Traffic Impact Assessment

36 Couranga Crescent, Hume, ACT
Resource Recovery Plant

Pinnacle ACT Pty Ltd

7th February 2020

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Document Issue History

Report File Name	Prepared	Reviewed	Issued	Date	Issued to
P4092.001R Waste Facility 36 Couranga Cres Hume ACT TIA	C. Luk	N. Edwards	N. Edwards	07/02/2020	Bob Thompson at Flexible Drainage Australia via email
P4092.002R Waste Facility 36 Couranga Cres Hume ACT TIA	C. Luk	D. Scutt	N. Edwards	07/02/2020	Bob Thompson at Flexible Drainage Australia via email

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1. INTRODUCTION

1.1 Background

Bitzios Consulting has been commissioned by Flexible Australia, a Division of Pinnacle ACT Pty Ltd (Flexible Australia), to prepare a traffic impact assessment (TIA) for a proposed 'Resource Recovery Facility' (facility) to be located at 36 Couranga Crescent, Hume (subject site).

The subject site is located within the existing Monaro Industrial Estate.

The facility is expected to receive and process approximately 23,300 tonnes of material each year. Once processed, approximately:

- 13,150 tonnes will be transported from the site for sale as recovered product and landfill use / disposal
- 5,250 tonnes will be used for hydro excavation work
- 4,900 tonnes (water) will be preferentially reused in processing or may be discharged to the sewer.

A copy of the proposed development plans is included at **Appendix A**.

1.2 Scope of Works

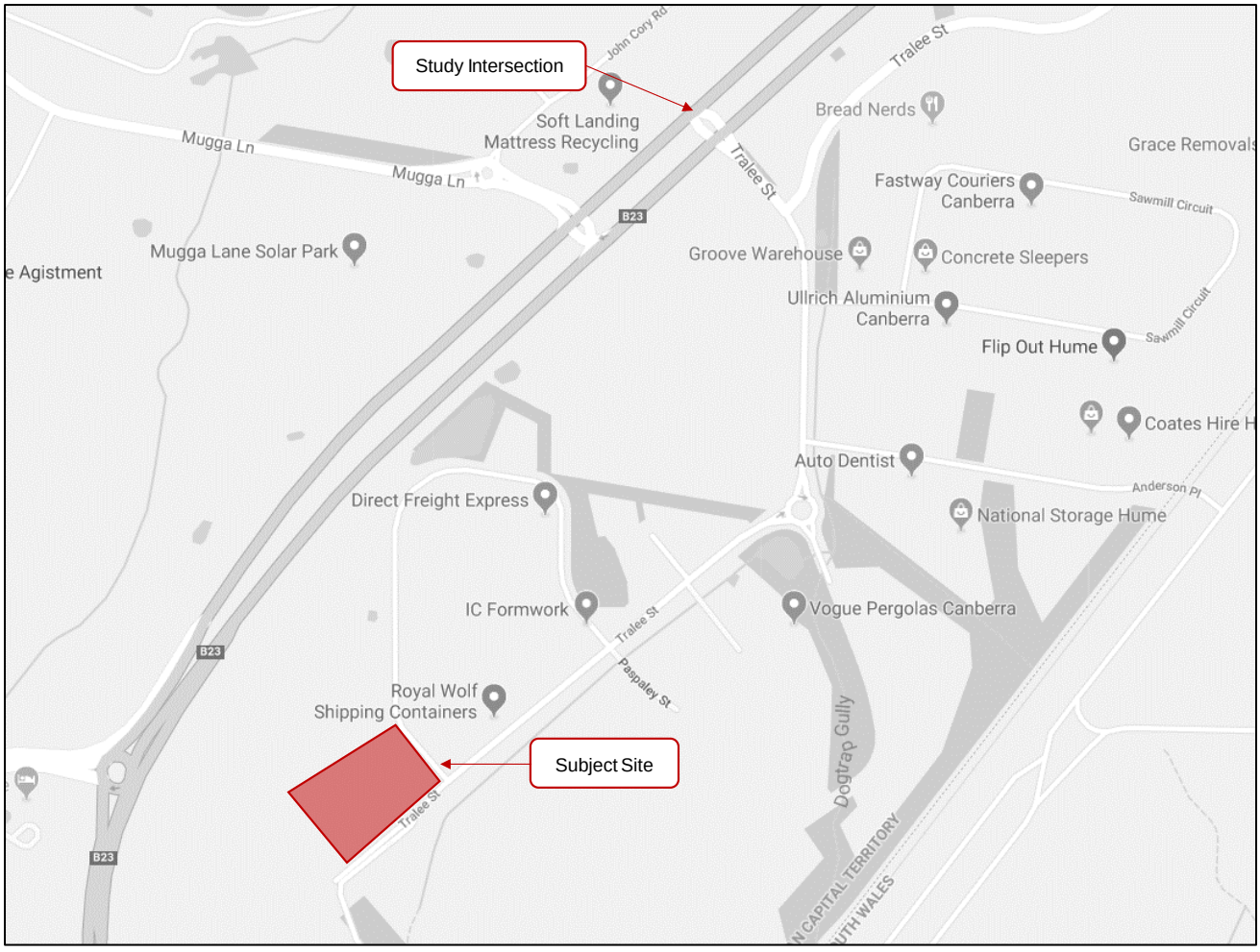
In preparing this report, we have completed the following scope of works:

- Reviewed existing transport infrastructure close to the subject site (i.e. road network, active transport network, public transport network and existing higher limit mass routes etc.)
- Reviewed the parking provision and site layout arrangements for the proposed development against the 'ACT Planning and Land Authority' (ACT PLA) Parking and Vehicular Access Code 2014, ACT 'Development Control Code, Design Standards for Urban Infrastructure – 10 Parking Areas' (Parking Area Design Standard) and relevant Australian Standards (i.e. AS2890)
- Reviewed the access arrangement against the ACT PLA Parking and Vehicular Access Code 2014
- Estimated peak hour traffic demands generated by the proposed development
- Reviewed potential operational impacts at the Monaro Highway / Tarlee Street intersection.

