



Lilydale Waste to Energy Facility (WtE)

Traffic Impact Assessment

CV- RP - 003 | D

15 November 2021

Yarra Valley Water

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Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
B	23/07/2021	DRAFT for client discussion	Chris B	Renukha N		
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Appendix A. Transport Impact Assessment – Yarra Valley Trail Stage 1/ New Access Road

Appendix B. Functional Layout Plan – Interim

Appendix C. Functional Layout Plan – Ultimate

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Table of terms and abbreviations

Term	Description
AUSTROADS	AUSTROADS <i>Guide to Traffic Management: Traffic Studies and Analysis (Part 3)</i>
AADT	Annual Average Daily Traffic
CBD	Central Business District
DoS	Degree of Saturation
DoT	Department of Transport
EB	Eastbound
HV	Heavy vehicle
LoS	Level of Service
LV	Light vehicle
NB	Northbound
pc/h	Passenger car per hour
PTV	Public Transport Victoria
SB	Southbound
STP	Lilydale Sewage Treatment Plant
TIA	Traffic Impact Assessment
v/c ratio	volume to capacity ratio
WB	Westbound
WtE	Waste to Energy Facility
YVW	Yarra Valley Water

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Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is to undertake a traffic impact assessment of the preferred access route in to the proposed regional organic waste processing facility on the northern edge of its Lilydale Sewerage Treatment Plant site in Figure 1-1 and in particular to the proposed functional layout plans are appropriate for the interim and ultimate phase in accordance with the scope of services set out in the contract between Jacobs and the Client. That scope of services, as described in this report, was developed with the Client.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

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This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

The traffic growth rates for both Maroondah Highway were based on information provided extracted from the SCATS data at Maroondah Highway/ Melba Highway intersection. The intersection assessment Maroondah Highway/ Ingram Road was based on traffic data obtained from the survey data collated on behalf of the client.

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1. Introduction

Yarra Valley Water (YVW) is proposing to create a new regional organic waste processing facility (WtE) on their existing Lilydale Sewage Treatment Plant (STP) site.

The Lilydale STP site is located in the suburb of Lilydale (refer Figure 1-1) approximately 50km east of Melbourne CBD. The YVW owned land is located in close proximity to Olinda Creek which runs through the site, Lilydale Railway Station and the town centre to the south, and the town of Coldstream to the east.

Access to the site is proposed to run along the newly purchased land north of the site via a new road link that will connect to the Maroondah Highway/ Ingram Road intersection.

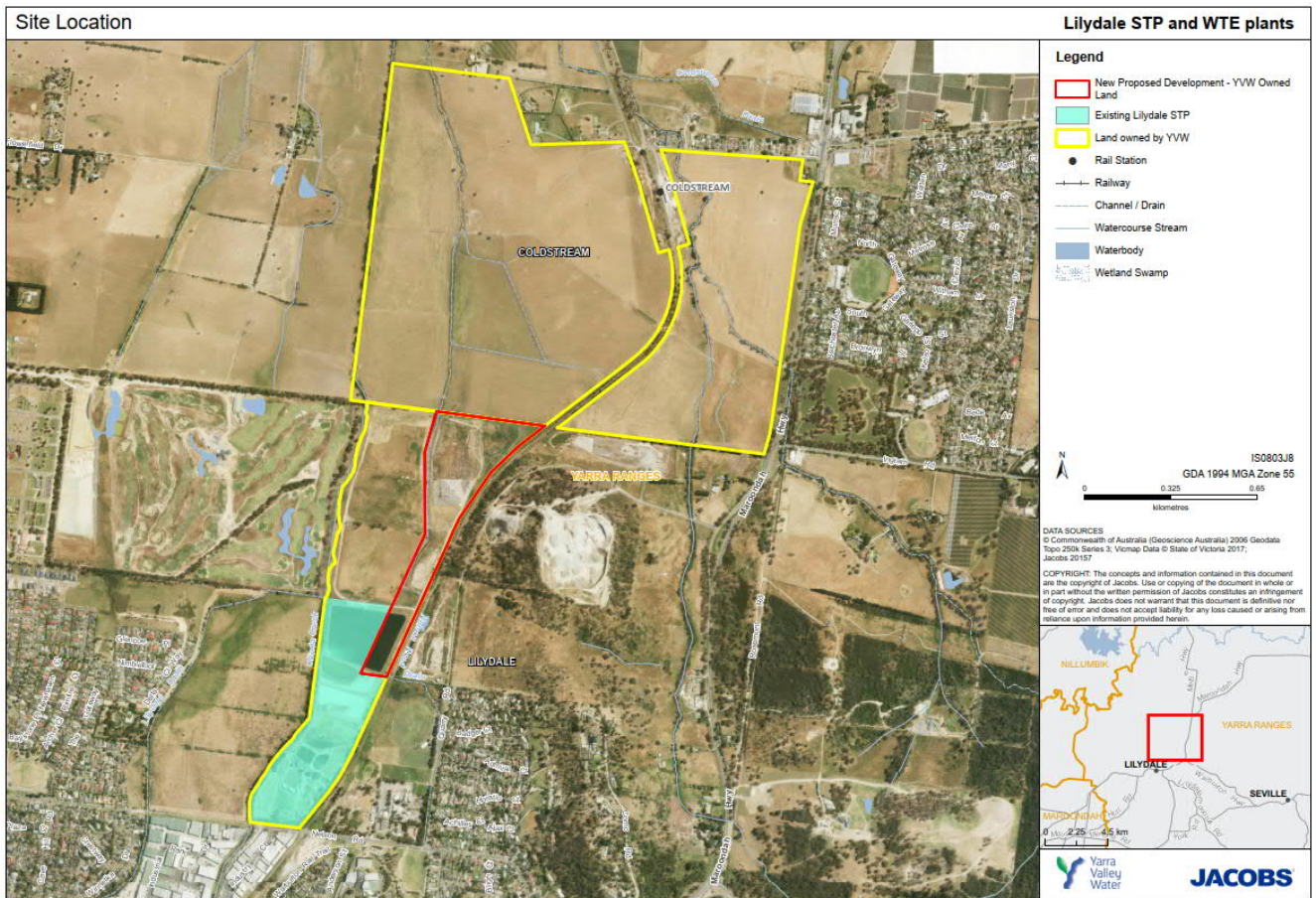


Figure 1-1: Location of the proposed development in relative to Lilydale town centre (Source: YVW, 2020)

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1.1 Previous traffic assessment

In July 2017, Jacobs was commissioned by YVW to undertake a high-level desktop traffic impact assessment (TIA) for the proposed development. The high-level TIA (July 2017) summarised and assessed the routes to the proposed development and the anticipated traffic impacts of the proposed development on these routes.

Subsequently, a revised TIA report was submitted in December 2020 for the Lilydale WtE facility. The revised TIA captured the changes proposed to the access route to the existing Lilydale STP and considered the benefits of moving the access of the proposed WtE facility into the newly purchased land, north of the site.

Various options were assessed to connect the new access road into Maroondah Highway. These options included a four-way signalised intersection at Ingram Road, an unsignalised T-intersection north of Ingram Road, and a signalised T-intersection north of Ingram Road. These intersection configurations were assessed from a performance and safety perspective during a safety in design workshop. The outcomes of the workshops indicated that a signalised intersection is required to meet performance needs, and a staggered T-intersection results in a less safe outcome. The final intersection chosen for further design was a signalised four-way intersection at Ingram Road. This option was presented during community consultation. No objections were noted.

Subsequent discussions have been held with Department of Transport (DoT) to ascertain the information needed to obtain in-principal approval to construct the proposed new access via Maroondah Highway/ Ingram Road. DoT have requested the following information to support the new access route via Maroondah Highway/ Ingram Road:

- Updated traffic counts at Maroondah Highway/ Ingram Road post Covid-19 phase. It should be noted that the March 2020 count was undertaken during the Covid-19 phase and might not be a correct representation of the background traffic along this corridor.
- Provide an interim (opening year) and ultimate (20-year horizon) functional layout plan for Maroondah Highway/ Ingram Road/ New Access Road intersection.

1.2 Purpose of this report

This document provides a summary of the traffic assessment undertaken for the proposed intersection upgrade at Maroondah Highway/ Ingram Road, which will provide access to the proposed WtE facility. The traffic assessment is to support the development of the functional layout plans (interim and ultimate) for the revised Maroondah Highway/ Ingram Road intersection.

This document also summarises the following key tasks:

- Estimation of the proposed construction and operation traffic being generated by the development.
- SIDRA outputs summarising the impacts of the estimated development traffic on a new proposed intersection at Maroondah Highway/ Ingram Road.
- Proposed functional layout plans of the proposed Maroondah Highway/ Ingram Road intersection for the interim and ultimate phase (refer Appendix B and C).
- A technical note summarising the transport impacts of the crossing of the Yarra Valley Trail Stage 1 with the proposed new Access Road (refer Appendix A). This technical note is provided for completeness of information. It does not form part of the TIA for the intersection connection. YVW is seeking approval from VicTrack for a lease of this rail corridor crossing.

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1.3 Proposed future duplication works along Maroondah Highway

Based on the information obtained from the Department of Infrastructure, Transport, Regional Development and Communication website¹, Maroondah Highway is an important road corridor linking Healesville, Coldstream, Lilydale and the inner suburbs of Melbourne. This project is expected to upgrade Maroondah Highway from the current two-lane configuration to four lanes and other capacity improvements which is still under investigation (as highlighted in Figure 1-2).

Preliminary discussions with DoT have confirmed that a business case is underway to investigate the upgrade of Maroondah Highway. However, the scope of works and the program of works is yet to be confirmed. For the purpose of this assessment, it is anticipated that the interim functional layout will not impact the planned duplication works along Maroondah Highway (i.e., Maroondah Highway will remain with two lanes in the interim). The ultimate functional layout plan proposed for Maroondah Highway/ Ingram Road captures the four-lane configuration proposed by DoT.

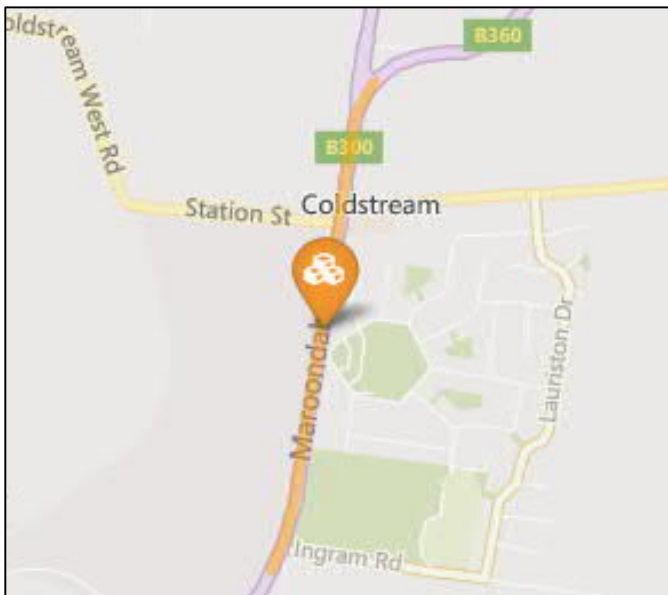


Figure 1-2: Maroondah Highway Upgrade

1.4 Content and layout of the document

This report is structured as follows:

- Section 1: Introduction (this section)
- Section 2: Existing conditions (transport network)
- Section 3: Proposed development
- Section 4: Traffic impact assessment
- Section 5: Intersection functional layout design
- Section 6: Summary

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¹ https://investment.infrastructure.gov.au/projects/ProjectDetails.aspx?Project_id=100466-18VIC-UCO

2. Existing conditions (transport network)

This section of the report documents the existing conditions of the transport network within close proximity to the Maroondah Highway/ Ingram Road intersection.

Where possible, this document includes updates to the traffic conditions detailed in the previous traffic impact assessment, through summarising more recent historical data and traffic surveys undertaken for this project.

2.1 Existing road network

Based on the information provided, most traffic accessing the site is anticipated to arrive via the south as per existing conditions with a small percentage (7.5%) of traffic arriving from the north. Vehicles arriving from the north will traverse through Melba Highway and Maroondah Highway.




Vehicles arriving from the south will traverse through Swansea Road and Maroondah Highway, and are proposed to travel the following route to get to the proposed new Access Road at Maroondah Highway/ Ingram Road:

- Northbound (NB) along Swansea Road and Anderson Street (Route C401) (see Figure 2-1)
- Eastbound (EB) on Main Street/ Maroondah Highway (Route B300) – bypassing Lilydale (see Figure 2-2)
- Continuing northbound (NB) on Maroondah Highway (Route B300) – heading towards Coldstream (see Figure 2-3)
- Westbound (WB) via the proposed new Access Road at Maroondah Highway/ Ingram Road intersection to the project site (see Figure 2-4)

Location	Figure
Anderson Street, at Main Street	 <p data-bbox="416 1688 1453 1720">Figure 2-1: Anderson Street/ Main Street intersection (NB) (Source: Google Maps, 2017)</p>

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Location	Figure
Main Street/ Maroondah Highway	 <p data-bbox="416 848 1358 882">Figure 2-2: Main Street/ Maroondah Highway (EB) (Source: Google Maps, 2017)</p>
Maroondah Highway	 <p data-bbox="416 1417 1206 1451">Figure 2-3: Maroondah Highway (NB) (Source: Google Maps, 2017)</p>
Maroondah Highway, at Ingram Road	<div data-bbox="7 1608 544 1910" style="border: 2px solid red; padding: 5px; color: red; font-weight: bold;"> <p>This copied document to be made available for the sole purpose of enabling its consideration and review as part of a planning process under the Planning and Environment Act 1987. The document must not be used for any purpose which may breach any copyright</p> </div>  <p data-bbox="416 2000 1458 2067">Figure 2-4: Proposed new access point (fourth west leg) at Maroondah Highway/ Ingram Road (NB) (Source: Google Maps, 2020)</p>

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2.2 Existing intersection

Maroondah Highway is a major east-west thoroughfare located in the eastern suburbs of Melbourne. Within proximity to its intersection with Ingram Road, the highway consists of one lane of through traffic in each direction on an undivided carriageway. The existing intersection has one northbound lane and one southbound lane. On the northern leg, these lanes are divided by a painted median. On the southern approach, there is an approximate 100m short right-turn lane. Ingram Road consists of one lane in each direction as shown in Figure 2.4 and Figure 2.5.



Figure 2-5: Existing Maroondah Highway/ Ingram Road intersection (MetroMap imagery – dated 4th April 2021)

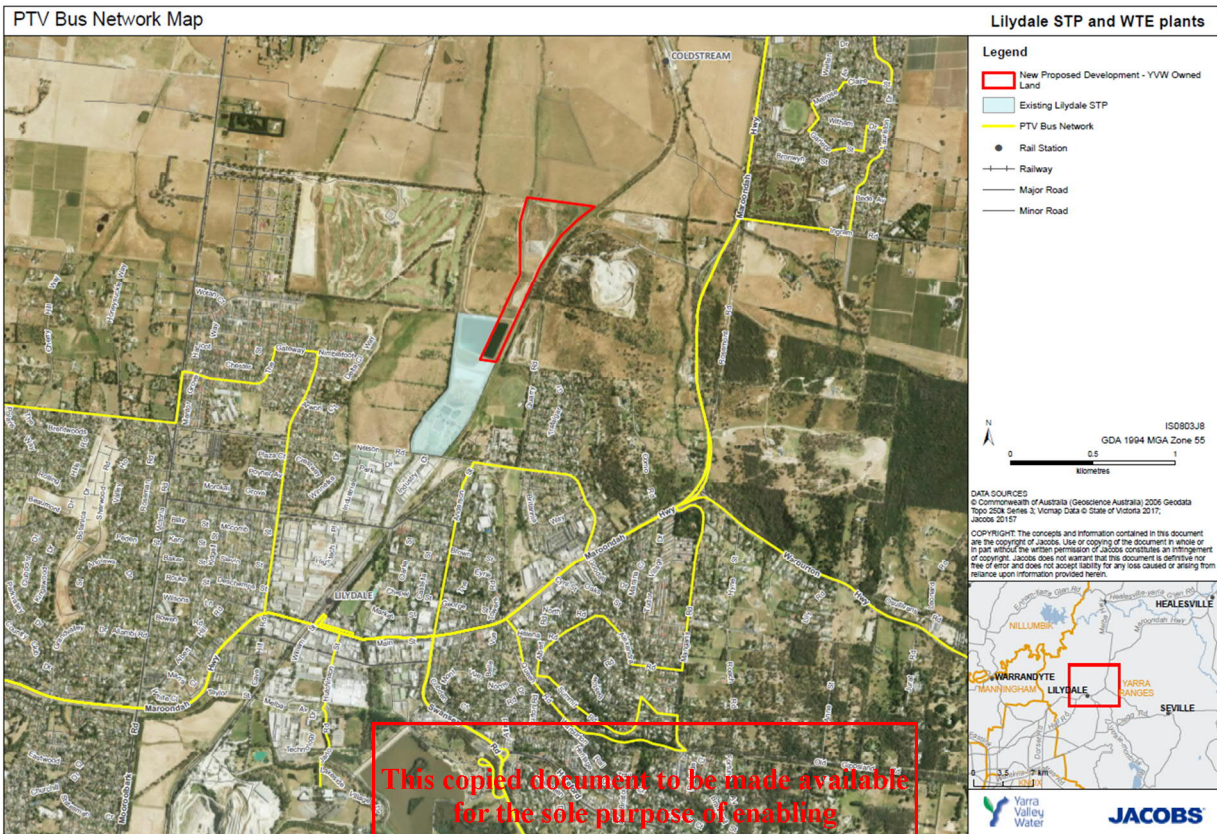
2.3 Public transport services

Based on the information provided on the Public Transport Victoria (PTV) website, there are 10 bus routes operating within the Lilydale catchment. These bus routes traverse the road network along key roads as illustrated within Figure 2-6.

In addition, there are five school bus routes traversing the Lilydale catchment as shown in Figure 2-7.

