C3: Level of Service Criteria for Intersections

Level of Service	Average Delay per Vehicle (sec/veh)	Traffic Signals	Priority Controlled
A	$0 < x < 14$	Good operation	Good operation
B	$14 < x < 28$	Good operation with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	$28 < x < 42$	Satisfactory operation	Satisfactory operation, but crash history study required
D	$42 < x < 56$	Operating near capacity	Operating near capacity and crash history study required
E	$56 < x < 70$	At capacity, incidents will cause excessive delays	At capacity, requires other control mode
F	$70 < x$	Requires further study	Requires other control mode

The figures in **Table C3** are intended as a guide only. Any particular assessment should take into account site-specific factors including 95th percentile queue lengths (and their effect on lane blocking), the influence of nearby intersections and the sensitivity of the location to delays. In many situations, a comparison of the current and future average delay provides a better appreciation of the impact of a proposal, and not simply the change in the level of service.

The intersection degree of saturation (DoS) can also be used to measure the performance of isolated intersections. The DoS value can be determined by computer-based assessment programs. At intersections controlled by traffic signals, both queue length and delays increase rapidly as DoS approaches 1.000. An upper limit of 0.900 is appropriate, however when DoS exceeds 0.850, overflow queues start to become a problem. Satisfactory intersection operation is generally achieved with a DoS of about 0.700 - 0.800. (Note that these figures are based on isolated signalised intersections with cycle lengths of 120 seconds. In coordinated signal systems DoS might be actively maximised at key intersections).

Although in some situations additional traffic does not alter the level of service, particularly where the level of service is 'E' or 'F', additional capacity may still be required. This is particularly appropriate for LoS 'F', where small increases in flow can cause disproportionately greater increases in delay. In this situation, it is advisable to consider means of control to maintain the existing level of absolute delay. Suggested criteria for the evaluation of the capacity of signalised intersections based on the DoS are summarised in **Table C4**.

Table C4: Criteria for Evaluating Capacity of Signalised Intersections

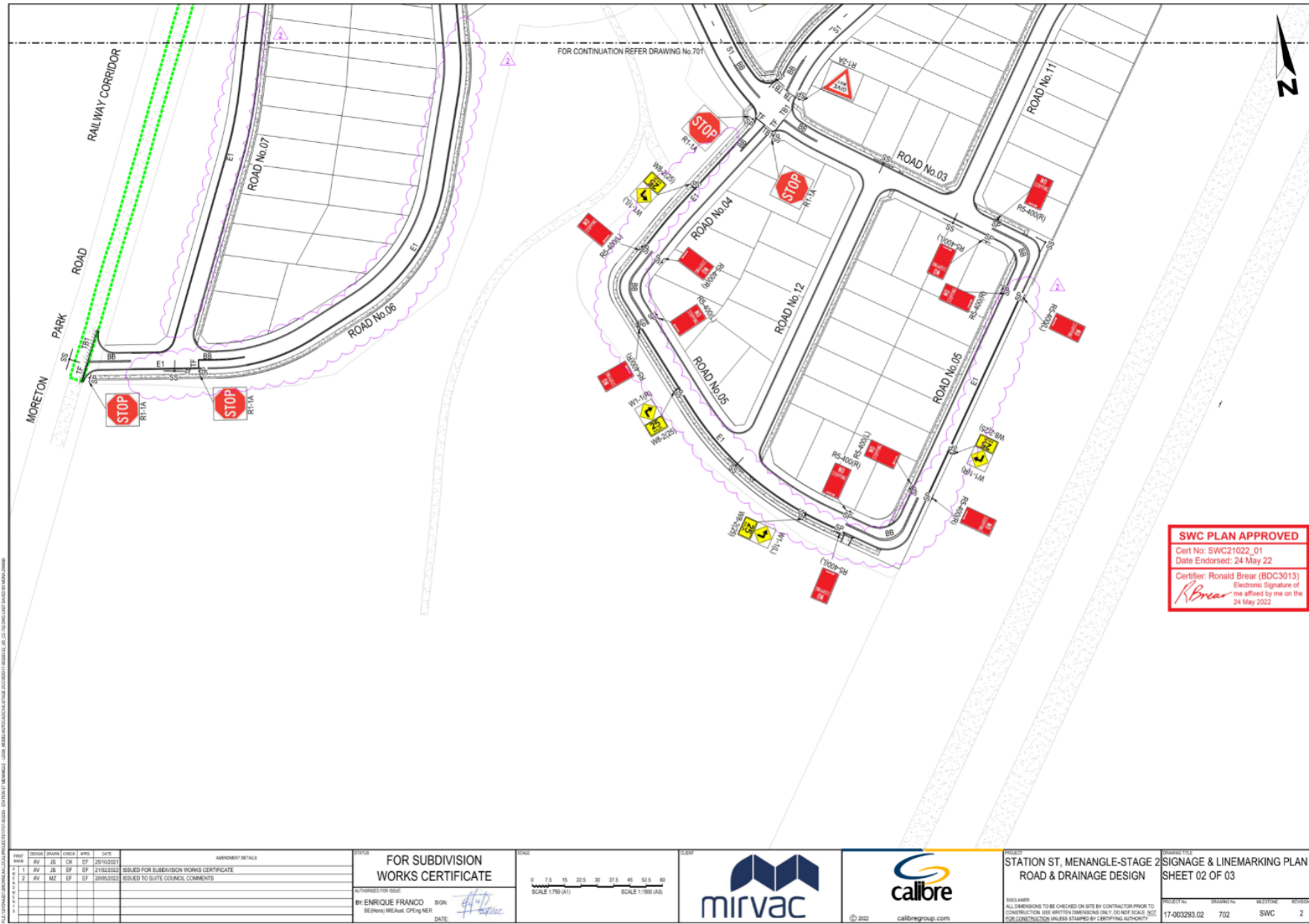
Level of Service	Optimum Cycle Length (seconds)	Movement Degree of Saturation (DoS)	Intersection Degree of Saturation (DoS)
A – Excellent	< 90	< 0.700	< 0.700
B – Very good	< 90	< 0.700	< 0.700
C – Good	90 - 120	0.700 – 0.800	0.700 – 0.850
D – Satisfactory	120 - 140	0.800 – 0.850	0.850 – 0.900
E – Poor	> 140	> 0.850	> 0.900
F – Extra capacity required	> 140	> 0.850	> 0.900

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2 GENERAL BUSINESS

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