2. EXISTING CONDITIONS

2.1 Road Network

The subject site location, key roads and key intersections are identified in Figure 2.1.



SOURCE: Google Maps

Figure 2.1: Existing Road Network

Table 2.1 summarises the characteristics of key roads close to the subject site.

Table 2.1: Key Roads

Road Name	Jurisdiction	Hierarchy	Cross Section	Speed Limit
Monaro Highway	ACT Government	Arterial	4 lanes divided	80km/h
Tralee Street	ACT Government	Minor Collector	2 lanes undivided	60km/h
Couranga Crescent	ACT Government	Access Street	2 lanes undivided	50km/h

Table 2.2 summarises the characteristics of the key study intersection close to the subject site.

Table 2.2: Study Intersection

ID	Name	Jurisdiction	Control
Intersection 1	Monaro Highway / Taree Street	ACT Government	Priority

2.2 Active Transport Network

Whilst industrial developments do not generate high walking and cycling demands, it is noted that:

- Couranga Crescent has footpaths on both sides
- The existing footpath network extends north of the subject site, beyond the 400m distance pedestrians typically walk to access public transport.

Importantly, the proposed development does not trigger the need for any modifications to the existing active transport network, or trigger the need for additional active transport infrastructure.

2.3 Public Transport Network

No public transport services operate close to the subject site. Whilst not ideal, it is unlikely that the development would generate any significant demand for public transport if services did operate.

The above assumption is supported by data published by Roads and Maritime Services (RMS) in August 2013 (refer Technical Direction TDT 2013/04a). The Technical Direction included traffic generation and mode share data for 11 'business park and industrial estates' in both metropolitan and regional Sydney.

Key observations from the Technical Direction are noted below:

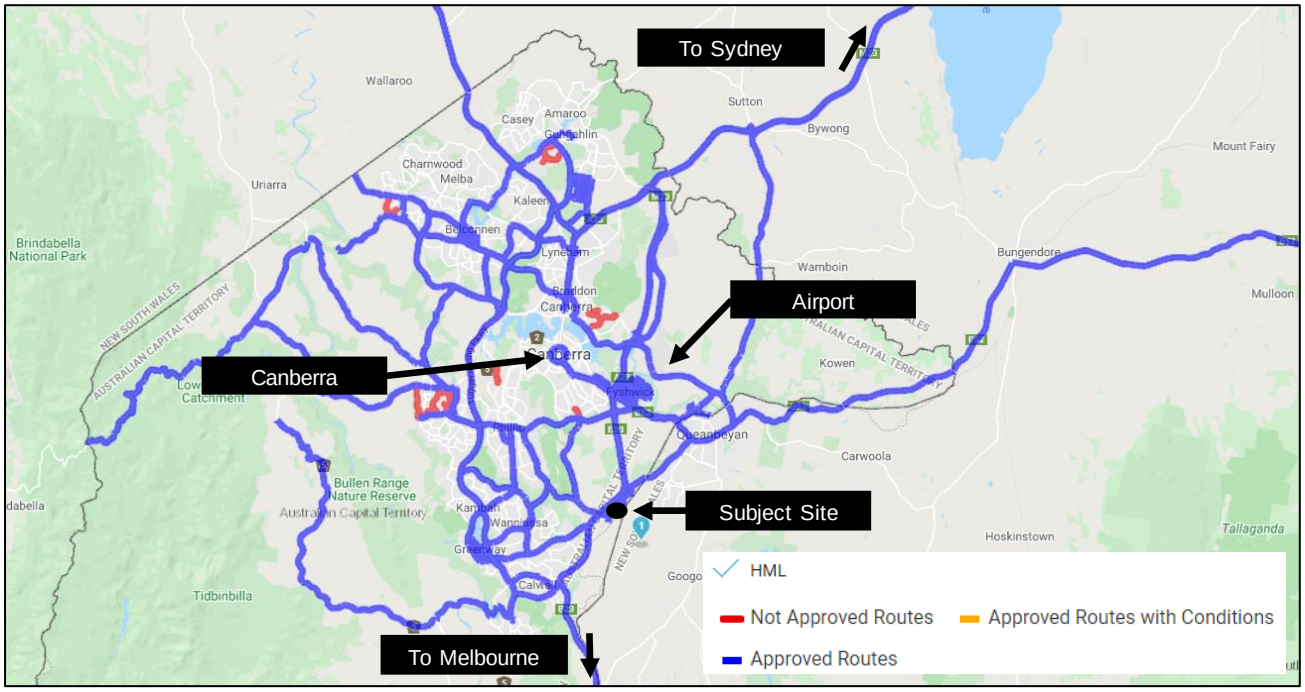
- A total of five (5) 'business park and industrial estates' recorded 0% total daily person trips by bus
- Only the sites with a high 'indicative public transport accessibility score' (i.e. located close to high quality public transport options etc.) recorded bus mode share greater than 2%
- The proportion of total daily person trips by bus ranged from 0% to 3.2% (average 1.6%).