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Figure 2-6: PTV Bus Network (Source: PTV 2017)

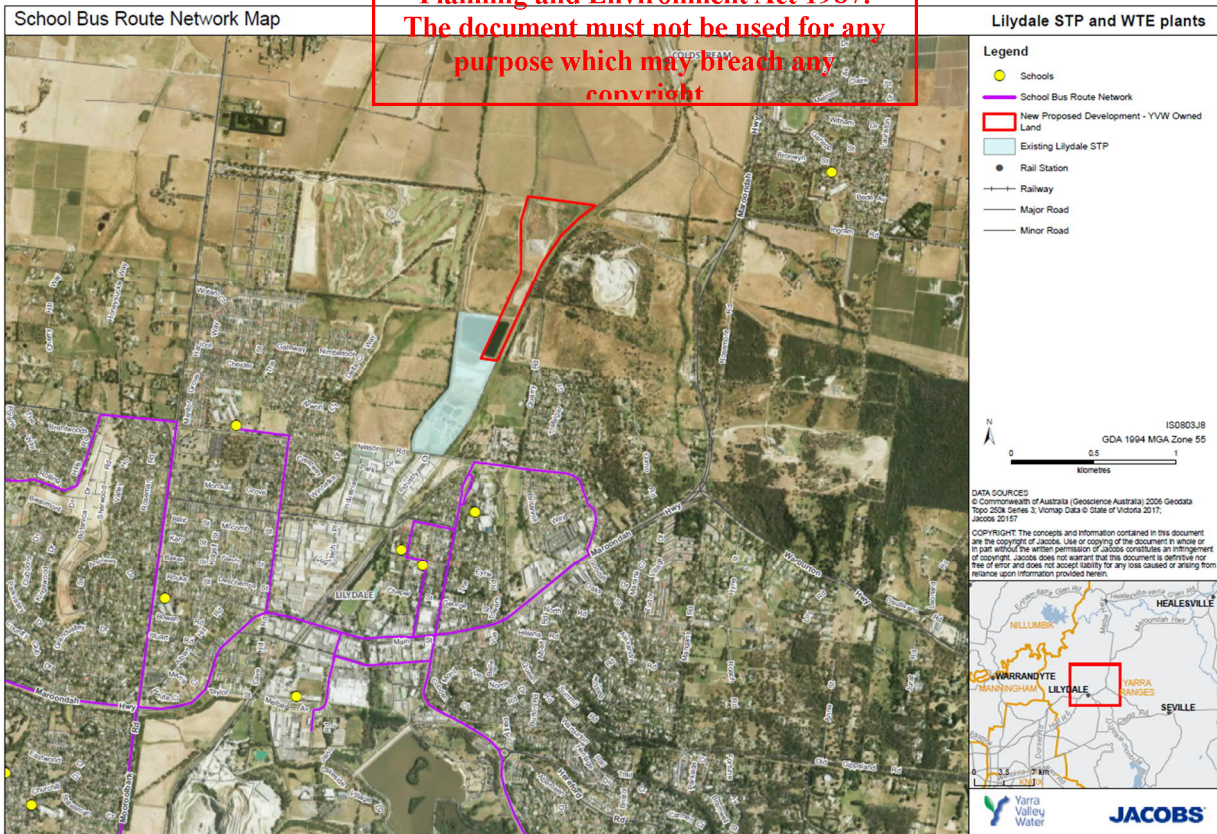


Figure 2-7: School Bus Route Network (Source: Invicta, 2011)

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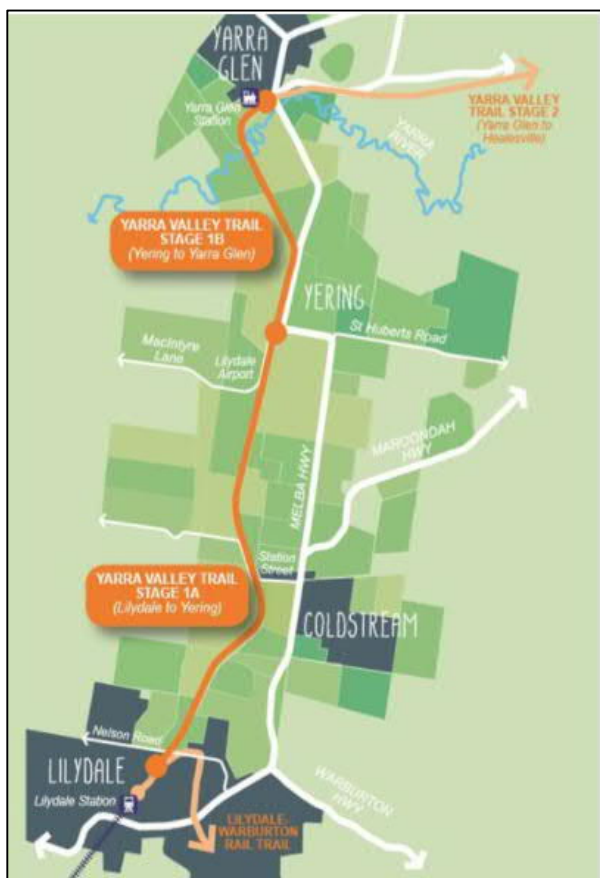
2.4 Active transport

Existing active transport infrastructure within the area primarily includes pedestrian footpaths, especially around the town centre and the shared trail referred to as the Yarra Valley Trail Stage 1.

The Yarra Valley Trail Stage 1 is a 12km shared trail using the existing rail corridor connecting Lilydale to Yarra Glen (refer to Figure 2-8). Stage 1A from Lilydale to Yering Station on Macintyre Lane was completed in 2020. Stage 1B from Yering to Yarra Glen is expected to be completed by end of April 2022.

The Yarra Valley Trail Stage 1 passes through the area, including:

- crossing the Maroondah Highway via a pedestrian bridge
- crossing Anderson Street near the T-intersection with Nelson Road
- running west of and parallel to Quarry Road for the length of the existing STP site.



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Figure 2-8: Yarra Valley Trail Stage 1A and 1B (Source: Yarra Ranges Council)

No dedicated cyclist facilities are provided within close proximity to the proposed development.

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2.5 Existing approved heavy vehicles routes within proximity to the proposed site

Based on the information provided, the approved heavy vehicle routes within proximity to the proposed site is illustrated within Figure 2-9.

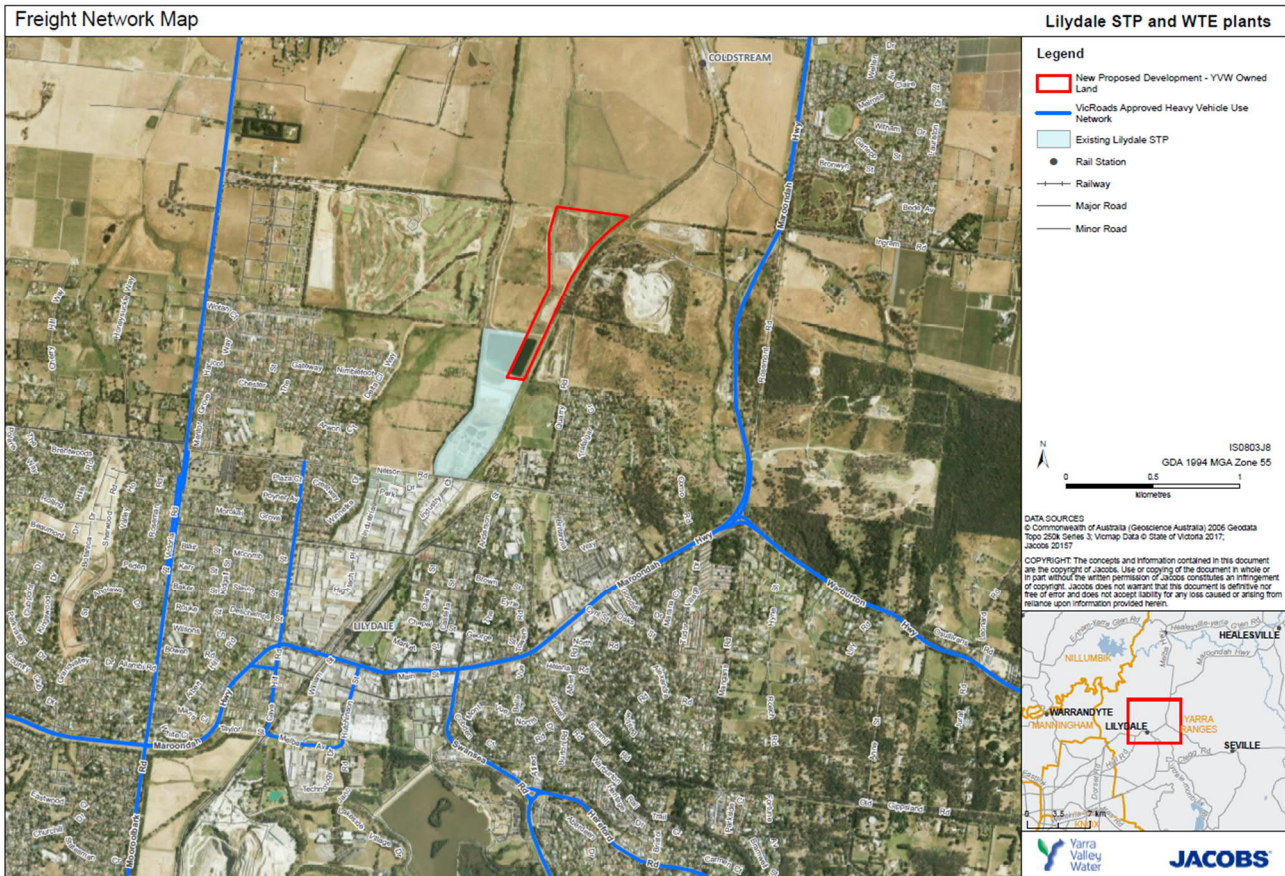


Figure 2-9: VicRoads' Approved Heavy Vehicle Use Network (Source: VicRoads, 2017)

2.6 Existing traffic data at Maroondah Highway/ Ingram Road

The traffic data used to inform this existing condition assessment is listed below:

- Maroondah Highway/ Ingram Road Intersection Counts, Thursday, 12 March 2020 (6:00am to 6:00pm). Source: Austraffic
- Maroondah Highway/ Ingram Road Intersection Counts, Thursday, 20 May 2021 (6:00am to 6:00pm). Source: Austraffic

The 2021 survey was undertaken specifically for this assessment. It is noted that the 2020 survey was undertaken when a large portion of the workforce had to change their travel patterns due to the impending restrictions and lockdowns put in place in Victoria for Covid-19.

An hourly comparison of the March 2020 and May 2021 data is summarised within Figure 2-10.

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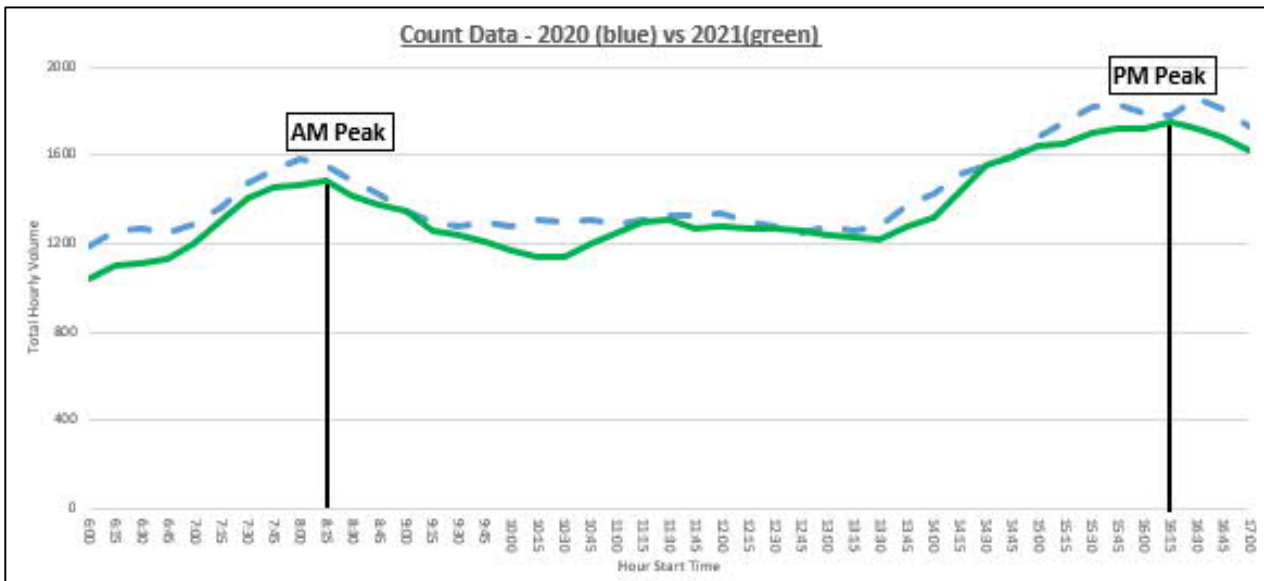


Figure 2-10: Traffic survey data 2020 vs 2021

Overall, the 12-hour (6am to 6pm) traffic survey data for May 2021 (green line) data was lower than March 2020 (blue dotted line) data by approximately five (5) percent. The AM and PM peak hour differences are -6.2 % and -5.9% respectively. However, it should be noted that March 2020 data was undertaken during an uncertain phase due to Covid-19. Therefore, the purposes of this assessment, the latest traffic data (May 2021) will be used and will also be adjusted against seasonal factors. This is to ensure the data used is consistent to pre Covid-19 phase.

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The AM and PM Peak hour period for May 2021 data are as follows:

- AM peak: 8:15 AM to 9:15 PM (Total hourly volume = 1,484 vehicles per hour)
- PM peak: 4:15 PM to 5:15 PM (Total hourly volume = 1,747 vehicles per hour)

2.7 Existing road network traffic volumes - seasonal adjustment methodology

The traffic volumes used for the existing intersection assessment and for the background traffic of the development assessments are based on the 2021 traffic counts undertaken by Austraffic (as outlined in Section 2.6). However, based on the 2020 Transport Modelling Guidelines (Volume 5 – Intersection Modelling), seasonality or seasonal variation is a consideration that needs to be included when evaluating traffic flow and intersection operation. This is especially relevant to reflect the post Covid-19 traffic conditions.

For this assessment, a full year’s traffic counts was obtained from 2019 SCATS of the closest intersection available, which was the Maroondah Highway/ Melba Highway intersection. The 2021 intersection volumes were adjusted to reflect the 30th busiest AM and PM peak hours in 2019.

Figure 2-11 and Figure 2-12 compares the combined northbound and southbound SCATS volumes for the intersections of Maroondah Highway/ Melba Highway on two survey days (March 2020 and May 2021) against the 30th busiest AM and PM hour in 2019.

Seasonal adjustment factors for the AM and PM peak are summarised in Table 2-1. These factors were applied to the network, including at the intersection Maroondah Highway/ Ingram Road. The AM and PM southbound and northbound volumes were factored by 1.02 % and 1.16 % respectively.

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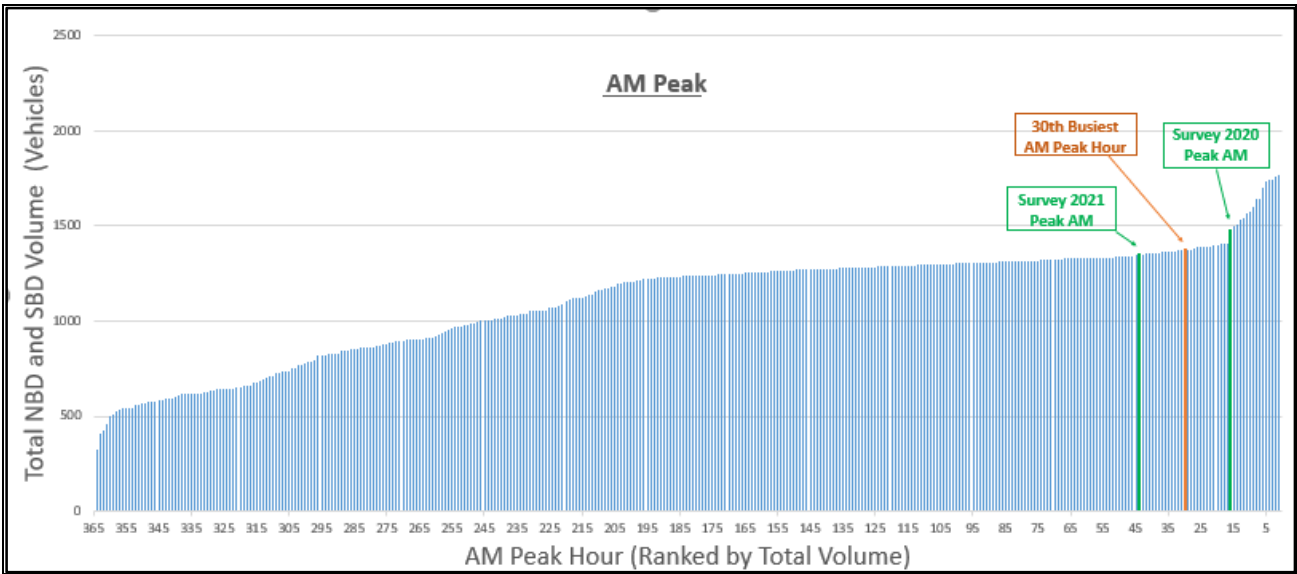


Figure 2-11: Survey day vs 30th busiest hour comparison – AM peak

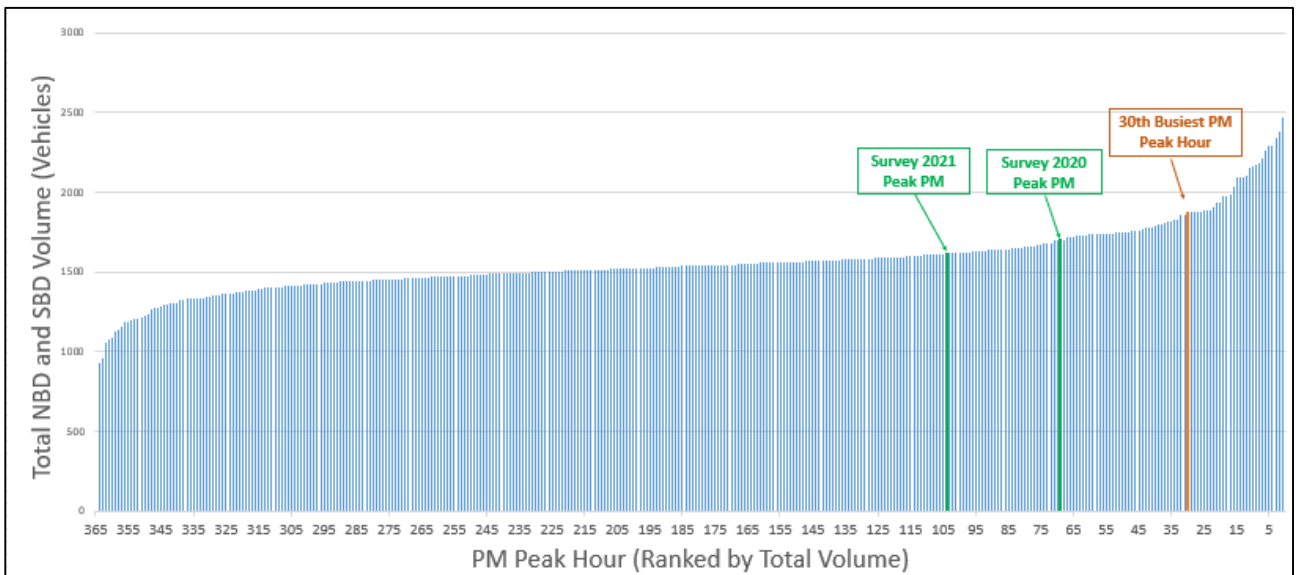


Figure 2-12: Survey day vs 30th busiest hour comparison – PM peak

Table 2-1: Seasonal adjustment factor for AM and PM peaks

	AM	PM
Seasonal adjustment factor	1.018	1.158

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2.8 Midblock performance criteria

The volume to capacity ratio (v/c) for the peak direction traffic volumes was calculated by dividing the total observed or modelled vehicles per lane per hour, by an assumed vehicle capacity per lane per hour (based on lane type) (AUSTROADS, 2013).

Table 2-2 outlines the typical midblock capacities for urban roads (excluding short, dedicated turning lanes). The theoretical capacity of a two-lane, two-way highway (urban/rural) is 1,800 pc/h for each direction of travel (AUSTROADS, 2013).

Table 2-2: Typical midblock capacities for urban roads with interrupted flow (Source: Austroads, 2013)

Lane type	One-way midblock capacity (per vehicle per hour)
Median or inner lane	
Divided road	1,000
Undivided road	900
Middle lane (of a 3-lane carriageway)	
Divided road	900
Undivided road	1,000
Kerb lane	
Adjacent to parking lane	900
Occasional parked vehicles	600
Clearway conditions	900
Increased peak period urban road capacity if there is e.g.:	
Adequate flaring at upstream intersections, major road priority controls, control/absence of parking and/or good traffic signal coordination along corridor	1,200

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Table 2-3 summarises the Level of Service (LoS) criteria for midblock sections in relation to the v/c ratio value.

Table 2-3: LoS criteria for midblock sections (Source: Highway Capacity Manual², 2010)

LoS	v/c ratio	General description
A	Less than or equal to 0.60	Free flow
B	>0.60 – 0.70	Stable flow
C	>0.70 – 0.80	Stable flow (acceptable/satisfactory performance)
D	>0.80 – 0.90	Approaching unstable flow (tolerable)
E	>0.90 – 1.00	Unstable flow (intolerable)
F	>1.00	Forced flow (congested)

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² The AUSTROADS guidelines refer to the 2010 Highway Capacity Manual

2.9 Intersection performance measures

The performance of the Maroondah Highway/ Ingram Road intersection for the nominated options assessment will be measured against the metrics outlined in this section.

2.9.1 Level of Service

Level of Service (LoS) is a qualitative measure for ranking “operating conditions”, based on factors such as speed, travel time, freedom to manoeuvre, interruptions, comfort and convenience. Intersection LoS will be assessed in accordance with the level of service method as outlined in Table 2-4.

Table 2-4: Intersection performance measures based on per person delay

Level of Service (LoS)	Average delay per person (seconds)	
	Signalised intersections	Sign controlled intersections
A	< 10	< 10
B	10 < 20	10 < 15
C	20 < 35	15 < 25
D	35 < 55	25 < 35
E	55 < 80	35 < 50
F	80 +	50 +

Source: Table 36 in DoT Transport Modelling Guidelines Volume 3: Intersection Modelling

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2.9.2 Degree of Saturation

Degree of Saturation (DoS) is defined as the ratio of the arrival flow (demand) to the capacity of the approach during the same period. The DoS of an intersection ranges from close to zero for very low traffic flows and up to one for saturated flows. The overall intersection DoS defined as the highest DoS of all individual movements at an intersection. DoS ratings are defined in Table 2-5.

Table 2-5: Degree of Saturation (DoS) rating

Degree of Saturation (DoS)	Rating
Excellent	DoS < 0.6
Very good	0.6 < DoS < 0.7
Good	0.7 < DoS < 0.8
Acceptable	0.8 < DoS < 0.9
Poor	0.9 < DoS < 1.0
Very poor	DoS > 1.0

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Source: SIDRA Intersection 9.0

2.9.3 95th percentile queues

The 95th percentile queue is the length (in metres) below which 95% of all observed cycle queues lengths fall. In other words, this queue length is expected to be exceeded only for 5% of observed queues. The 95th percentile queue is often interpreted as a design queue and is used to determine desirable turn lane and storage lengths.

2.9.4 Targets

The performance targets for the options assessment are summarised in Table 2-6.

Table 2-6: Performance targets

Performance measure	Target
Level of Service	D
Degree of Saturation	< 0.9
95 th percentile queues	< lane storage length

2.10 Existing midblock volumes and performance

Table 2-7 shows the current midblock traffic volumes (base case dataset) and traffic performance on the Maroondah Highway in the vicinity of the Maroondah Highway/ Ingram Road intersection. Overall, from a midblock traffic perspective, the highway is currently performing satisfactorily during the peak hour period (noting that these peak hour volumes represent an average of the AM and PM peak periods) with roads generally experiencing a LoS A.

Table 2-7: Midblock performance for existing traffic volumes on the Maroondah Highway

Road	Direction	AADT (vehicles)	Annual growth rate	No of Lanes	Peak hour volume (vehicles)	Year of Count	Assumed Capacity (pc/h)	v/c ratio	LoS
Maroondah Highway (between Warburton Hwy and Station St)	NB	9,300	0.8%	1	920	2020	1,800	0.51	A
	SB	9,100	0.8%	1	920	2020	1,800	0.51	A

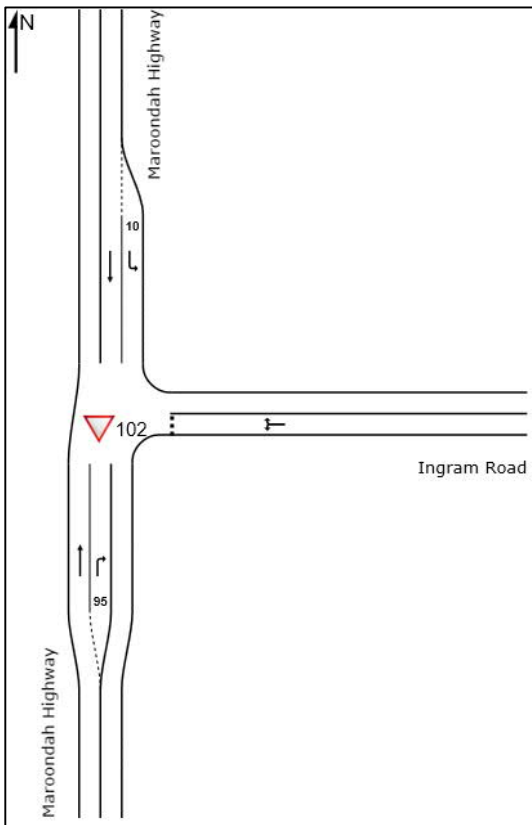
2.11 Existing intersection volumes and performance

A SIDRA intersection analysis was undertaken on the existing the Maroondah Highway/ Ingram Road intersection, to understand the existing performance of the intersection. This assessment was undertaken using the adjusted traffic volumes from Section 2.6.

Figure 2-13 shows the existing intersection layout as input into SIDRA Intersection (version 9). Table 2-8 and Table 2-9 details the lane configuration, existing traffic volumes and intersection performance during the AM and PM peak hour periods respectively.

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Figure 2-13: Existing Maroondah Highway/ Ingram Road intersection layout

Table 2-8: Maroondah Highway/ Ingram Road intersection existing AM peak traffic volumes and performance

Approach		Volume (veh/hr)	Degree of Saturation	Average Delay (s)	Level of Service	95% Queue (m)
Ingram Road (E)	L/R	83	0.27	14.6	LOS B	0.9
Maroondah Highway (N)	L	7	0.01	6.4	LOS A	0.0
	T	785	0.43	0.1	LOS A	0.0
Maroondah Highway (S)	T	652	0.36	0.1	LOS A	0.0
	R	60	0.13	12.6	LOS B	0.4
Intersection performance		1,587	0.42	1.4	LOS A	0.9

Table 2-9: Maroondah Highway/ Ingram Road intersection existing PM peak traffic volumes and performance

Approach		Volume (veh/hr)	Degree of Saturation	Average Delay (s)	Level of Service	95% Queue (m)
Ingram Road (E)	L/R	67	0.62	57.5	LOS F	15.9
Maroondah Highway (N)	L	14	0.01	6.4	LOS A	0.0
	T	868	0.46	0.2	LOS A	0.0
Maroondah Highway (S)	T	1,084	0.58	0.2	LOS A	0.0
	R	74	0.18	14.2	LOS B	4.4
Intersection performance		2,107	0.62	2.6	LOS A	15.9

The findings showed that the Maroondah Highway/ Ingram Road intersection performs satisfactorily in both the AM and PM peak periods. The only approach which did not perform satisfactorily according to the AUSTRROADS Guidelines in terms of average delay (i.e., exceeds 50 seconds) is Ingram Road which experiences an average delay of 58 seconds in the PM peak. In terms of DoS and queue length, Ingram Road still performs satisfactorily.

Due to the very low volumes of traffic entering and leaving Rosemont Road, it has not been included in the existing assessment or the future year assessment in Section 4.6. It's impact on the network is minimal. The queues on Ingram Road would block access to/ from Rosemont Road during the AM and PM peak periods. A clear zone should be implemented at the Rosemont Road/ Ingram Road intersection to allow sufficient gap for the traffic to access/ egress Rosemont Road.

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3. Proposed development

The proposed new WtE facility will be located north of the existing Lilydale STP site.

The scenarios for the traffic assessment relate to the construction and operation phase of the proposed development, which are as follows:

- The main drivers of construction traffic generation are the delivery of construction materials, equipment, WtE plant components, as well as the construction workforce travelling to and from the Lilydale site. Construction is expected to take approximately 24 months, with peak construction activity occurring during the second half of 2023.
- The operational phase of the project will mainly require the daily delivery by heavy vehicles of waste to be processed at the proposed WtE facility, and the transport of regular on-site operators. The operation phase is expected to run for 20 years, commencing at 100 percent capacity by 2025.

3.1 Maroondah Highway/ Ingram Road/ New Access Road intersection

As part of the land acquisition further north of the existing Lilydale STP, a new access road to the site at Maroondah Highway/ Ingram Road intersection is proposed (i.e., by developing a fourth west leg to the existing intersection). The purpose of establishing this new access is to divert any WtE related traffic away from roads located within the Lilydale township, thus keeping traffic impacts on these roads to a minimum.

3.2 Proposed transport routes to site

The traffic generated by the construction/ operation phase will enter the Lilydale catchment via Maroondah Highway. The southern and northern access routes are as follows (refer Figure 3-1):

- Southern route (black line) - approach from the south via Swansea Road and Maroondah Highway, accessing the left turn at the Maroondah Highway/ Ingram Road intersection to traverse along the new access road to the site.
- Northern route (blue line) - approach from the north via Melba Highway and Maroondah Highway, accessing the right turn at the Maroondah Highway/ Ingram Road intersection to traverse along the new access road to the site.

Both suggested routes use "B" and "C" class roads designated under the VicRoads hierarchy of road classification.

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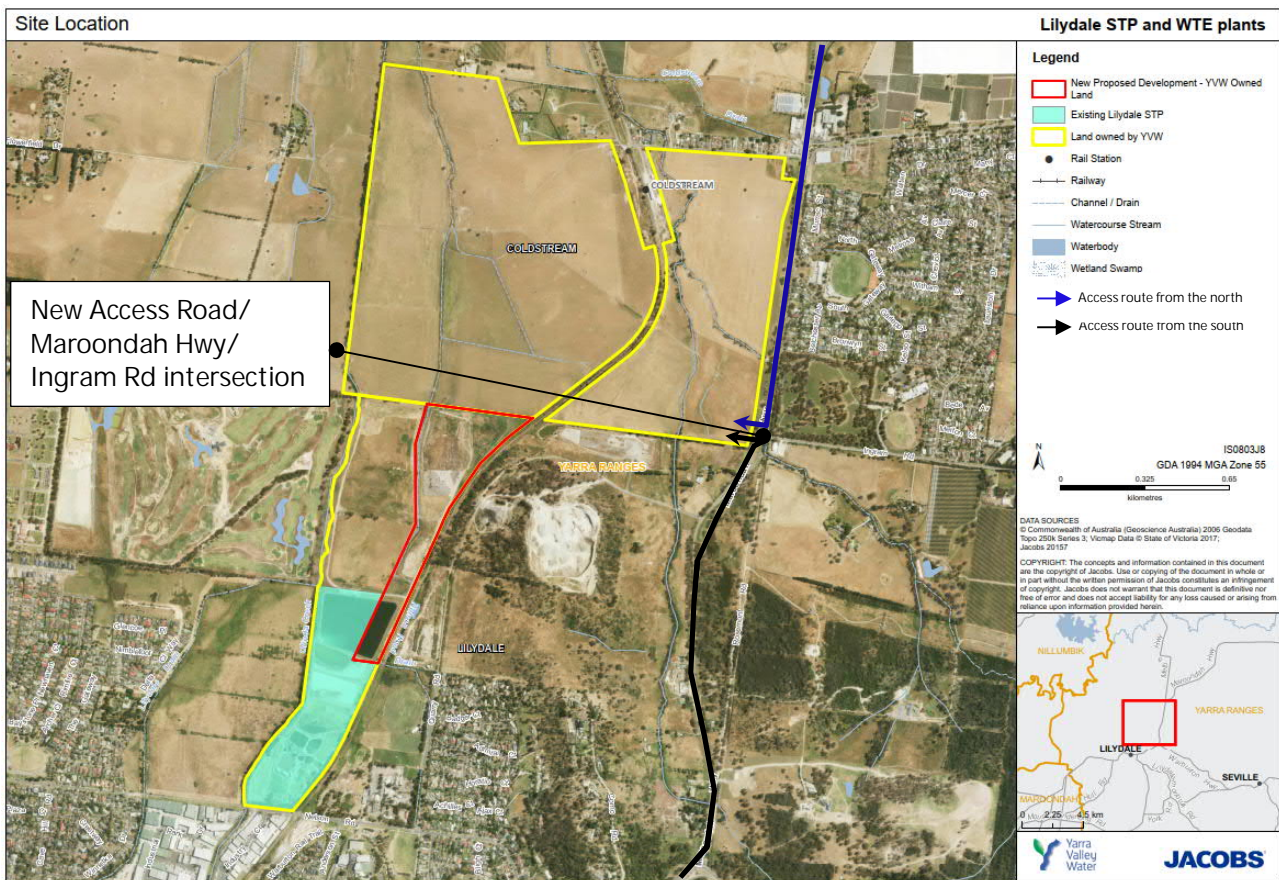


Figure 3-1: Access routes to the proposed new WtE site (Source: YVW, 2017)

3.3 Project time frames and operating hours

The scenarios for traffic impact assessments relate to the project timeline and milestone dates as outlined in Table 3-1.

Table 3-1: Project timeline (Source: YVW, 2020)

Phase	Timeframe
Construction period	2023
Peak period of construction	2023
Operation commences (100% capacity)	2025
Traffic operation assessment horizon	2045

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Construction work hours are assumed to be from 6:00 AM to 5:00 PM, Monday to Friday.

Operational times are 6:00 AM to 5:00 PM Monday to Friday. Saturday work hours are rare and will only be for trucks by appointment and staff for unscheduled maintenance only.

However, typical truck movements for normal operational times for the waste industry are 6:00 AM to 4:00 PM with only the occasional truck after 2:00 PM (this is the delivery pattern at the Wollert facility).

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3.4 Estimated traffic generated and assumed traffic distribution

3.4.1 Construction traffic

Table 3-2 shows the predicted maximum daily traffic volumes travelling one-way during the identified peak construction period.

Table 3-2 : Estimates of traffic volumes generated during the construction phase (Source: YVW, 2017)

Lilydale WtE – Construction Phase	
Construction Delivery	20 heavy vehicles (HV) accessing the site throughout the day – traffic assessment to assume 30% (i.e., six) of these heavy vehicles will travel during the peak periods
Construction workflow/ staff	40 light vehicles (LV) accessing the site (i.e., enter/exit) during peak hour periods
Total Number of vehicles	46 vehicles to enter the site during peak periods

In terms of construction traffic distribution, the following assumptions have been employed:

- 92.5% of construction traffic travelling during the peak hour periods will access the site from the south via Maroondah Highway and turn left at Ingram Road intersection
- 7.5% of construction traffic travelling during the peak hour periods will access the site from the north via Maroondah Highway and turn right at Ingram Road intersection
- During the AM peak traffic volumes exiting the site are assumed to be approximately 25% of the volume entering the site. In the PM peak volumes entering the site are assumed to be approximately 25% of the exiting traffic volumes.

Figure 3-2 summarises the expected traffic movements accessing the new WtE site at the Maroondah Highway/ Ingram Road intersection during the AM and PM peak periods of the construction phase.