The above findings are consistent with the ACT PLA Parking and Vehicular Code 2014 which states that *'the location and the nature of Canberra's industrial land areas at Fyshwick, Hume and Mitchell, ensure that the great majority of trips to industrial areas are made by private and commercial vehicles, with public transport catering for only a small proportion of journey to work trips and a low level of customer and visitor travel.'*

Importantly, the development does not trigger the need for local public transport services.

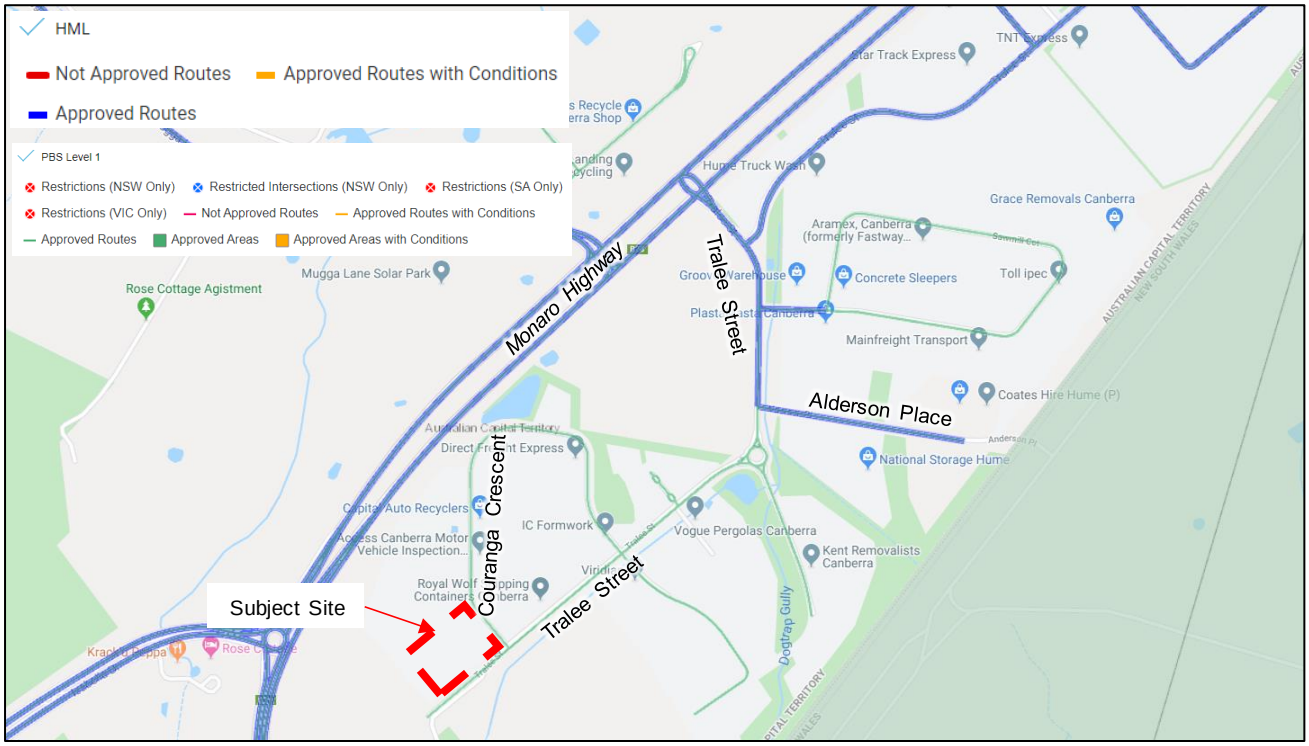
2.4 Existing Haulage Routes

Figure 2.2 and Figure 2.3 illustrate the existing National Heavy Vehicle Regulator (NVHR) approved HML routes in proximity to the subject site.



SOURCE: NHVR Route Planner Tool

Figure 2.2: Existing Approved Higher Mass Limit Routes



SOURCE: NHVR Route Planner Tool

Figure 2.3: Existing Approved Heavy Vehicle Routes – Hume

As illustrated above, the subject site is located close to the Monaro Highway which connects to a comprehensive network of approved HML routes. The routes enable access to Canberra, Queanbeyan and beyond.

Importantly however, Couranga Crescent and the section of Tralee Street between the subject site and Alderson Place is only an approved PBS Level 1 route (i.e. not an approved HML route). Therefore, should HML vehicle access be required to the subject site, approval should be sought from the NVHR.

3. TRAFFIC DESIGN REVIEW

3.1 Overview

The proposed development plans have been reviewed against the requirements outlined in:

- ACT PLA Parking and Vehicular Code 2014
- ACT Parking Area Design Standard.

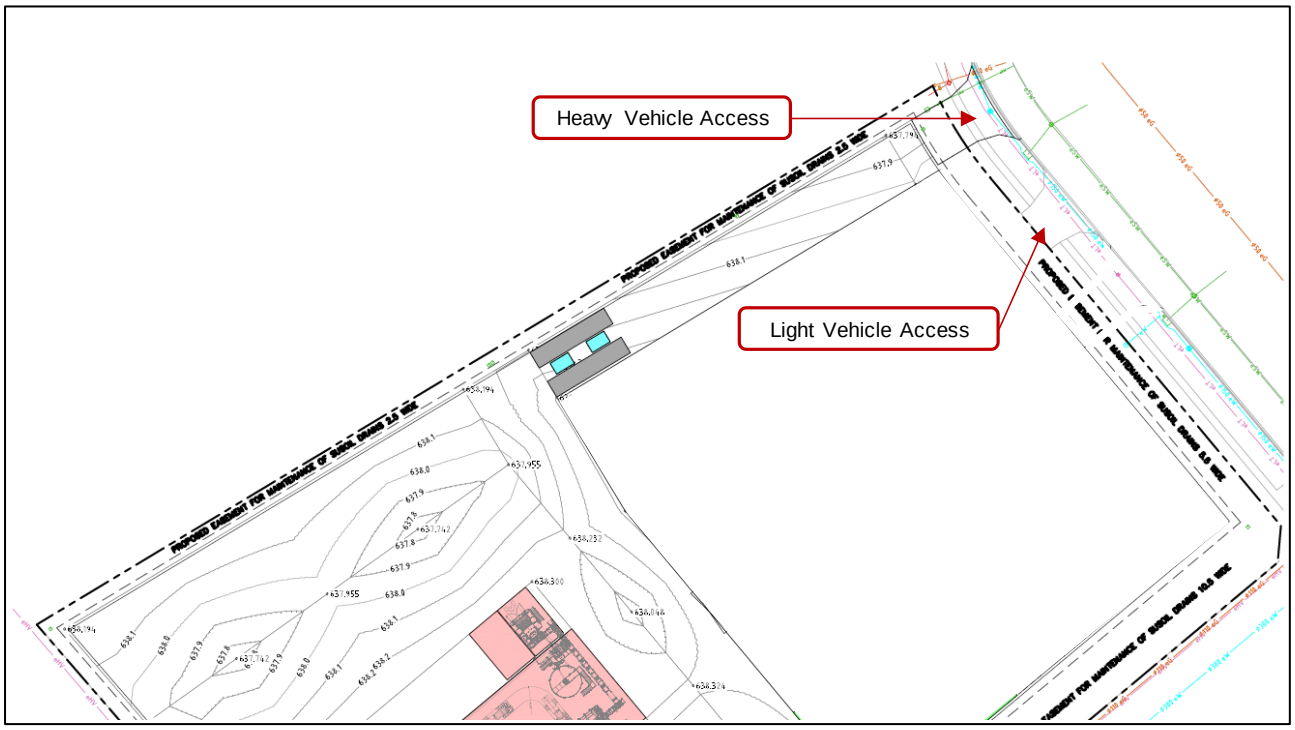
The review has focused on access, parking and servicing arrangements.

3.2 Site Access

3.2.1 Overview

As illustrated on Figure 3.1, two (2) driveways are proposed on Couranga Crescent including a:

- 9m wide driveway for heavy vehicle access
- 8m wide driveway for light vehicle access.



Source: Sellick Consultants

Figure 3.1: Site Access Overview

3.2.2 Configuration

The ACT PLA Parking and Vehicular Code 2014 refers to AS2890.2 in relation to heavy vehicle driveway crossover design requirements. AS2890.2 provides typical designs for access on both minor and major roads, but also indicates that the actual required driveway configuration will depend on the width of public road available for manoeuvring in and out.

Table 3.1 summarises our review of the proposed driveway crossover configuration.

Table 3.1: Access Configuration Review

Access	Design Vehicle	Required Configuration	Proposed Configuration	Compliant
Heavy Vehicles	Truck & Dog (T&D)	9m wide minor road access	9m wide minor road access	Yes
Light Vehicles	B99 Car	6m wide minor road access	8m wide minor road access (existing)	Yes

Swept path diagrams have also been prepared for the heavy vehicle driveway which indicate that it can accommodate T&D vehicles. A copy of the swept path diagrams is included at **Appendix B**.

In summary, the proposed driveway crossover configurations comply with ACT PLA Parking and Vehicular Code 2014 requirements.

3.2.3 Sight Distance

The ACT PLA Parking and Vehicular Code 2014 indicates that sight distances at driveways should comply with Austroads 'Guide to Road Design Part 4A: Unsignalised and Signalised Intersections' (GTRD Part 4A), intersection sight distance requirements.

Table 3.2 summarises our desktop review of sight distances at the proposed access against Austroads GTRD Part 4A.

Table 3.2: Safe Intersection Sight Distance Review

Access	Direction	Speed	Available Sight Distance	Desirable Sight Distance	Compliant
Heavy Vehicles	North	50km/h	>100m	97m	Yes
	South		>100m	97m	Yes
Light Vehicles	North	50km/h	>100m	97m	Yes
	South		97m	97m	Yes

In summary, our desktop review indicates that available sight distances at the driveway will generally comply with Austroads GTRD Part 4A requirements.

3.3 Car Parking

The subject site is zoned 'General Industrial' under Territory Plan 2008. The proposed land uses are defined by the Territory Plan as 'Recycling Facility' and 'Waste Transfer Station'. These land uses are consistent with those envisaged by the subject site's zoning.

Table 3.3 summarises our review of the car parking provision against the ACT PLA Parking and Vehicular Code 2014.

Table 3.3: Car Parking Review

Peak Staffing	Parking Rate	Required (spaces)	Proposed (spaces)	Difference (spaces)
4 staff	1 space per peak shift employee	4	4	0

As outlined above, the proposed car parking provision complies with the ACT PLA Parking and Vehicular Code 2014.

3.4 Servicing

Flexible Australia have indicated that T&D vehicles will be the largest vehicles that will require access to the subject site.

Swept path diagrams have been prepared which indicate that T&D vehicles will be able to enter the site in a forward gear, manoeuvre through the site and service the development, before exiting the site in a forward gear. A copy of the swept path diagrams is included at **Appendix B**.

In summary, the servicing arrangements are acceptable from a traffic engineering perspective.

3.5 Site Layout Review

The ACT Parking Area Design Standard refers to AS2890 in relation to car park layout requirements.