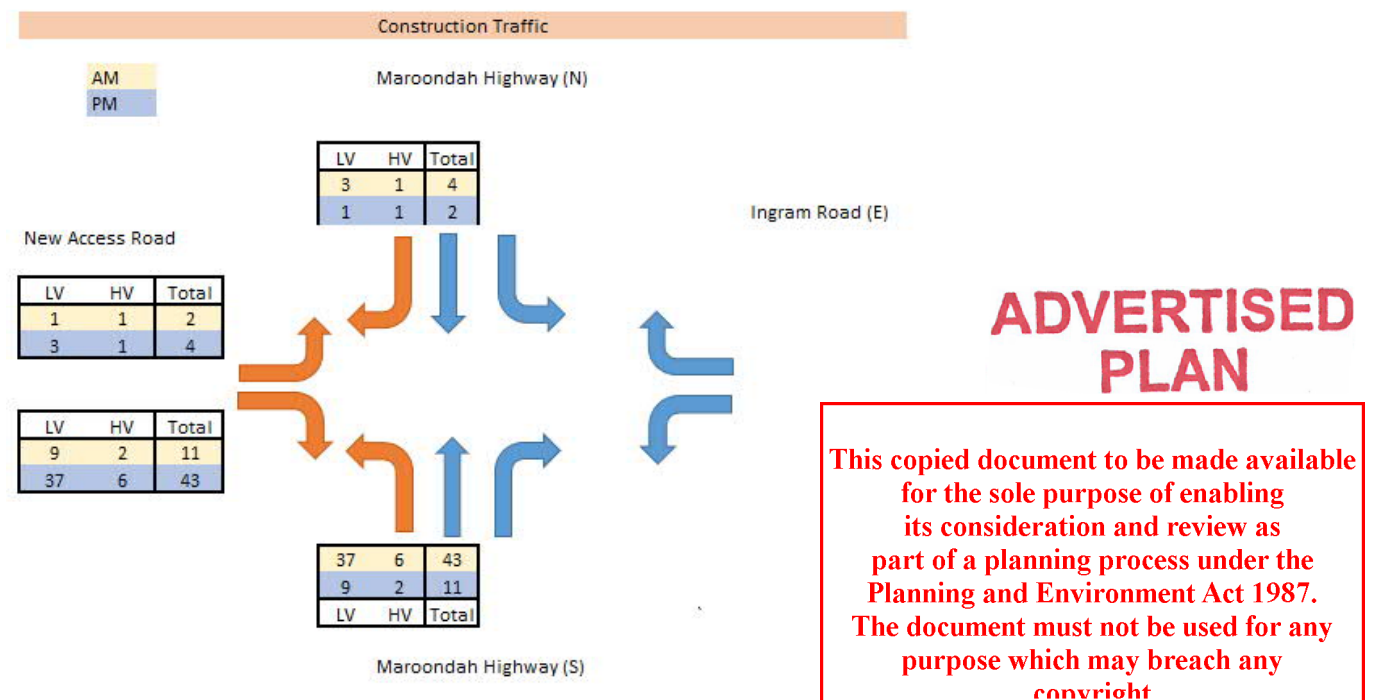


Figure 3-2: Expected peak hour traffic movements generated during the construction phase

3.4.2 Operational traffic

Table 3-3 shows the predicted maximum daily traffic volumes travelling one-way during the identified peak operation period.

Table 3-3: Estimates of traffic volumes generated during the operation phase (Source: YVW, 2017)

Lilydale WtE – Operation Phase	
Operation Delivery	33 heavy vehicles (HV) accessing the site– with approximately 30% (i.e., 10) of these heavy vehicles travelling during the peak periods
Operation workflow/ staff	10 light vehicles (LV) accessing the site during operations
Total Number of vehicles	20 to enter the site during peak periods

In terms of operation traffic distribution, the following assumptions have been employed:

- 92.5% of construction traffic travelling during the peak hour periods will access the site from the south via Maroondah Highway and turn left at Ingram Road intersection
- 7.5% of construction traffic travelling during the peak hour periods will access the site from the north via Maroondah Highway and turn right at Ingram Road intersection
- During the AM peak traffic volumes exiting the site are assumed to be approximately 50% of the volume entering the site. In the PM peak volumes entering the site are assumed to be approximately 50% of the exiting traffic volumes.

Figure 3-3 summarises the expected traffic movements accessing the new WtE site at the Maroondah Highway/ Ingram Road intersection during the AM and PM peak periods of the operational phase.

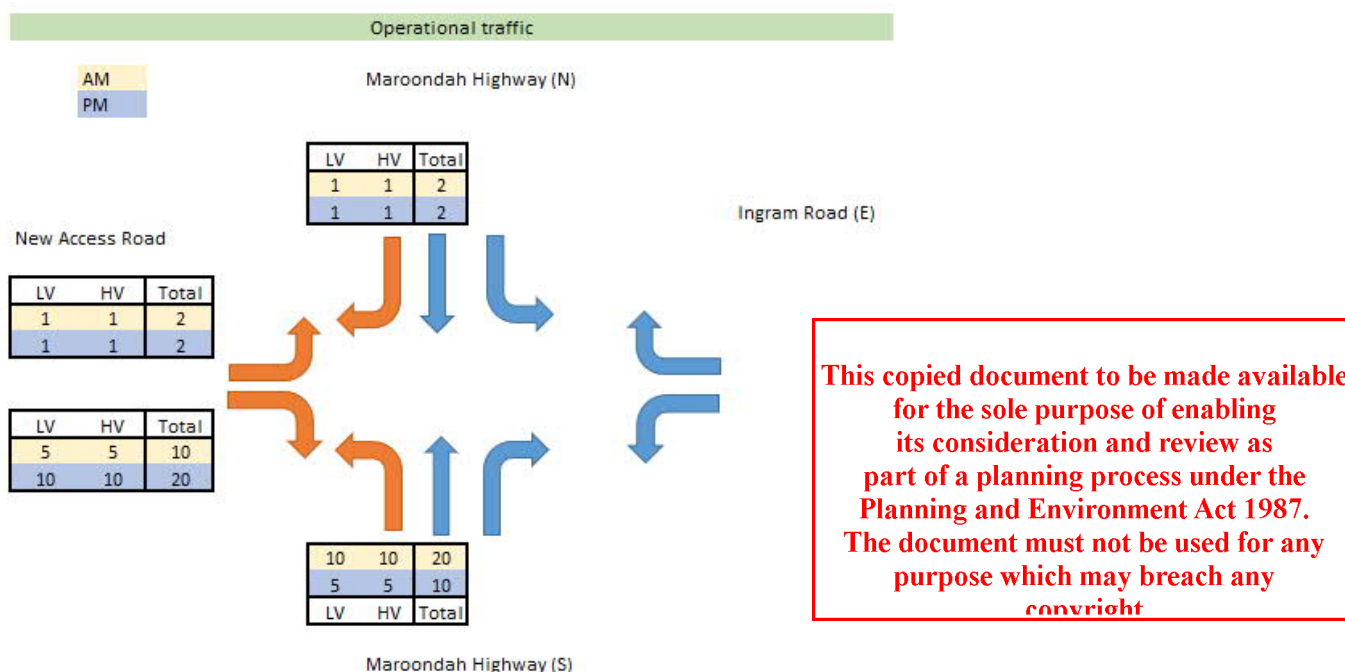


Figure 3-3: Expected peak hour traffic movements generated during the operational phase

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4. Traffic impact assessment

4.1 Key assumptions

The following inputs and assumptions were used for the future midblock and intersection analyses:

- Intersection analyses using SIDRA (version 9) were undertaken for the Maroondah Highway/ Ingram Road intersection during the AM and PM peaks, in order to determine the traffic impacts of the estimated vehicles movements to and from the proposed development.
- Based on the tenders received, the timings for the future scenarios are:
 - Scenario 1 - Peak construction year 2023: It is anticipated that construction for the proposed development is to start by early to mid-2023 with an approximate 24-month construction schedule. Peak construction phase is anticipated to occur in year 2023.
 - Scenario 2 - Opening year 2025: Year of opening based on an approximate 24-month construction phase. The site is anticipated to open by mid to late 2024. However, the proposed facility is expected to be operating at 100 percent capacity by 2025.
 - Scenario 3 - Operation year 2045: 20-year horizon.
- Traffic count data and background growth:
 - For the midblock and intersection volumes, a background traffic growth rate of zero (0) percent to 2025, and two (2) percent from 2025 to 2045 was assumed. It is assumed that the next few years will have minimal growth due to the uncertainty in travel patterns post Covid-19. The 2020 vs 2021 count data showed a negative growth trend. However, for the purposes of this assessment, a 0% growth rate was adopted up to the opening year 2025. A two (2) percent growth rate was adopted for the future years up to 2045 based on a typical conservative growth rate that is expected to occur.
 - Estimates of traffic generated during the construction and operation phases of the WtE project were provided by YVW (see Table 3-2 and Table 3-2). For the purpose of this assessment, it is assumed that all traffic will use the new access point of Maroondah Highway/ Ingram Road to access the proposed development, following the routes discussed in Section 3.2.

4.2 Future midblock volumes and performance

The impact of the additional traffic for the peak construction year (2023), opening year (2025) and twenty-year operation horizon (2045) scenarios was assessed as marginal and does not impact the LoS on the surrounding roads. The existing road network is expected to operate within an acceptable LoS as shown Table 4-1 for the nominated scenarios.

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Table 4-1: Future midblock performance of Maroondah Highway, between Warburton Highway and Station Street

Year	Direction	AADT (vehicles)	No of Lanes	Peak hour volume (vehicles)	Assumed capacity (pc/h)	v/c ratio	LoS
2019	NB	9,300	1	920	1,800	0.51	A
	SB	9,100	1	920	1,800	0.51	A
2023	NB	9,680	1	960	1,800	0.51	A
	SB	9,470	1	960	1,800	0.51	A
2025	NB	9,680	1	960	1,800	0.51	A
	SB	9,470	1	960	1,800	0.51	A
2045	NB	14,380	2	1,420	3,600	0.39	A
	SB	14,070	2	1,420	3,600	0.39	A

4.3 Public transport impacts

In terms of traffic relating to local public transport services in the Lilydale/ Coldstream area, traffic along Maroondah Highway will generally not have much impact during the construction and operation phases of the project. While both PTV run bus services (see Figure 2-6) and Invicta³ run school bus services (see Figure 2-7) regularly use both preferred routes, the traffic impact will be minimal because the arterial roads used are expected to maintain a similar service flow rate or LoS, particularly during AM and PM peak periods.

4.4 Active transport impacts

The new Access Road to the proposed WtE site will cross the existing Yarra Valley Trail Stage 1 approximately 800m west of the Maroondah Highway/ Ingram Road/ New Access Road intersection.

A technical note summarising the transport impacts of the crossing of the Yarra Valley Trail Stage 1 with the proposed new Access Road is provided in Appendix A. This technical note has been prepared for completeness of information. It does not form part of the TIA for the intersection connection. YVW is seeking approval from VicTrack for a lease of this rail corridor crossing

The findings of the transport impact assessment show that the provision of a pedestrian/cyclist crossing where trail users give way to vehicles on the road will have a minimal impact on trail users for all three nominated scenarios in both the AM and PM peak periods. It is therefore proposed that an Access Road Typical Rail Trail Entry-Exit treatment is provided at the Yarra Valley Trail crossing point of the new access road. The treatment is consistent with the road crossing treatments provided on Station Street and Nelson Road to the north and south of the site respectively, and thus considered appropriate and safe for use at the new access road crossing point.

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³ Invicta runs school bus services for a number of schools in Lilydale. There are four schools located nearby the Lilydale STP, they are: Lilydale Heights College, Lilydale Primary School, Mount Lilydale Mercy College and Lilydale Pre School Centre Inc.

4.5 Intersection configuration

Figure 4-1 shows the SIDRA layout of the Maroondah Highway/ Ingram Road/ New Access Road intersection for Scenario 1 (Peak Construction-2023) and Scenario 2 (Opening Year-2025). The short lane lengths for the new Access Road were determined based on the required queue storage for the assessed scenarios.

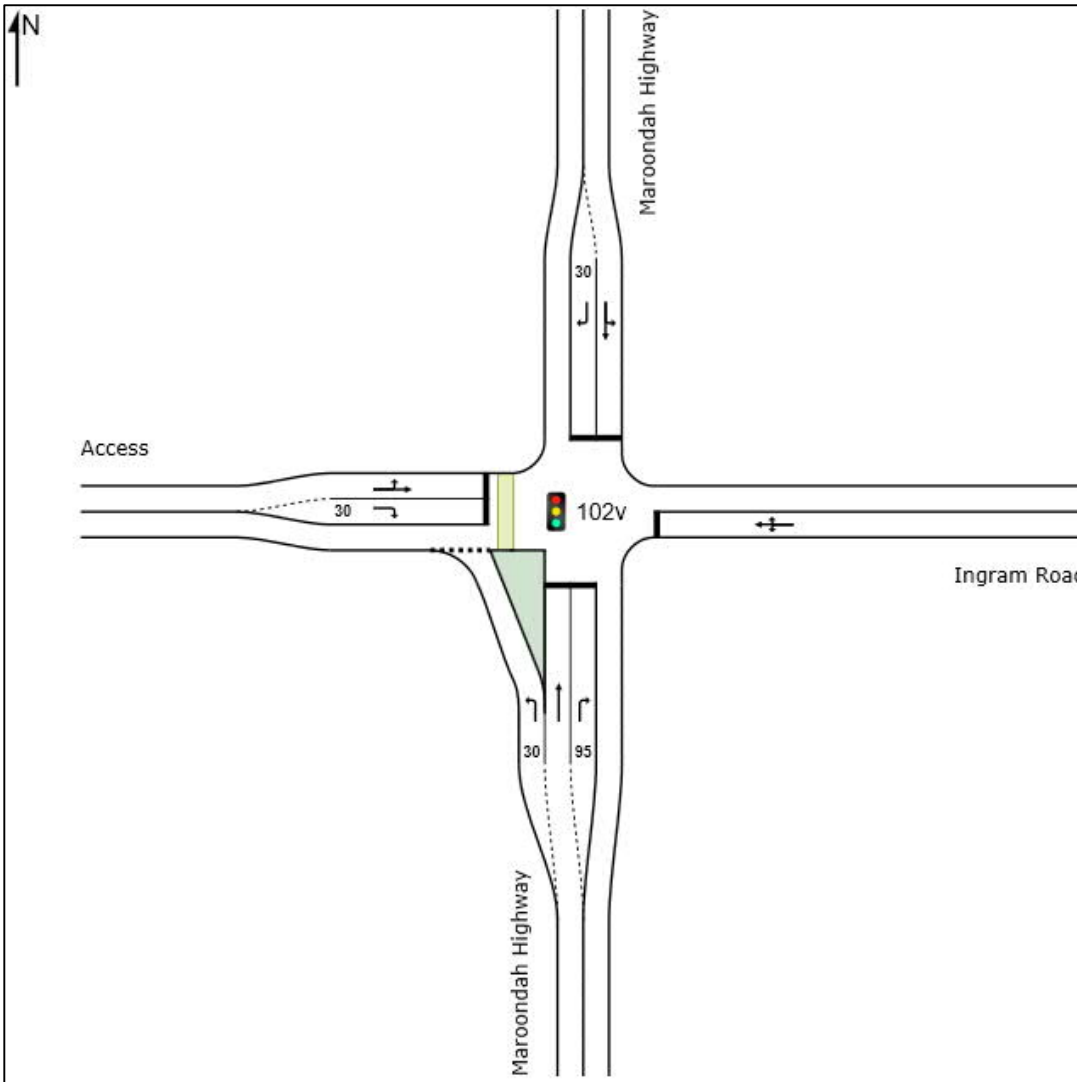


Figure 4-1: SIDRA layout for the Maroondah Highway/ Ingram Road/ New access road intersection for Scenario 1 and Scenario 2 (interim layout)

Figure 4-2 shows the SIDRA layout of the Maroondah Highway/ Ingram Road/ New Access Road intersection for Scenario 3 (Operation Year-2045). The difference between the interim layout and the ultimate layout is the four (4) lane configuration along Maroondah Highway to support the future modifications proposed by DoT.

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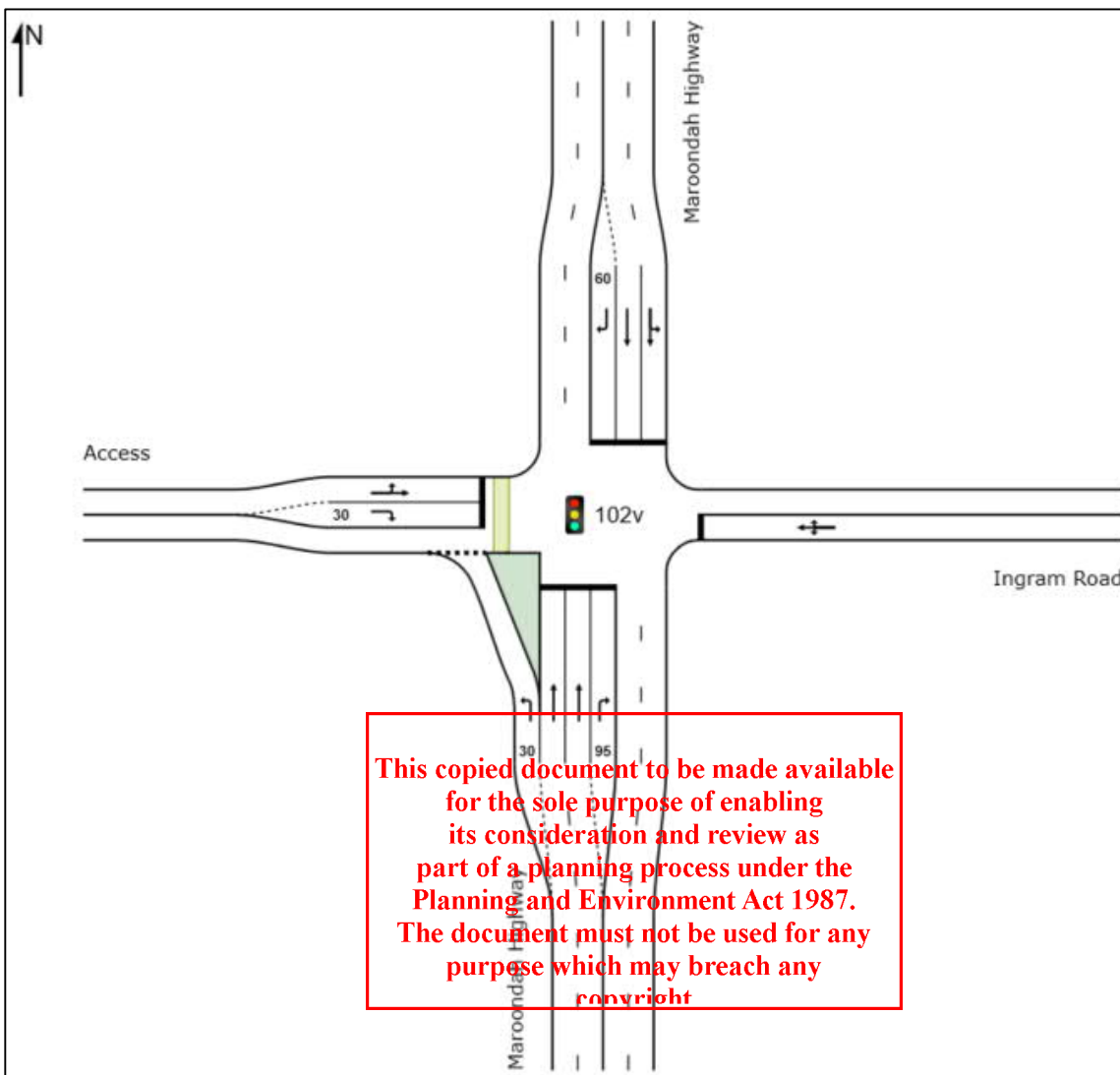


Figure 4-2: SIDRA layout for the Maroondah Highway/ Ingram Road/ New access road intersection for Scenario 3 (ultimate layout)

4.6 Intersection performance - future scenarios

Table 4-2 shows the signal times adopted for the SIDRA analysis in each scenario and peak period. A four-phase signal phasing was adopted for this assessment.