Table 3.4 identifies the site design elements that we have reviewed against AS2890.1 and AS2890.2.

Table 3.4: Site Layout Review

Design Element	Proposed	Required	Compliant
Car Parking Spaces	2.5m x 5.4m	2.5m x 5.4m	Yes
Car Parking Aisle	6.0m	5.8m	Yes
Two-way Heavy Vehicle Driveway	10.0m	6.5m	Yes

As indicated above, the site layout arrangements we have reviewed comply with AS2890.

It is important to note however that only initial concept plans have been prepared for the development. Accordingly, minor changes / refinements to the plans are likely to be made as part of more detailed development planning. It is understood that Flexible would be accepting of a condition requiring the site layout to be designed in accordance with AS2890.

4. TRAFFIC IMPACT ASSESSMENT INPUTS

4.1 Background Traffic Volumes

4.1.1 Traffic Survey Data

Traffic survey data was obtained at the intersection of Monaro Highway / Tralee Street on Tuesday 28th February 2017 (afternoon peak) and Wednesday 1st March 2017 (morning peak) to establish existing background traffic volumes and distribution patterns.

The following peak hour periods were recorded:

- Weekday AM Peak Period: 7:45am to 8:45am
- Weekday PM Peak Period: 4:00pm to 5:00pm.

A copy of the traffic survey data is provided at **Appendix C**.

4.1.2 Traffic Growth Rate

As summarised in Table 4.1, the ACT population is predicted to increase at approximately 1.92% growth per annum between 2017 and 2027.

Table 4.1: Predicted Population Growth in ACT

2017 Population	2027 Population	Net Increase	Predicted Growth Rate
411,667 persons	490,850 persons	79,183 persons over 10 years	1.92% p.a.

Source: www.apps.treasury.act.gov.au/demography/projections/act/total

Population growth and traffic growth are typically comparable and as such, we have adopted a traffic growth rate of 2%p.a for the purposes of this assessment.

4.2 Development Traffic

4.2.1 Assessment Scenarios

Development traffic impacts at the following design horizons have been assessed:

- Year of Opening: 2021
- 10 Years Post Opening: 2031.

4.2.2 Traffic Generation – Construction Traffic

Peak construction traffic impacts have not specifically been considered as part of this report. However, the level of traffic generated by the construction activities is anticipated to be relatively low, and comparable to typical traffic levels generated by industrial developments. Given the subject site is located within an industrial area, and the construction period will be relatively short, we do not anticipate that peak construction traffic will significantly impact the safety and efficiency of the surrounding road network.

4.2.3 Traffic Generation – Operational Traffic

The RMS 'Guide to Traffic Generating Developments' does not provide typical traffic generation rates for a 'Waste Transfer Station'. As such we have estimated development traffic volumes based on a first principles approach (i.e. based on expected site operation data).

The facility is expected to receive and process approximately 23,300 tonnes of material each year. Once processed, approximately:

- 13,150 tonnes will be transported from the site for sale as recovered product and landfill use / disposal
- 5,250 tonnes will be used for hydro excavation work
- 4,900 tonnes (water) will be preferentially reused in processing or may be discharged to the sewer.

Table 4.2 summarises development operation information provided by Flexible Australia.

Table 4.2: Expected Development Operation Information

Parameter	Description
Operating Days / Hours	Monday to Friday, 7:00am to 6:00pm
Operating Days per Year	250 days (5 days per week, 50 weeks per year)
Operating Profile	Generally even profile across the year
Incoming Waste (i.e. for processing)	23,280 tonnes
Incoming Waste Trucks per Year	4,803 trucks / 9,606 trips (average 4.85 tonnes per truck)
Outgoing Waste (For Recovered Product or Landfill Waste)	13,153 tonnes
Outgoing Waste Trucks per Year (For Recovered Product or Landfill Waste)	1,493 trucks / 2,986 trips (average 8.81 tonnes per truck)
Outgoing Waste (For Hydro Excavation Work)	5,238 tonnes
Outgoing Waste Trucks per Year (For Hydro Excavation Work)	4,768 trucks / 9,536 trips (average 1.10 tonnes per truck)
Staff	4 persons
Staff Trips per Year	2,000 trips (8 trips per day x 250 days per year)
Miscellaneous Deliveries	1 delivery per day 500 trips (2 trips per day x 250 days per year)

It has been assumed that all incoming waste vehicles leave empty and all outgoing waste vehicles arrive empty. However, Flexible Australia indicated that this is unlikely to be the case (i.e. some will arrive loaded and leave loaded with different waste and vice-versa). Accordingly, the development is likely to generate fewer trips than what has been estimated above (i.e. conservative estimates).

Based on the above information, and using engineering judgement, we have applied factors to daily traffic demands to estimate peak hour development trips.

Table 4.3 summarises expected development traffic generation.

Table 4.3: Estimated Traffic Generation

Trip Type	Annual Trips	Daily Trips	% of Daily Trips in Peak	AM Peak Trips	PM Peak Trips
Incoming Waste	9,606	38	20%	8	8
Outgoing Waste (Recovered Product or Landfill)	2,986	12	20%	2	2
Outgoing Waste (Hydro Excavation)	9,536	38	20%	8	8
Staff	2,000	8	30%	2	2
Miscellaneous Deliveries	500	2	30%	1	1
Total	**24,628**	**98**	**-**	**21**	**21**

It is worth noting that given the site will operate between 7:00am to 6:00pm, it is highly likely that the staff will arrive and depart outside road peak hours (surveyed as 7:45 to 8:45am and 4:00 to 5:00pm respectively). Therefore, the estimated peak staff movements are conservative.

Furthermore, as indicated previously, it has been assumed that all vehicles arrive full and leave empty and vice-versa. However, this is unlikely to be the case. Accordingly, the development is likely to generate fewer trips than that identified.

In summary, our conservative calculations indicate that the proposed development may generate 21 peak hour trips. This equates to around one (1) trip every three (3) minutes on average which is low. The development is therefore expected to have negligible impacts on the surrounding road network.

4.2.4 Traffic Distribution

Table 4.4 provides a summary of the surveyed peak hour traffic distribution patterns at the Monaro Highway / Tarlee Street intersection. Given that the turning movements recorded at this location are associated with the Monaro industrial estate, it is appropriate to adopt the same for the subject site.

Table 4.4: Existing Traffic Distribution at Study Intersection

Trip Direction	AM Peak Hour Trips	AM Peak Hour %	PM Peak Hour Trips	PM Peak Hour %
In from NE	53	19%	52	18%
In from SW	144	52%	78	27%
Total In	197	71%	130	44%
Out to NE	23	8%	28	10%
Out to SW	59	21%	136	46%
Total Out	82	29%	164	56%
TOTAL In + Out	**279**	**100%**	**294**	**100%**

4.2.5 Design Traffic Volumes

Design traffic volumes have been derived by adding estimated development trips to the surveyed traffic forecasts for various design horizons.

Figure 4.1 identifies design traffic volumes. Corresponding figures are also included at **Appendix D**.

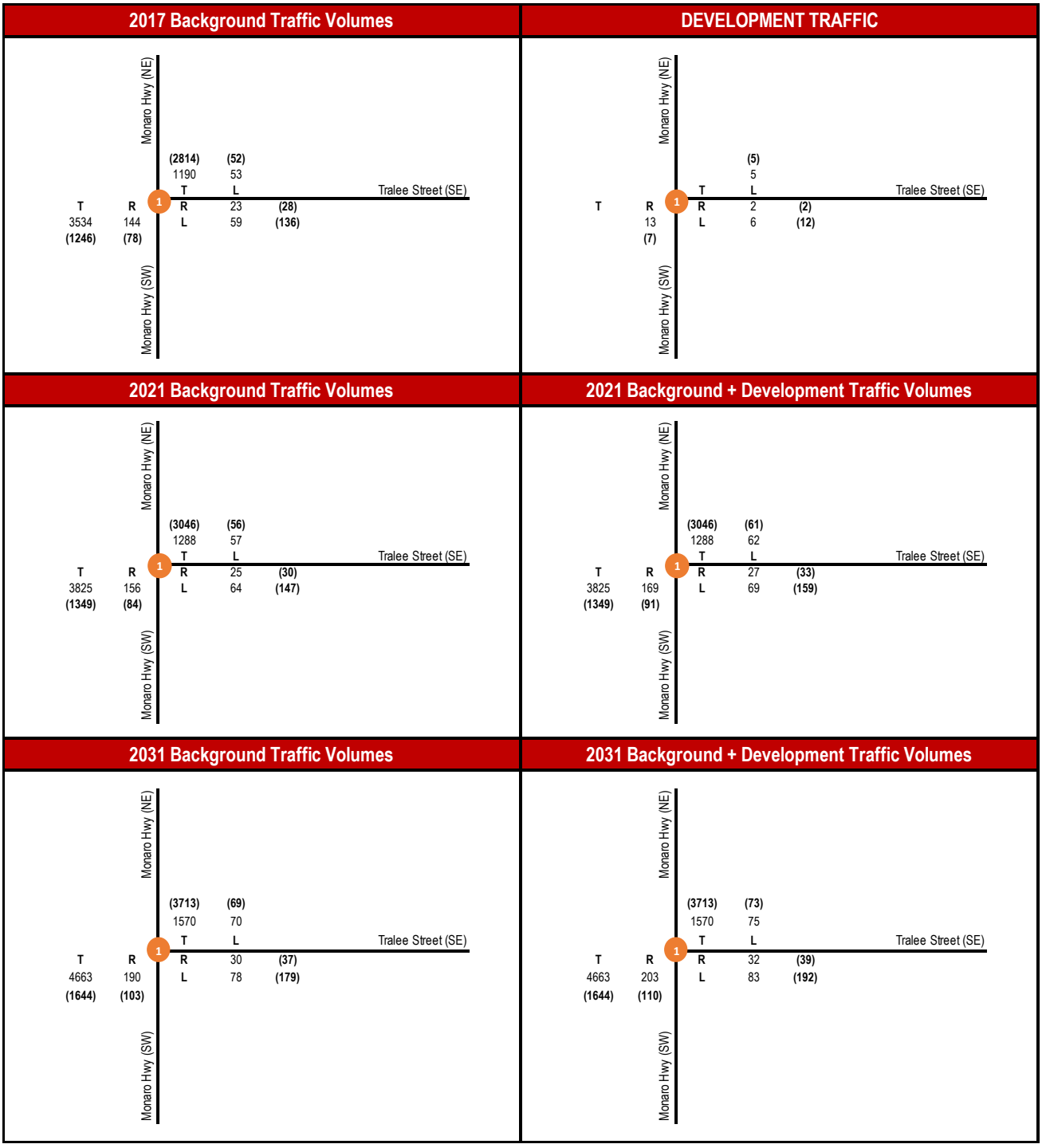


Figure 4.1: Design Traffic Volumes

5. INTERSECTION PERFORMANCE ANALYSIS

Given the Monaro Highway carriageways are separated by 40m, right turn movements in and out of Tralee Street are undertaken in two (2) stages. As such, we have use SIDRA Network to model the intersection as two (2) closely spaced individual intersections. The modelled geometry is shown in Figure 5.1.