The SIDRA Intersection analysis shows that the proposed interim and ultimate intersection layout will perform within the acceptable range of DoS, delays and queues for both the AM and PM peak periods. Refer Table 4-3 and Table 4-4.

During the AM peak, the southbound movements (directional peak) had the highest DoS for all the scenarios. Similarly, for the PM peak, the northbound movement had the highest DoS levels. The lane lengths provided within the proposed layouts will cater for the 95th percentile queues and the acceleration/ declaration requirements. In addition, the performance of Ingram Road is improved with the implementation of a signalised intersection, with delays and LoS improving.

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Table 4-2: SIDRA phase times for the Maroondah Highway/ Ingram Road/ New Access Road intersection

Scenario		Phasing (seconds)			
		Phase A	Phase B	Phase C	Phase D
Scenario 1 (Peak Construction - 2023)	AM	81 s (68%)	12 s (10%)	12 s (10%)	15 s (13%)
	PM	84 s (70%)	12 s (10%)	12 s (10%)	12 s (10%)
Scenario 2 (Opening Year - 2025)	AM	81 s (68%)	12 s (10%)	12 s (10%)	15 s (13%)
	PM	84 s (70%)	12 s (10%)	12 s (10%)	12 s (10%)
Scenario 3 (Operation Year - 2045)	AM	71 s (59%)	16 s (13%)	12 s (10%)	21 s (18%)
	PM	77 s (64%)	16 s (13%)	12 s (10%)	15 s (13%)

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Table 4-3: Maroondah Highway/ Ingram Road/ New Access Road intersection future AM peak traffic volumes and performance

Approach		Queue storage (m)	Scenario 1 (Peak Construction-2023)					Scenario 2 (Opening Year-2025)					Scenario 3 (Operation Year-2045)				
			Volume (veh/hr)	Degree of Saturation	Average Delay (s)	Level of Service	95% Queue (m)	Volume (veh/hr)	Degree of Saturation	Average Delay (s)	Level of Service	95% Queue (m)	Volume (veh/hr)	Degree of Saturation	Average Delay (s)	Level of Service	95% Queue (m)
Ingram Road (E)	L/T/R	>500	80	0.35	45.8	LOS D	28.1	80	0.35	45.8	LOS D	28.1	120	0.33	37.6	LOS D	37.3
Maroondah Highway (N)	L	>500	7	0.65	14.1	LOS B	117.9	7	0.65	14.1	LOS B	117.9	11	0.56	25.1	LOS C	155.1
	T	>500	746	0.65	7.8	LOS A	117.9	746	0.65	7.8	LOS A	117.9	1,110	0.56	18.9	LOS B	157.9
	R	30	4	0.05	67.5	LOS E	2.0	2	0.03	67.8	LOS E	1.2	2	0.02	62.0	LOS E	1.1
Maroondah Highway (S)	L	30	43	0.03	6.1	LOS A	1.0	10	0.01	6.5	LOS A	0.3	20	0.02	6.5	LOS A	0.6
	T	>500	619	0.55	6.9	LOS A	81.2	619	0.54	6.9	LOS A	81.2	921	0.47	17.8	LOS B	125.3
	R	95	57	0.63	71.7	LOS E	25.7	57	0.63	71.7	LOS E	25.7	85	0.56	66.2	LOS E	36.3
New access road (W)	L/T	>500	3	0.04	65.7	LOS E	1.6	3	0.04	65.7	LOS E	1.6	3	0.04	65.7	LOS E	1.6
	R	30	11	0.13	68.3	LOS E	6.0	10	0.15	69.5	LOS E	6.0	10	0.15	69.5	LOS E	6.0
Overall intersection			1,570	0.65	12.3	LOS B	117.9	1,534	0.65	12.4	LOS B	117.9	2,282	0.56	21.5	LOS C	157.9

Table 4-4: Maroondah Highway/ Ingram Road/ New Access Road intersection future PM peak traffic volumes and performance

Approach		Queue storage (m)	Scenario 1 (Peak Construction-2023)					Scenario 2 (Opening Year-2025)					Scenario 3 (Operation Year-2045)				
			Volume (veh/hr)	Degree of Saturation	Average Delay (s)	Level of Service	95% Queue (m)	Volume (veh/hr)	Degree of Saturation	Average Delay (s)	Level of Service	95% Queue (m)	Volume (veh/hr)	Degree of Saturation	Average Delay (s)	Level of Service	95% Queue (m)
Ingram Road (E)	L/T/R	>500	65	0.38	48.5	LOS D	23.6	65	0.38	48.5	LOS D	23.6	97	0.39	42.6	LOS D	32.5
Maroondah Highway (N)	L	>500	13	0.69	12.6	LOS B	118.3	13	0.69	12.6	LOS B	118.3	20	0.56	21.9	LOS C	158.4
	T	>500	825	0.69	6.3	LOS A	118.3	825	0.69	6.3	LOS A	118.3	1,227	0.56	15.7	LOS B	161.0
	R	30	2	0.03	67.8	LOS E	1.2	2	0.03	67.8	LOS E	1.2	2	0.02	62.0	LOS E	1.1
Maroondah Highway (S)	L	30	11	0.01	6.1	LOS A	0.3	10	0.01	6.5	LOS A	0.3	10	0.01	6.5	LOS A	0.3
	T	>500	1030	0.85	8.4	LOS A	220.5	1,030	0.85	8.4	LOS A	221.0	1,531	0.72	17.9	LOS B	237.0
	R	95	70	0.77	74.0	LOS E	32.2	70	0.77	74.0	LOS E	32.2	105	0.69	68.1	LOS E	45.9
New access road (W)	L/T	>500	5	0.03	57.1	LOS E	2.2	3	0.04	65.7	LOS E	1.6	3	0.04	65.7	LOS E	1.6
	R	30	43	0.51	70.5	LOS E	20.8	20	0.29	70.6	LOS E	12.3	20	0.29	70.6	LOS E	12.3
Overall intersection			2,064	0.85	12.5	LOS B	220.5	2,038	0.85	11.9	LOS B	221.0	3,015	0.72	20.0	LOS B	237.0

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5. Intersection functional layout design

5.1 Road design criteria

A functional layout plan for the interim and ultimate intersection layout was developed in conjunction with the capacity output from the intersection assessment outlined in Section 4, and the following assumptions/ criteria:

- 3.5m wide median has been allowed for in the ultimate functional layout with a median safety barrier assumed, adjacent to the northbound and southbound carriageway.
- Existing southbound travel lane has been maintained for both the interim and ultimate functional intersection layouts; all widening works are proposed to occur to the west of the existing carriageway.
- No allowance has been made for horizontal curve widening.
- It is assumed that the 70 km/h posted speed will remain, a design speed of 80 km/h has been assumed for the functional layouts.
- 19m semi-trailer has been assumed as the design vehicle with a 26m B-Double as the checking vehicle.
- The Service Road south of Rosemont Road will be as per existing condition with a LILLO (left-in-left-out) arrangement.

Table 5-1 has been developed to summarise the design criteria adopted for the 2D functional layouts, no 3D design has been undertaken for this stage of the project. The 2D functional layouts can be found in Appendix B and C.

Table 5-1: Summary of the road design criteria adopted for the interim and ultimate functional layout plan

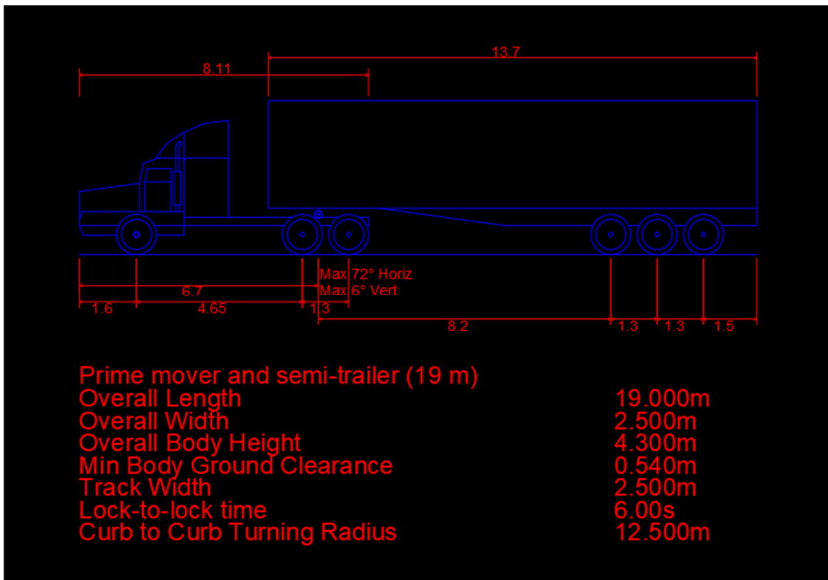
Element	Minimum Adopted Value
Posted Speed	Maroondah Highway = 70 km/h Ingram Road = 60 km/h Proposed Service Road = 60 km/h Existing Service Road = 50 km/h
Design Speed	Maroondah Highway = 70 km/h Ingram Road = 60 km/h Proposed Service Road = 60 km/h Existing Service Road = 50 km/h
Road Lane Width	3.5m minimum, no lane widening assumed
Left Shoulder	3m proposed, existing as noted on drawings
Turn Lane Deceleration and Taper Lengths	60 km/h = 35m deceleration length, 20m taper length 70 km/h = 50m deceleration length, 25m taper length
Design Vehicle – Intersection	Austroads 19m Semi Trailer
Check Vehicle – Intersection	Austroads 25m B-Double

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5.2 Swept path analysis

A swept path analysis was undertaken for the interim and ultimate functional layout plans. The detailed analysis is outlined within Appendix B and C. The proposed intersection layouts were designed to cater for a 19m semi-trailer, and a 26 m B-double design vehicle as shown in Figure 5-1 and Figure 5-2.



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Figure 5-1: 19m semi-trailer design vehicles specification

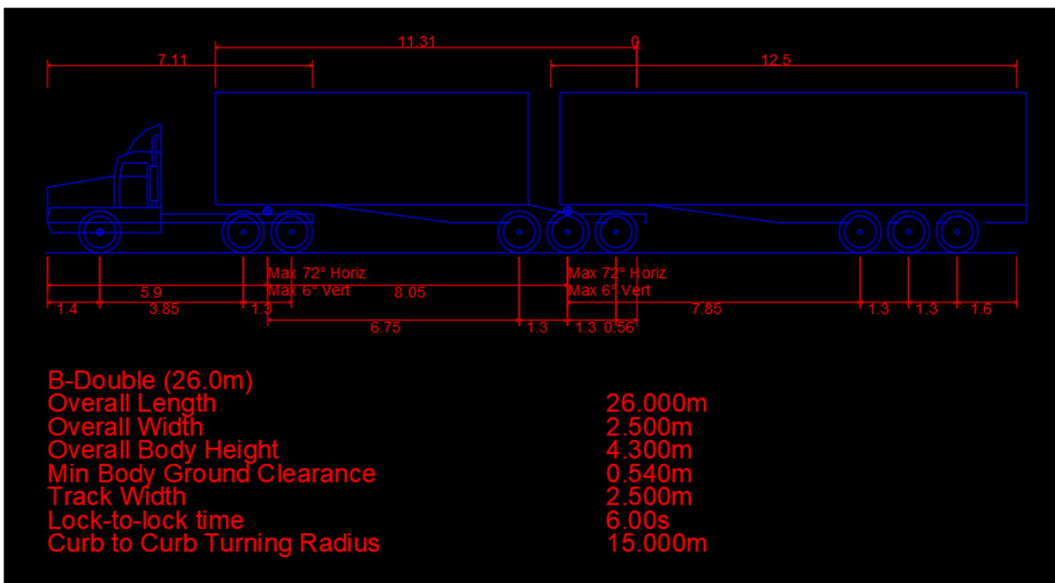


Figure 5-2: 26m B-double design vehicle specification

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6. Summary

YVW is proposing to create a new regional WtE facility on their existing Lilydale STP site. Access to the site is proposed to run along the newly purchased land to the north of the site via a new road link that will connect to the Maroondah Highway/ Ingram Road intersection.

The new intersection will be a four-way signalised intersection. Construction and operation traffic will enter the proposed development via the newly constructed western approach of the Maroondah Highway/ Ingram Road intersection. The new Access Road between the proposed WtE site and Maroondah Highway will cross the existing Yarra Valley Trail Stage 1. The trail is approximately 800m west of the Maroondah Highway/ Ingram Road / New Access Road intersection. Refer to Appendix A for a summary of the transport impact assessment undertaken for the crossing of the Yarra Valley Trail Stage 1 and the proposed new Access Road.

Section 3 summarises the estimated maximum daily and peak hour traffic volumes during the identified peak construction year (2023), the opening year (2025), and the twenty-year operation horizon (2045).

The midblock performance along the Maroondah Highway in the vicinity of the intersection has remained unchanged (LoS A). Therefore, the existing road network has sufficient capacity to accommodate the estimated traffic demand for the peak construction year (2023), the opening year (2025) and the twenty-year operation horizon (2045). It is noted that the Operation year-2045 scenario contains four lanes along Maroondah Highway to support the proposed future duplication for Maroondah Highway (that is currently being investigated by DoT).

Overall, the intersection analysis results indicate that the Maroondah Highway/ Ingram Road/ New Access Road intersection would perform within the acceptable range of DoS and delays for both peak periods during the peak construction year (2023), the opening year (2025), and the twenty-year operation horizon (2045). In addition, the performance of Ingram Road is improved with the implementation of a signalised intersection, with delays and LoS improving.

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Appendix A. Transport Impact Assessment – Yarra Valley Trail
Stage 1/ New Access Road

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Project Name Lilydale Waste to Energy Facility (WtE)
Subject Transport Impact Assessment - Yarra Valley Trail (Stage 1)/ New Access Road
Attention Ashley Naylor, Brandon Bloom
From Christina Emmitt
Date 15 November 2021
Copies to Hendry Young, Matthew De Marco

1. Introduction

Yarra Valley Water (YVW) is proposing to create a new regional organic waste processing facility (WtE) at the northern end of their existing Lilydale Sewage Treatment Plant (STP) site.

To avoid additional vehicular movement (mostly trucks) impacting residential streets, access to the site is proposed via a new road link that will connect to the Maroondah Highway/ Ingram Road intersection. The proposed access track crosses the Yarra Valley Trail (Stage 1) approximately 800m west of the Maroondah Highway/ Ingram Road intersection.

This technical note has been prepared to summarise the transport impacts of the crossing of the Yarra Valley Trail (Stage 1) and the proposed new access road to the WtE facility.

2. Existing conditions

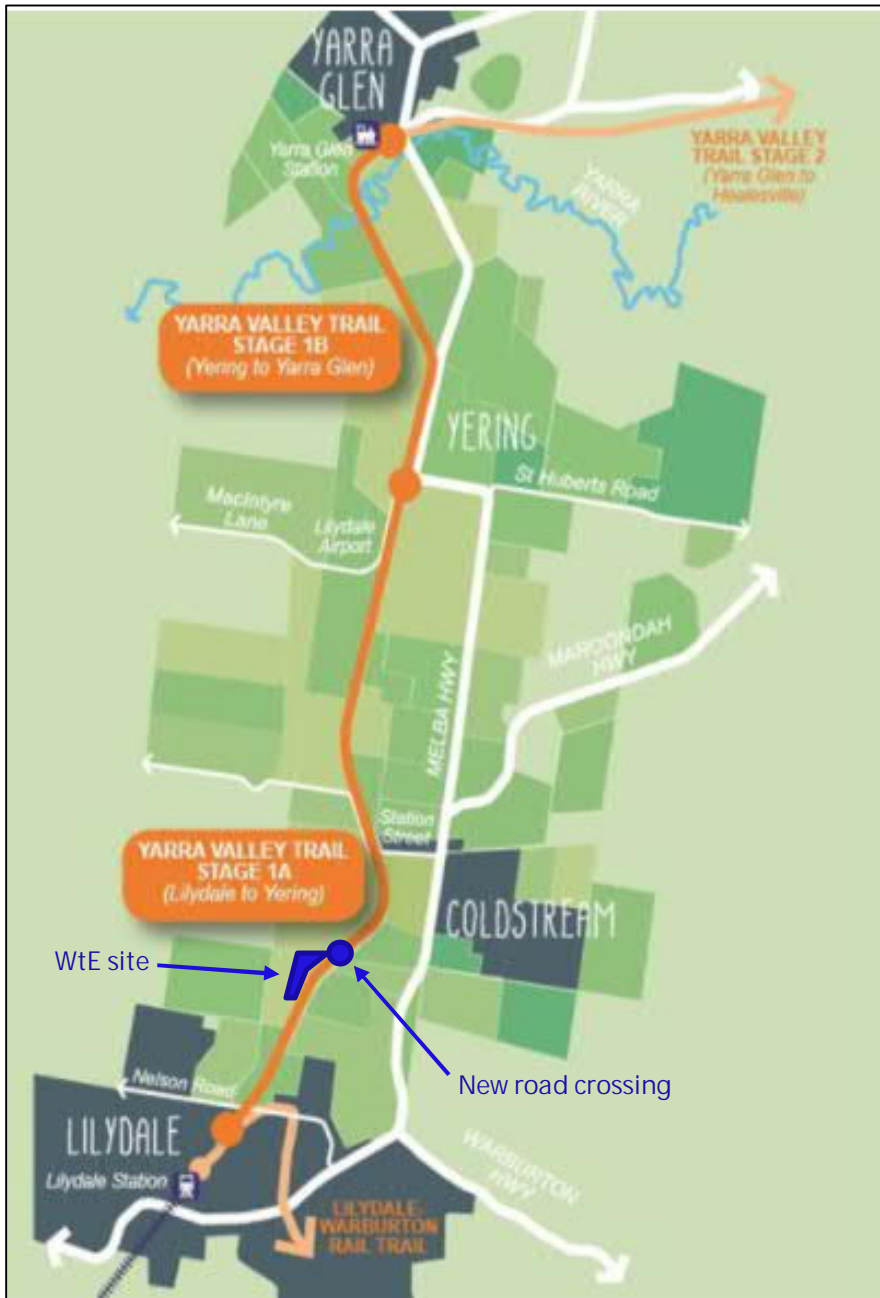
2.1 Yarra Valley Trail (Stage 1)

The Yarra Valley Trail (Stage 1) is a 12km long off-road shared user path for pedestrians and cyclists. It utilises the existing rail corridor connecting Lilydale to Yarra Glen, as shown in Figure 1. Stage 1A from Lilydale to Yering Station on Macintyre Lane was completed in 2020. Stage 1B from Yering to Yarra Glen is expected to be completed by end of April 2022.

The location of the proposed WtE site and the new road crossing point is also shown in Figure 1.

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Figure 1: Yarra Valley Trail Stage 1A and 1B (Source: Yarra Ranges Council)

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2.2 Road crossings

The Yarra Valley Trail (Stage 1) passes through the area in a mainly north-south direction on the west side of Maroondah Highway/ Melba Highway (Route B300). Stage 1A runs along the eastern boundary of the existing STP site and crosses Station Street (see Figure 2) and Nelson Road (see Figure 3) to the north and south of the site respectively.

Figure 2 and Figure 3 show the existing Access Road Typical Rail Trail Entry-Exit treatment provided at the road crossing points.

Station Street

Station Street provides an east-west connection between Maroondah Highway and Coldstream W Road. Residential properties are located on the north side of the road and vacant land is located on the south side of the road. The Yarra Valley Trail crossing is located approximately 650m west of Maroondah Highway and immediately east of Coldstream W Road.

Station Street comprises a sealed two-lane, two-way carriageway with a narrow gravel shoulder, open drain and grass verge located on both sides of the road. The posted speed limit is 70km/h. A horizontal curve with a 20km/h advisory speed limit is located immediately west of the Yarra Valley Trail crossing.

Station Street is classified as a collector road under Yarra Ranges Council Road Management Plan 2018. Collector roads are defined as links between arterial and local roads that have a higher traffic usage and speed rating and serve many properties or adjacent local roads.

Nelson Road

The section of Nelson Road where the Yarra Valley Trail crossing is located, runs in an east-west direction from Anderson Street to a dead-end. It provides direct access to several properties (including the Lilydale STP) and a small industrial area via Industry Court which is located approximately 120m west of the Yarra Valley Trail crossing.

Nelson Road comprises a sealed two-lane, two-way carriageway with a narrow gravel shoulder, open drain and grass verge located on both sides of the road. The urban default speed limit of 50km/h applies to this section of Nelson Road.

Nelson Road from Anderson Street to the dead-end, is classified as a local road under Yarra Ranges Council Road Management Plan 2018. Local roads are defined as links provided for access to private property. These roads have low traffic usage and speed ratings and generally do not perform a through road or alternative route function within the road system.

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Location	Figure
Station Street	 <p data-bbox="379 1070 1129 1104">Figure 2: Station Street/ Yarra Valley Trail crossing, looking north</p>
Nelson Road	 <p data-bbox="379 1668 1121 1702">Figure 3: Nelson Road/ Yarra Valley Trail crossing, looking south</p>

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2.3 Yarra Valley Trail usage

Survey data was provided by Yarra Ranges Council which shows the current usage of the Yarra Valley Trail (Stage 1A) to the north and south of the proposed WtE site. Council has two counters at the following locations to monitor pedestrian, cyclist and horse-riding activity along the trail:

- North of Station Street, Coldstream
- South of Nelson Road, Lilydale

Given the proximity of the proposed WtE site to Nelson Road, the data collected from the counter on Nelson Road will be used for this assessment.

The weekday monthly average number of users recorded by the Nelson Road counter for the period between 1/01/2021 and 31/07/2021 is shown in Table 1. (Weekend data has been excluded as the WtE facility is not proposed to operate on weekends, refer Section 3.3 of the Traffic Impact Assessment report).

Table 1: Weekday monthly average users – Nelson Road, Lilydale

Month (2021)	Weekday average no. of users/day
January	191
February	214
March	168
April	174
May	131
June	195
July	216

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Table 1 shows that the maximum weekday monthly average number of users is 216 per day in July 2021.

Survey data provided by Council also shows that the highest number of users over a one-hour period was recorded on Sunday 30/05/2021 with 168 users accessing the trail.

The average split between pedestrians, cyclists and horse-riders using the trail is:

- Pedestrians = 57%
- Cyclists = 43%
- Horse-riders = negligible.

3. Proposed new access road

3.1 Road characteristics

The proposed new access road will run in an east-west direction from Maroondah Highway to the WtE site, providing direct access to the WtE site only. It will comprise a sealed two-lane, two-way carriageway with a posted 50km/h speed limit.

The proposed new access road will cross the existing Yarra Valley Trail (Stage 1) approximately 800m west of the Maroondah Highway/ Ingram Road/ New Access Road intersection. The access point to the WtE site is located approximately 100m west of the trail crossing.

3.2 Estimated traffic volumes

The volume of traffic expected to use the proposed new access road is summarised in Table 2 (refer Section 3.4 of the Traffic Impact Assessment report for further details). It is noted that the only traffic volumes expected to use the new access road will be those entering and exiting the WtE site.

Table 2: Estimated peak hour traffic volumes on the new WtE access road

Peak period	Scenario 1 (Peak Construction 2023)		Scenario 2 (Opening year 2025)		Scenario 3 (Operation year 2045)	
	Enter	Exit	Enter	Exit	Enter	Exit
AM Peak	47	13	22	12	22	12
PM Peak	13	47	12	22	12	22

The peak hour traffic volumes expected on the new access road have been assessed in Section 4.2 below.

3.3 Road classification

Under the Yarra Ranges Council Road Management Plan 2018, the proposed new access road is classified as a local road based on the following criteria:

- Provides access to private property
- Low traffic usage and speed rating
- Does not perform a through road or alternative route function within the road system.

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4. Impact assessment

4.1 Future trail usage

Usage of the Yarra Valley Trail is expected to grow significantly over the next 10 years as more sections of the trail are constructed. Advice provided by Council indicates that the maximum weekday monthly average number of pedestrians and cyclists using the trail may increase from 216 users per day (July 2021) to in the order of 579 to 786 users per day in 2031. Refer to Attachment A for a copy of the letter from Yarra Ranges Council dated 1 October 2021.

Assuming the number of users increases to 786 per day in 2031, the annual growth rate is 13.8%. Applying this annual growth rate to the existing peak hour volume of 168 users per hour, the peak hour volume of users expected in Scenarios 1 and 2 are summarised below.

- Scenario 1: Peak Construction 2023 = 218 users per hour
- Scenario 2: Opening year 2025 = 282 users per hour

Growth along the trail is expected to be minimal after 2031 following the completion of the trail network. It is therefore assumed that the same number of users in 2031 will use the trail in Scenario 3: Operation year 2045. Based on the annual growth rate of 13.8%, the peak hour volume of users expected in 2045 is 611 users per hour.

The peak hour pedestrian and cyclist volumes on the Yarra Valley Trail have been assessed in Section 4.2 below.

4.2 Performance assessment

The performance of the crossing of the Yarra Valley Trail (Stage 1) and the proposed new access road has been assessed using SIDRA Intersection 9.0 during the AM and PM peaks for each of the three scenarios, to determine the impact of vehicle priority movements accessing the WtE site on trail users.

The results of the performance assessment are summarised in Table 3.

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Table 3: Proposed Yarra Valley Trail crossing of the new WtE access road performance assessment

Approach		Queue storage (m)	Scenario 1 (Construction 2023)					Scenario 2 (Operation 2025 – Opening Year)					Scenario 3 (Operation 2045)				
			Volume (veh/hr)	Degree of Saturation	Average Delay (s)	Level of Service	95% Queue (m)	Volume (veh/hr)	Degree of Saturation	Average Delay (s)	Level of Service	95% Queue (m)	Volume (veh/hr)	Degree of Saturation	Average Delay (s)	Level of Service	95% Queue (m)
AM Peak																	
New access road (E)	T	>500	47	0.026	0	LOS A	0	22	0.015	0	LOS A	0	22	0.015	0	LOS A	0
New access road (W)	T	100	13	0.008	0	LOS A	0	12	0.008	0	LOS A	0	12	0.008	0	LOS A	0
Yarra Valley Trail	T	-	218	0.197	0.5	LOS A	1.0	282	0.248	0.4	LOS A	1.4	611	0.537	0.6	LOS A	4.5
PM Peak																	
New access road (E)	T	>500	13	0.008	0	LOS A	0	12	0.008	0	LOS A	0	12	0.008	0	LOS A	0
New access road (W)	T	100	47	0.026	0	LOS A	0	22	0.015	0	LOS A	0	22	0.015	0	LOS A	0
Yarra Valley Trail	T	-	218	0.197	0.5	LOS A	1.0	282	0.248	0.4	LOS A	1.4	611	0.537	0.6	LOS A	4.5

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Table 3 shows that the provision of a pedestrian/cyclist crossing (where trail users give way to vehicles on the road) will have a minimal impact on trail users for all three scenarios. The SIDRA analysis results show that the crossing treatment will perform within the acceptable range of DoS, delays and queues in both the AM and PM peak periods. It is noted that the DoS and 95th percentile queue length are higher in Scenario 3 than Scenarios 1 and 2 although still within the acceptable range.

Therefore, the crossing treatment will perform adequately and operate with an acceptable LoS for the nominated scenarios.

5. Road crossing treatment

5.1 Proposed treatment

It is proposed that an Access Road Typical Rail Trail Entry-Exit treatment be provided at the Yarra Valley Trail crossing point of the new WtE access road, as shown in Figure 4. Refer to Attachment B for a copy of Council's design plan.



Figure 4: Access Road Typical Rail Trail Entry-Exit Treatment (Source: Yarra Ranges Council)

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The proposed treatment is consistent with the road crossing treatments provided on Station Street and Nelson Road to the north and south of the site respectively. Consistency is recommended to effectively manage the expectations of pedestrians and cyclists using the trail. The current treatment requires pedestrians and cyclists to give way to vehicles on Station Street and Nelson Road, and thus, a similar treatment is considered appropriate and safe for use at the new access road crossing point. This approach has also been validated by Council, who noted that the proposed intersection does not pose an unacceptable risk for current and future pedestrian/ cyclist volumes on the trail. Refer Attachment A.

It is recommended that the intersection of the new access road and the Yarra Valley Trail be squared up so that they intersect at right angles to optimise sight lines for all road and trail users. Sight distances will need to be checked to ensure that all sight lines are clear and design requirements are met.

5.2 Future performance and monitoring

The performance assessment of a pedestrian/cyclist crossing where trail users give way to vehicles on the road shows that the proposed crossing treatment will perform within the acceptable range of LoS, DoS, delays and queues for all three scenarios in both the AM and PM peak periods (refer Table 3).

Therefore, the proposed crossing treatment will perform adequately and have a minimal impact on trail users for the nominated scenarios.

In Scenario 3: Operation year 2045, the DoS and 95th percentile queue length are higher than Scenarios 1 and 2 (although still within the acceptable range) which shows that the potential long-term growth in usage of the trail may have an impact on trail users in the future.

The usage of the Yarra Valley Trail should therefore be monitored and assessed regularly by Council to determine if any upgrades are required in the future to improve safety and performance along the trail, including road crossing points. The proposed crossing of the new WtE access road will form part of the trail network which will be managed by Council.

6. Summary

YVW is proposing to create a new regional WtE facility on their existing Lilydale STP site. Access to the site is proposed via a new road link that will connect to the Maroondah Highway/ Ingram Road intersection. The proposed access track will cross the existing Yarra Valley Trail (Stage 1) approximately 800m west of the intersection.

An Access Road Typical Rail Trail Entry-Exit treatment is proposed to be provided at the Yarra Valley Trail crossing point of the new access road. The treatment is consistent with the road crossing treatments provided on Station Street and Nelson Road to the north and south of the site respectively.

An assessment of the proposed treatment using SIDRA Intersection 9.0 shows that the provision of a pedestrian/cyclist crossing where trail users give way to vehicles on the road will have a minimal impact on trail users for all three nominated scenarios in both the AM and PM peak periods.

The usage of the Yarra Valley Trail should be monitored and assessed regularly by Council to determine if any upgrades are required in the future to improve safety and performance along the trail, including road crossing points. The proposed crossing of the new WtE access road will form part of the trail network which will be managed by Council.

Attachment A Letter from Yarra Ranges Council dated 1 October 2021

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Enquiries: Paul Goodison
Telephone: (03) 9294 6651

Yarra Ranges Council
PO Box 105
Lilydale Vic 3140
DX 34051

Call 1300 368 333
Fax 03 9735 4249

mail@yarraranges.vic.gov.au
www.yarraranges.vic.gov.au



1 October 2021

Mr Ashley Naylor
Project Manager Lilydale Waste to Energy
Yarra Valley Water
Via email: ashley.naylor@yvw.com.au

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Dear Mr Naylor

Further to your recent enquiry Yarra Ranges Council has no objection to Yarra Valley Water establishing crossings over the Yarra Valley Trail to the Waste to Energy Plant, ensuring the following conditions are met:

- A qualified Traffic Engineer provide advice on what vehicle/pedestrian controls are located at the crossing point, outlining necessary traffic controls and signage, with a functional yet aesthetically pleasing design.
- Appropriate dust mitigation with sealed surface at crossing points.
- Appropriate design consideration for drainage and surface finish for grip.
- Suitable sight lines and signage for pedestrian/cyclist's approaching crossings.
- All appropriate safety and security measures are included in the works.

Council can provide example concept plans for crossings prepared by Traffic Engineers of a similar treatment for considered in design and development. We look forward to working with you in preparing a suitable crossing.

Yarra Valley Trail is predicted to have significant growth over the coming 10 years as further trail sections are completed. Use may increase from a maximum weekday monthly average of 216 per day (July 2021) to be in the order of 579 to 786 per day by 2031.

Council will be managing foot and bicycle traffic at busier crossings such as Beresford Road, Lilydale and Station Street, Coldstream and numerous farm occupational crossings along the corridor. The introduction of the proposed crossing and associated risks are not considered unacceptable and can be managed with the above conditions in a similar way to how risks are assessed and managed at existing crossings.

Should you require further information, please contact Paul Goodison, Project Manager Yarra Valley Trail on telephone number (03) 9294 6651.