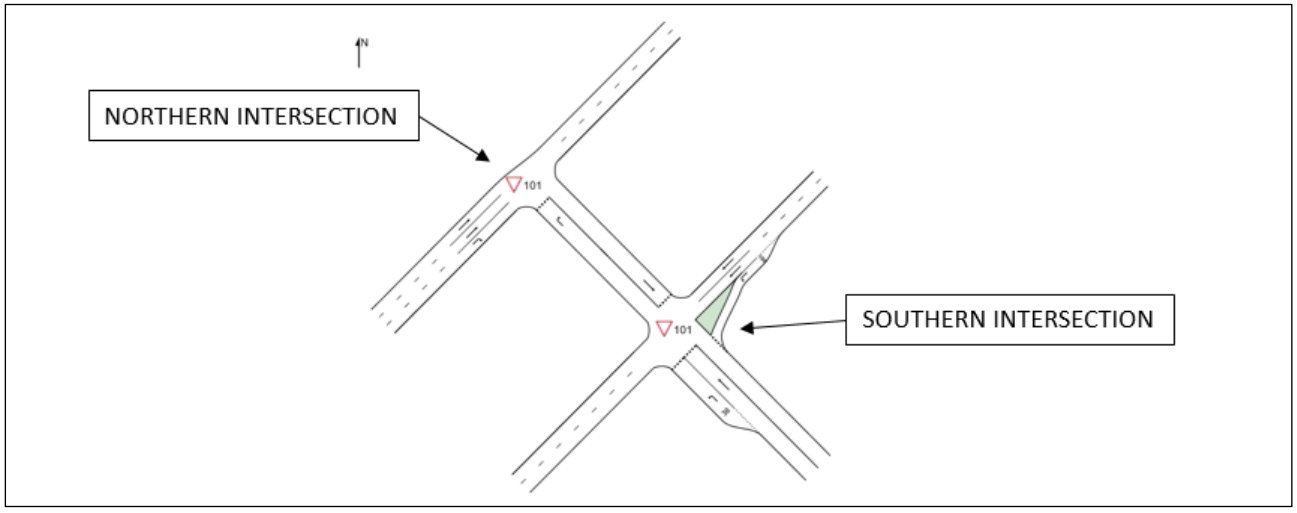


Figure 5.1: SIDRA Geometry: Monaro Highway / Tralee Street – Existing Layout

Table 5.1 summarises analysis results, with detailed outputs provided at **Appendix E**.

Table 5.1: SIDRA Results: Monaro Highway / Tralee Street – Existing Configuration

Peak	Intersection	Degree of Saturation (DOS)	Average Delay (s)	Level of Service	Intersection 95th %ile Queue Length (m)	Median 95th %ile Queue Length (m)
2017 Background						
AM	Northern	0.91	0.9	NA	4.4	4.4
	Southern	0.33	1.3	NA	4.4	4.4
PM	Northern	0.32	0.5	NA	0.4	0.4
	Southern	1.09	10.9	NA	70.8	70.8
2021 Background						
AM	Northern	0.98	3.9	NA	24.7	24.7
	Southern	0.35	1.4	NA	5.2	5.2
PM	Northern	0.35	0.5	NA	211	0.5
	Southern	2.54	58.9	NA	290.9	99.4
2021 Background + Development						
AM	Northern	1.05	4.3	NA	32.0	32.0
	Southern	0.35	1.5	NA	5.7	5.7
PM	Northern	0.35	0.6	NA	250.1	0.6
	Southern	2.75	72.5	NA	360.3	99.4

Peak	Intersection	Degree of Saturation (DOS)	Average Delay (s)	Level of Service	Intersection 95th %ile Queue Length (m)	Median 95th %ile Queue Length (m)
2031 Background						
AM	Northern	5.00	64.5	NA	99.4	99.4
	Southern	0.43	1.7	NA	8.7	8.7
PM	Northern	0.42	0.5	NA	659.2	0.1
	Southern	29.83	1,565.1	NA	1,548.6	99.4
2031 Background + Development						
AM	Northern	5.33	67.8	NA	99.4	99.4
	Southern	0.43	1.8	NA	9.5	9.5
PM	Northern	0.42	0.5	NA	712.6	0.1
	Southern	32.00	1,786.0	NA	1,663.4	99.4

The above results suggest that this intersection is currently operating at or above the typical DOS threshold for a priority-controlled intersection (i.e. DOS > 0.80).

This is not surprising given the significant traffic flows recorded on Monaro Highway in 2017 (i.e. 3,534 northbound vehicles in the AM peak and 2,814 southbound vehicles in the PM peak). Factoring these base volumes up in line with ACT predicted population growth (circa 2%p.a.) results in even higher traffic demands and a worsening of performance at the intersection.

Noting the above, the intersection will need to be upgraded irrespective of the proposed development.

Given the proposed development is a very low traffic generator, is to be located within an established industrial estate and is expected to have limited impacts on intersection performance, we are of the view that no external road upgrades are required to offset development impacts.

Notwithstanding the above, we have undertaken further SIDRA analysis to identify potential future road upgrade requirements. Based on our high-level analysis, the results suggest that the intersection will need to be signalised and the Monaro Highway widened.

The modelled geometry is illustrated in Figure 5.2.