Yours sincerely

Mark Varmalis
Director
Environment and Infrastructure

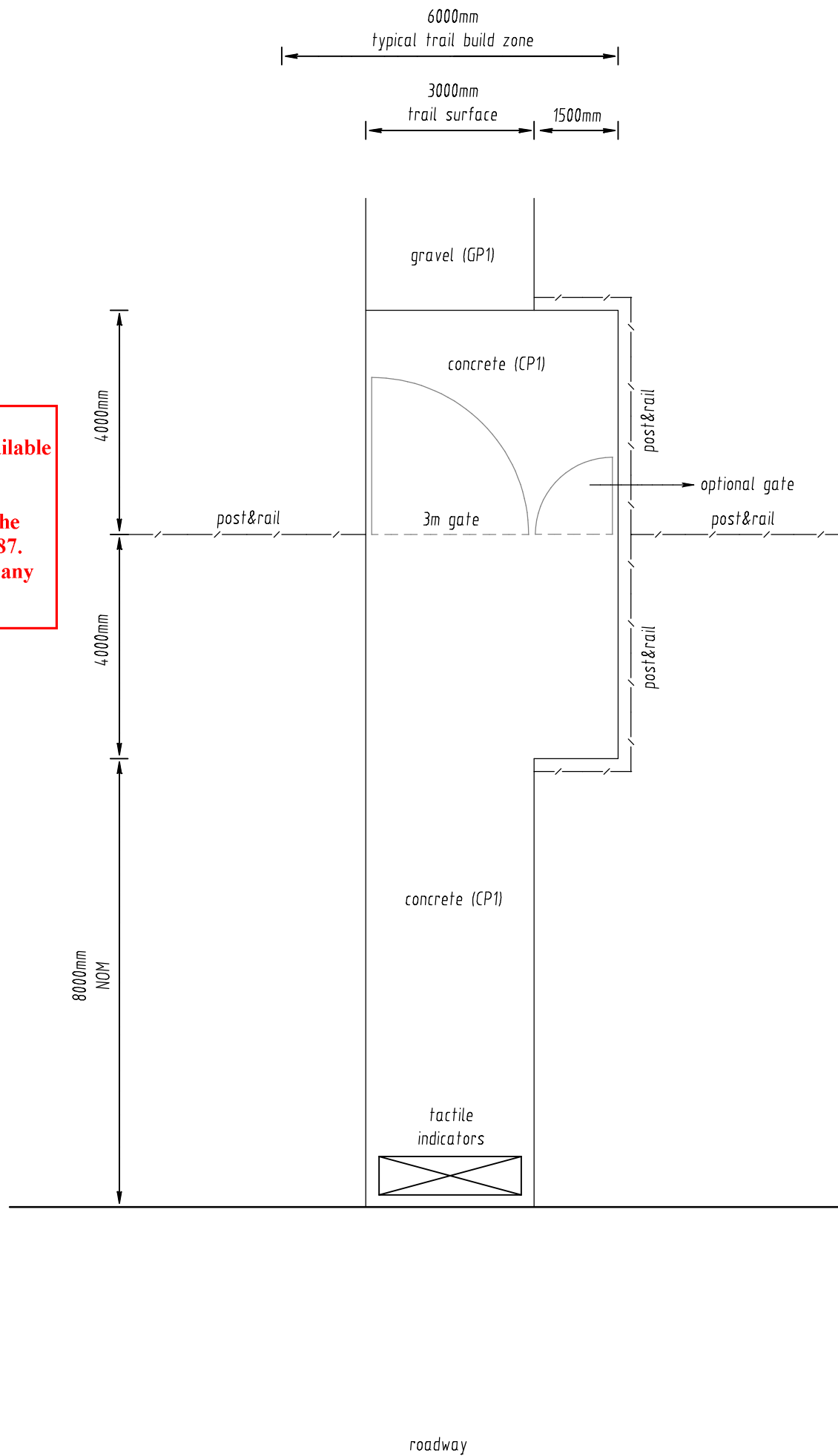
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Attachment B Access Road Typical Rail Trail Entry-Exit Design Plan
(Source: Yarra Ranges Council)

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Typical Trail Entry/Exit Point Detail

Notations	 Yarra Valley Rail Trail		Specifications Plan - Entry/Exit	
	Yarra Ranges Shire Council			
	Plan No. 191036 SP-2	Scale -	Drawn 19/06/2019	 OnePlan LAND DEVELOPMENT GROUP SURVEYING CONSULTANTS

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Appendix B. Functional Layout Plan – Interim

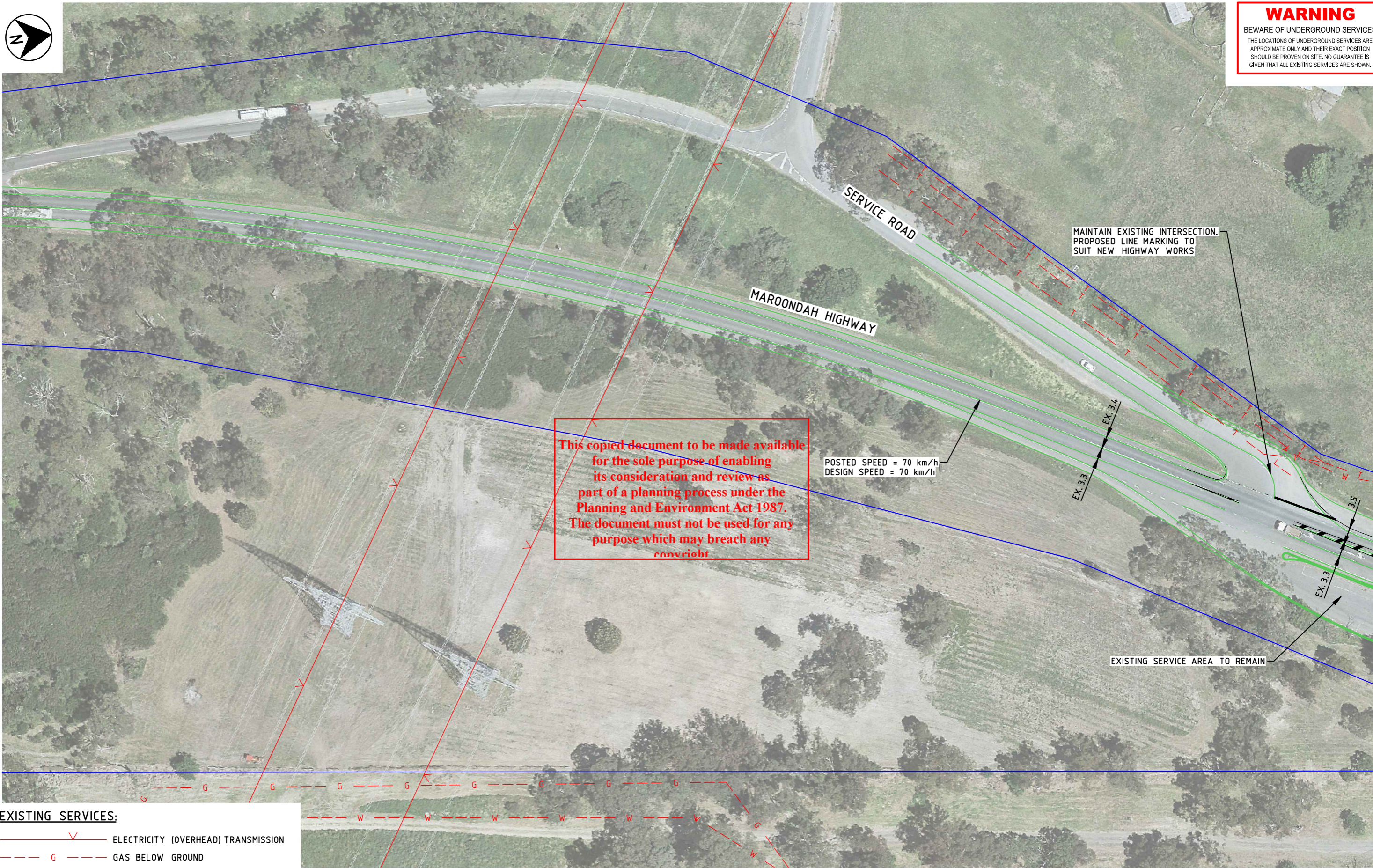
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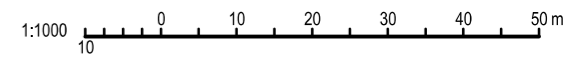


EXISTING SERVICES:

- V — ELECTRICITY (OVERHEAD) TRANSMISSION
- - - G - - - GAS BELOW GROUND
- - - T - - - TELECOM BELOW GROUND
- - - W - - - WATER BELOW GROUND

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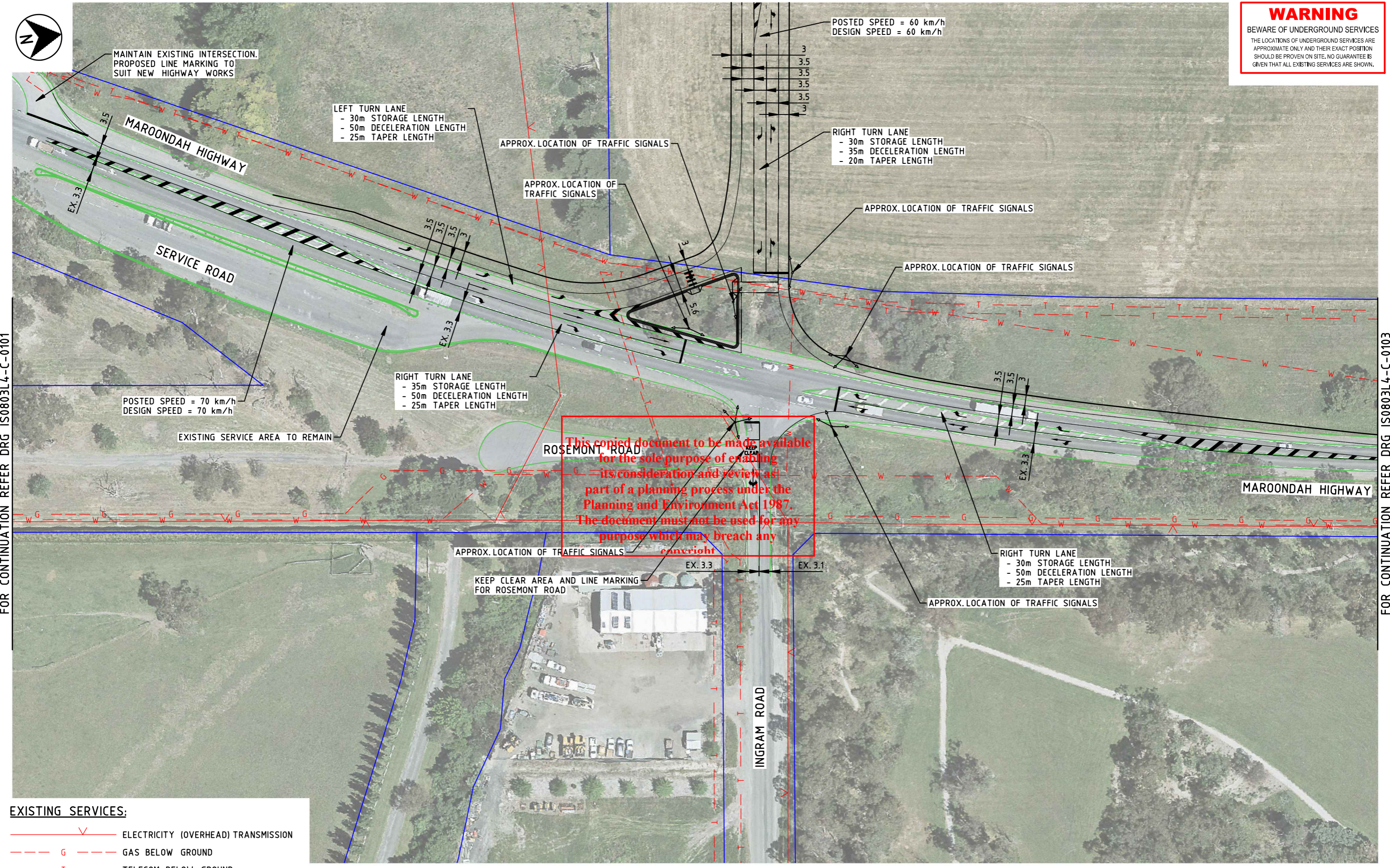
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MAINTAIN EXISTING INTERSECTION. PROPOSED LINE MARKING TO SUIT NEW HIGHWAY WORKS

LEFT TURN LANE
 - 30m STORAGE LENGTH
 - 50m DECELERATION LENGTH
 - 25m TAPER LENGTH

POSTED SPEED = 60 km/h
 DESIGN SPEED = 60 km/h

RIGHT TURN LANE
 - 30m STORAGE LENGTH
 - 35m DECELERATION LENGTH
 - 20m TAPER LENGTH

POSTED SPEED = 70 km/h
 DESIGN SPEED = 70 km/h

EXISTING SERVICE AREA TO REMAIN

RIGHT TURN LANE
 - 35m STORAGE LENGTH
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 - 25m TAPER LENGTH

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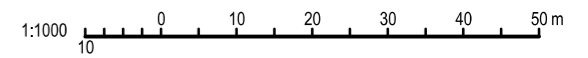
RIGHT TURN LANE
 - 30m STORAGE LENGTH
 - 50m DECELERATION LENGTH
 - 25m TAPER LENGTH

EXISTING SERVICES:

	ELECTRICITY (OVERHEAD) TRANSMISSION
	GAS BELOW GROUND
	TELECOM BELOW GROUND
	WATER BELOW GROUND

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CLIENT	YARRA VALLEY WATER
PROJECT	WASTE TO ENERGY 2 - BUSINESS CASE INTERSECTION OF MAROONDAH HIGHWAY AND INGRAM ROAD
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REV	0

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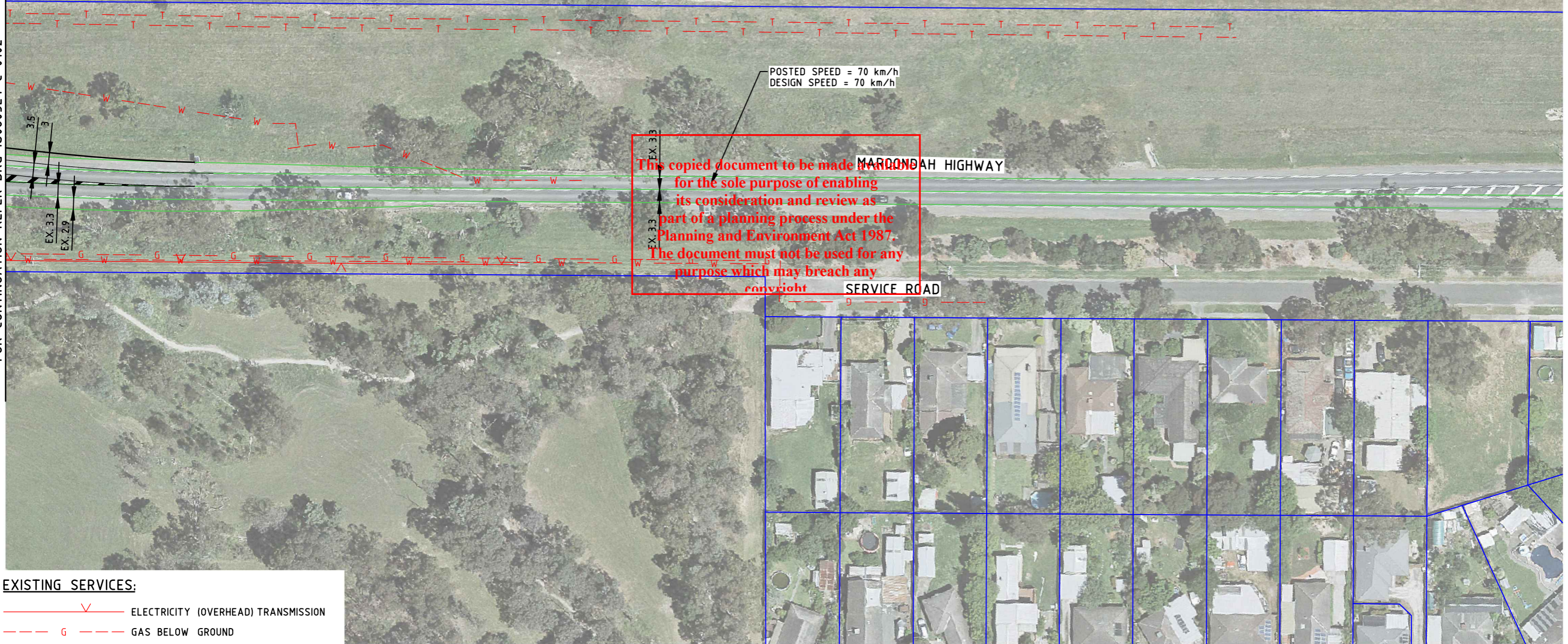
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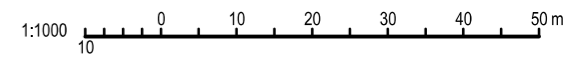
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 - - - G - - - GAS BELOW GROUND
 - - - T - - - TELECOM BELOW GROUND
 - - - W - - - WATER BELOW GROUND

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REV	DATE	DRAWN	REV'D	APP'D
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				CN9680
				VICROADS DRAWING No.

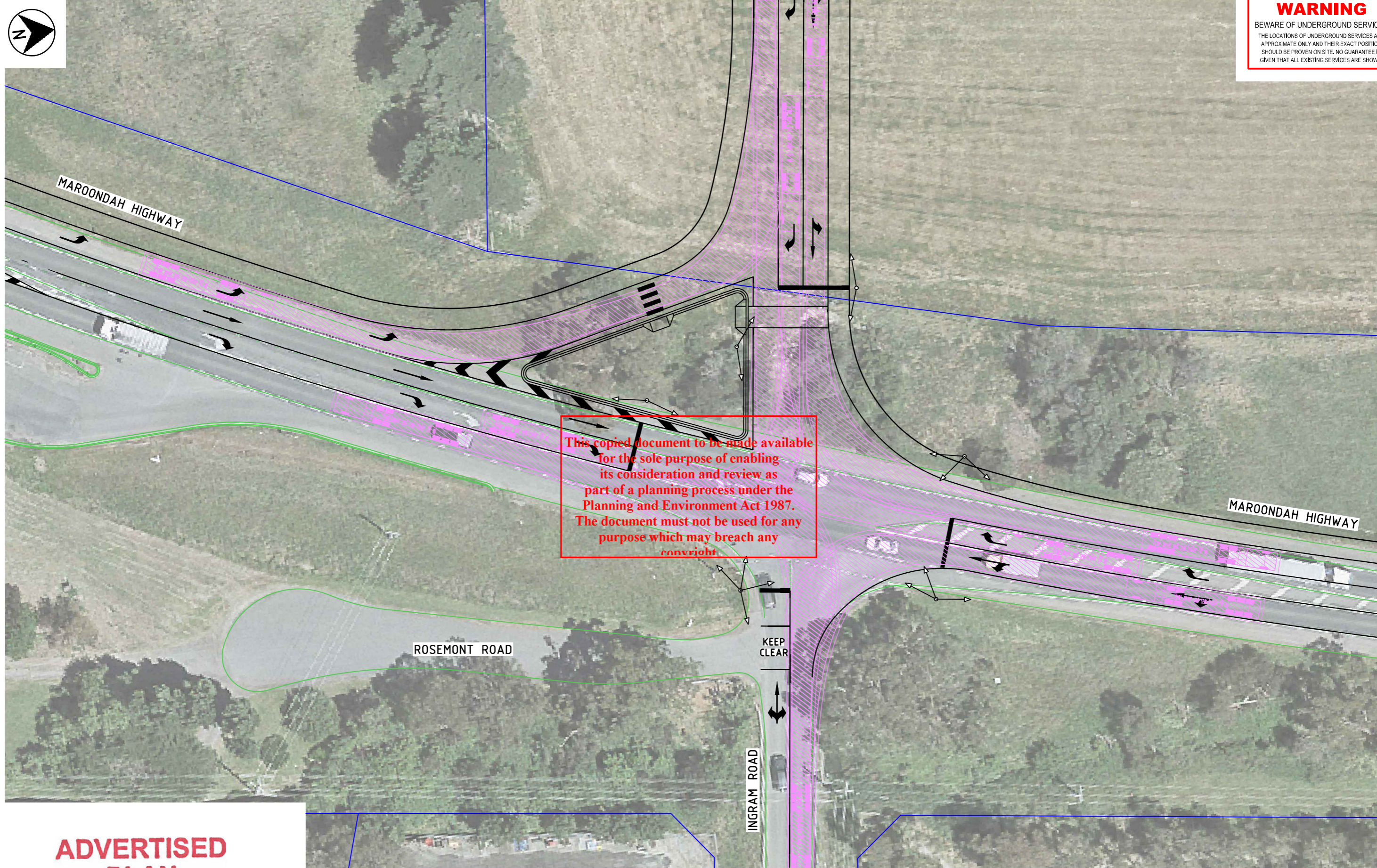
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CLIENT	YARRA VALLEY WATER
PROJECT	WASTE TO ENERGY 2 - BUSINESS CASE INTERSECTION OF MAROONDAH HIGHWAY AND INGRAM ROAD
DRAWN	GCD
DESIGNED	GCD
DRAWING CHECK	
DESIGN REVIEW	
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DATE	

TITLE	INTERIM INTERSECTION UPGRADE SHEET 3 OF 3
SCALE	1:1000
DRAWING No.	IS0803L4-C-0103
REV	0

MICROSTATION

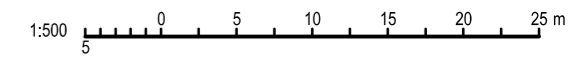


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GCD			
DESIGNED	DESIGN REVIEW	DATE	DATE
GCD			

TITLE	INTERIM INTERSECTION UPGRADE 19m SEMI TRAILER TURNING MOVEMENTS	
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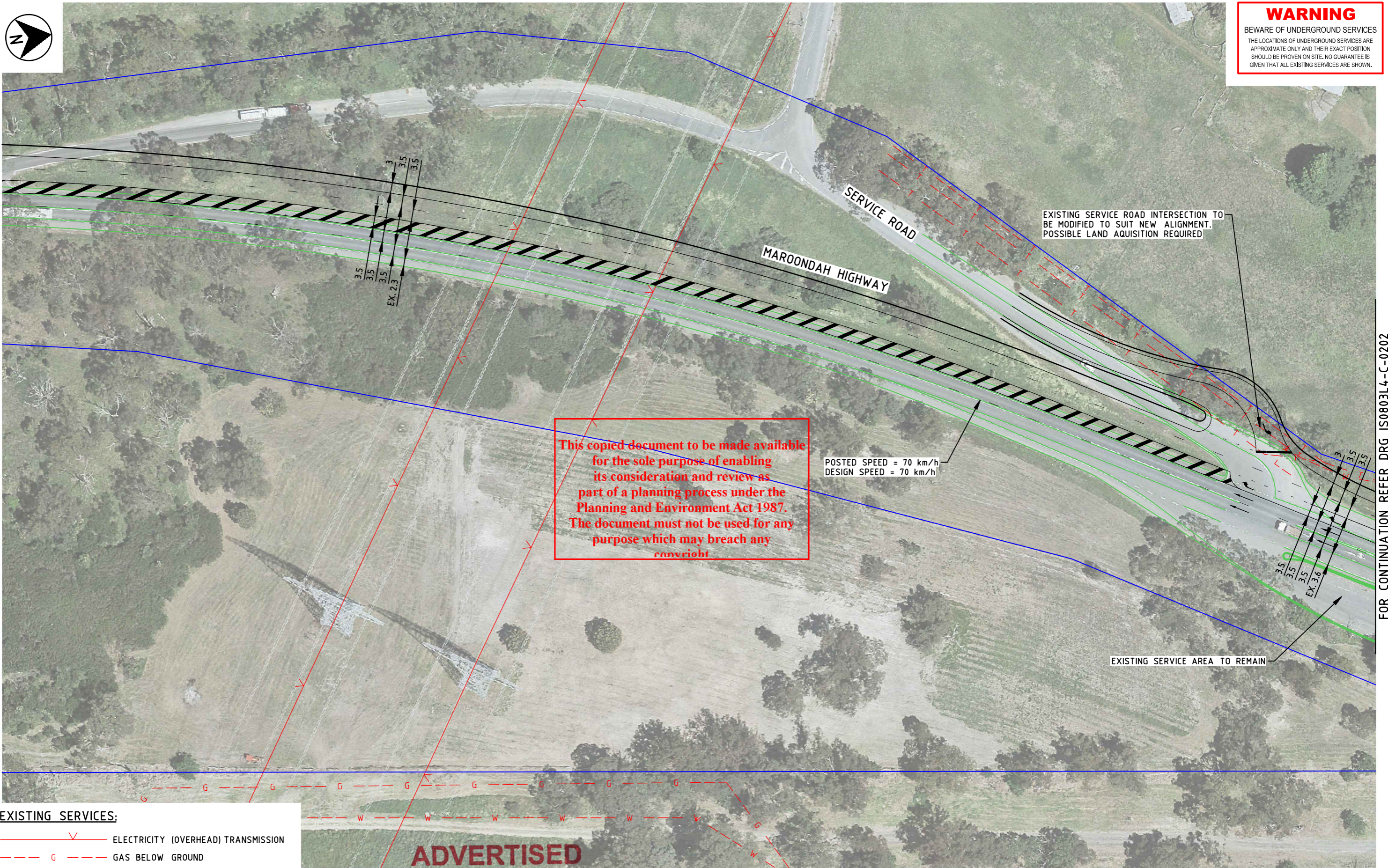
Appendix C. Functional Layout Plan – Ultimate

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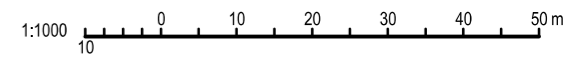
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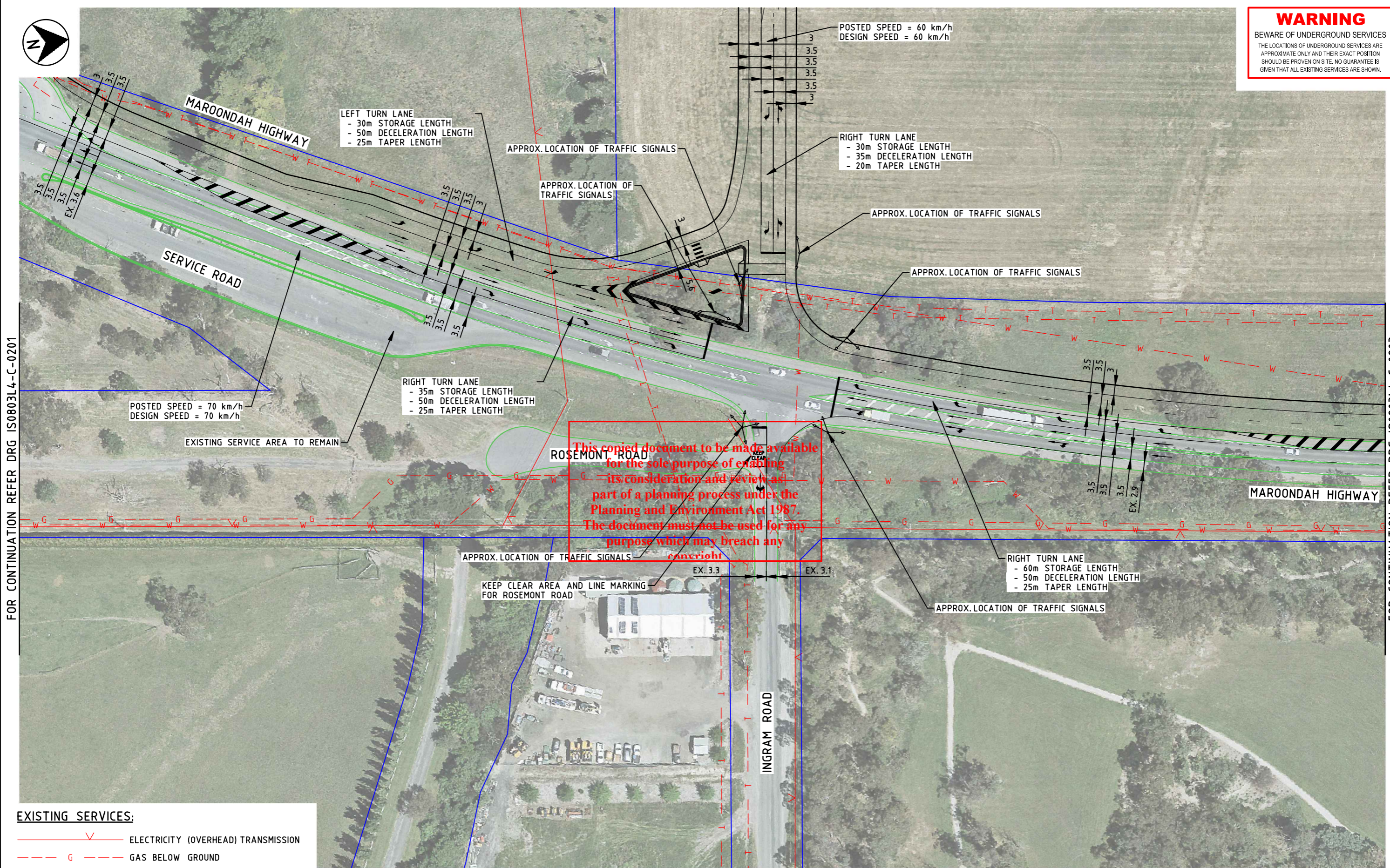
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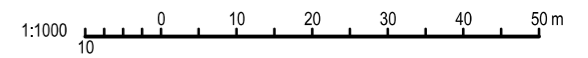
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VICROADS DRAWING No.	

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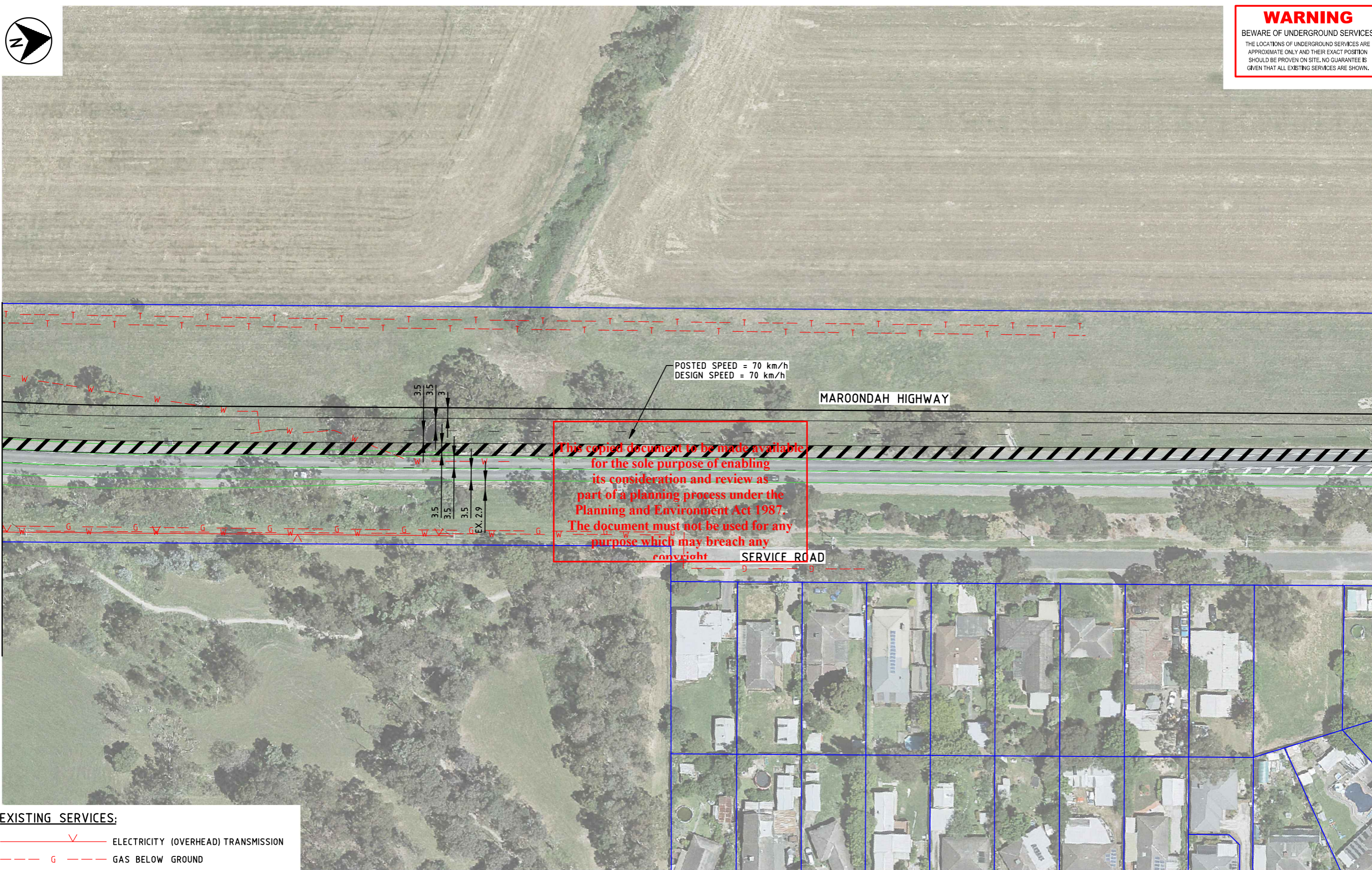
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PROJECT		WASTE TO ENERGY 2 - BUSINESS CASE INTERSECTION OF MAROONDAH HIGHWAY AND INGRAM ROAD	
DRAWN	DRAWING CHECK	REVIEWED	APPROVED
GCD			
DESIGNED	DESIGN REVIEW	DATE	DATE
GCD			

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SCALE	DRAWING No.	REV	
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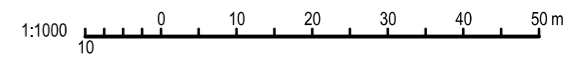


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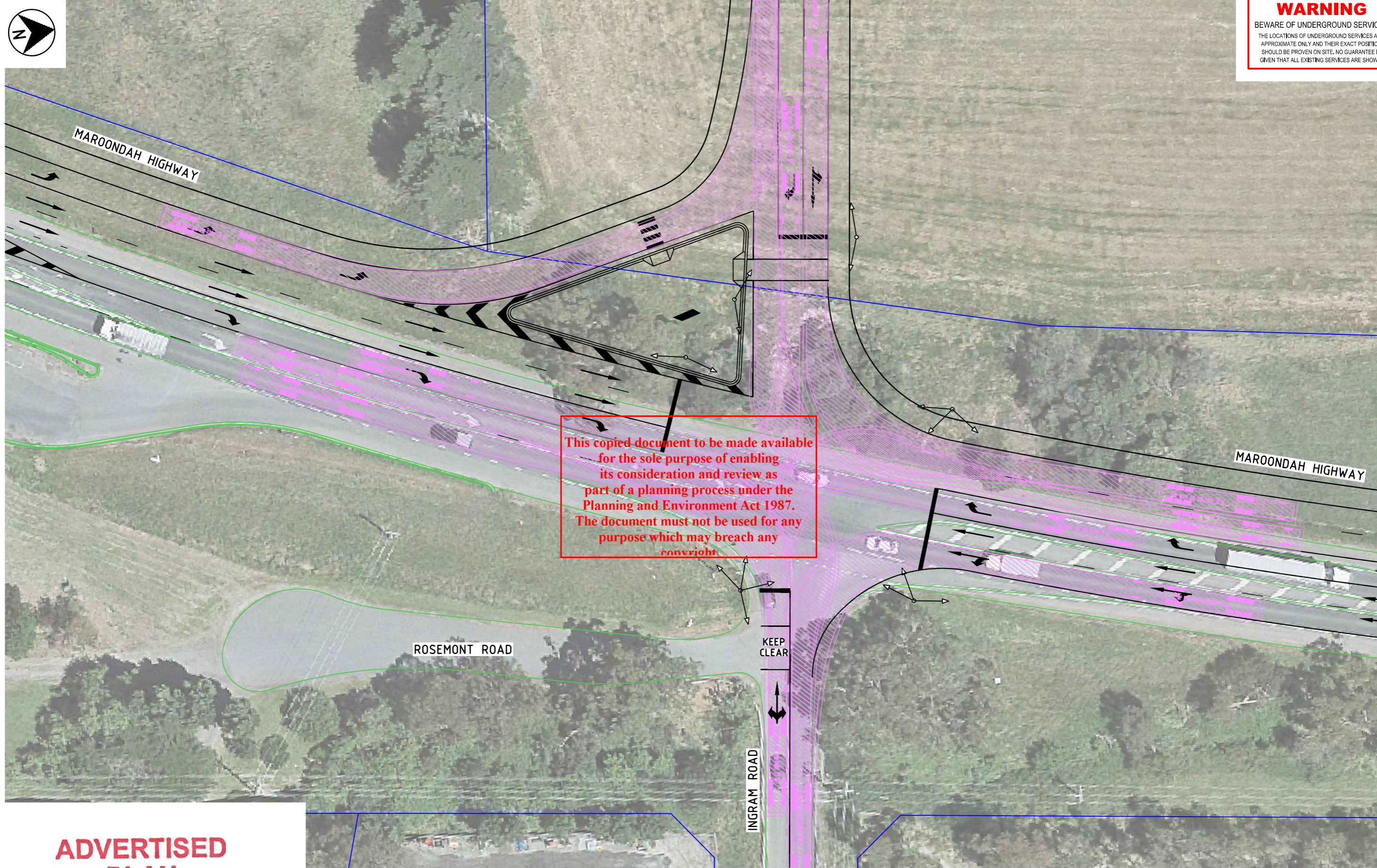
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APPROVED	
DATE	

TITLE	FUTURE INTERSECTION UPGRADE SHEET 3 OF 3
SCALE	1:1000
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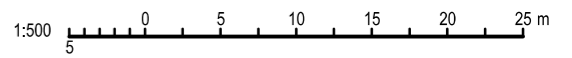


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DATE	
APPROVED	
DATE	

TITLE	FUTURE INTERSECTION UPGRADE 19m SEMI TRAILER TURNING MOVEMENTS
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