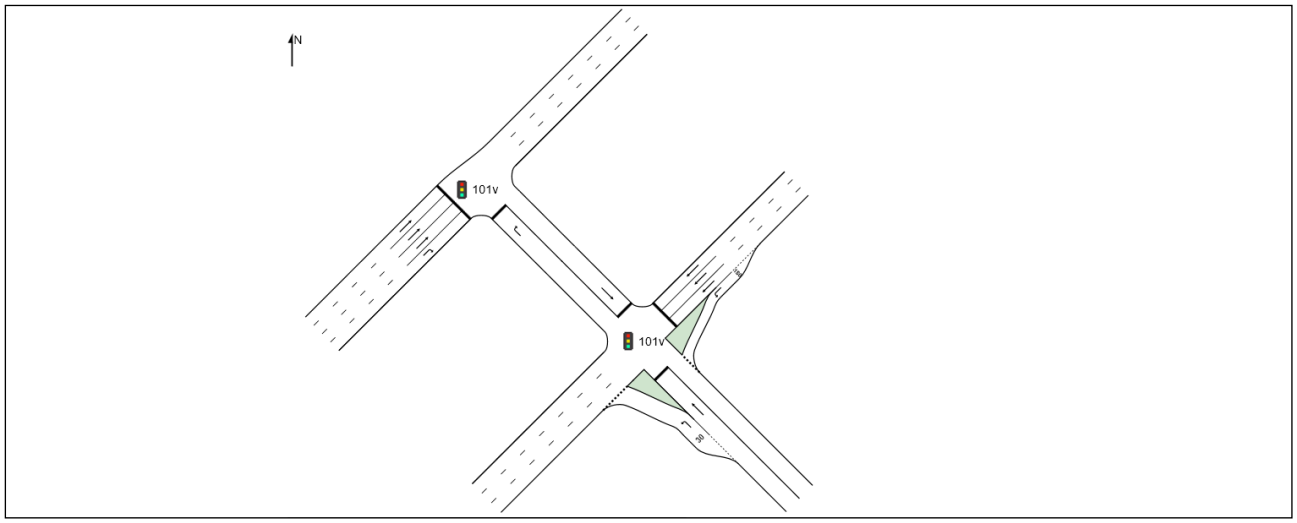


Figure 5.2: SIDRA Geometry: Monaro Highway / Tralee Street – Potential Upgrade Layout

Figure 5.3 and Figure 5.4 illustrates adopted signal phasing in the AM and PM peaks respectively.

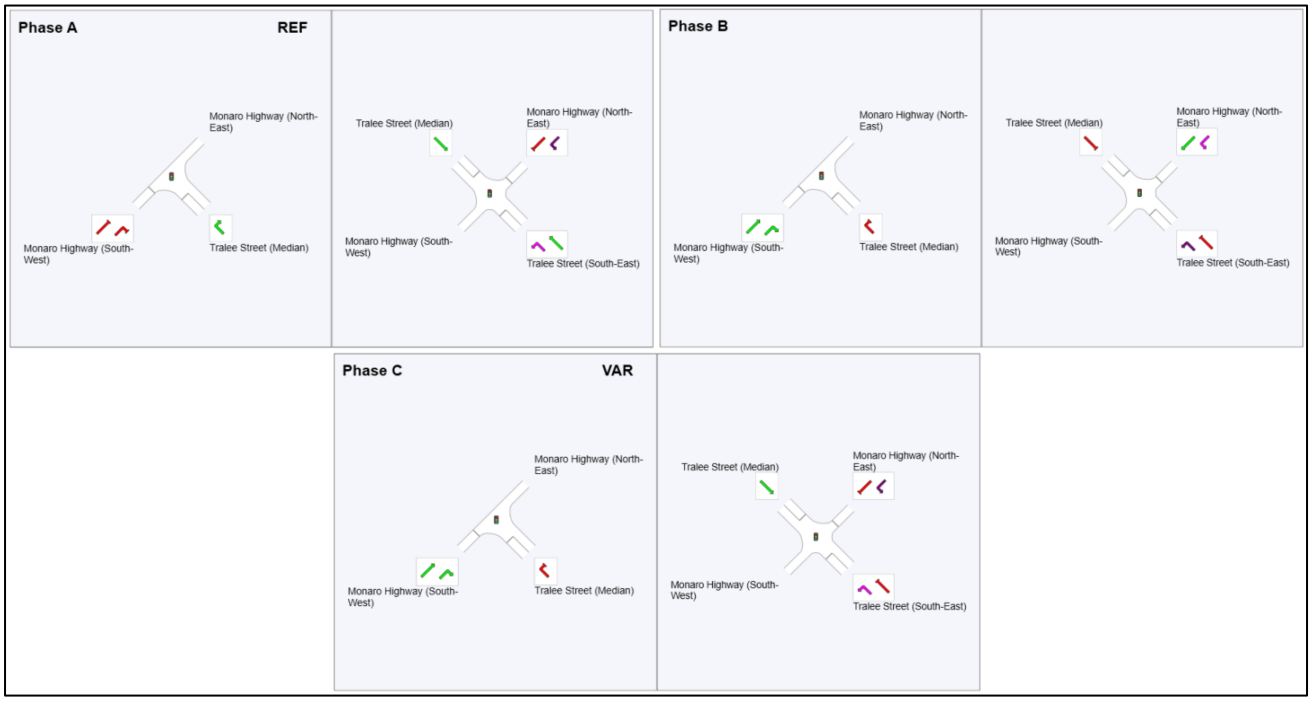


Figure 5.3: SIDRA Phasing: Monaro Highway / Tralee Street – AM Peak

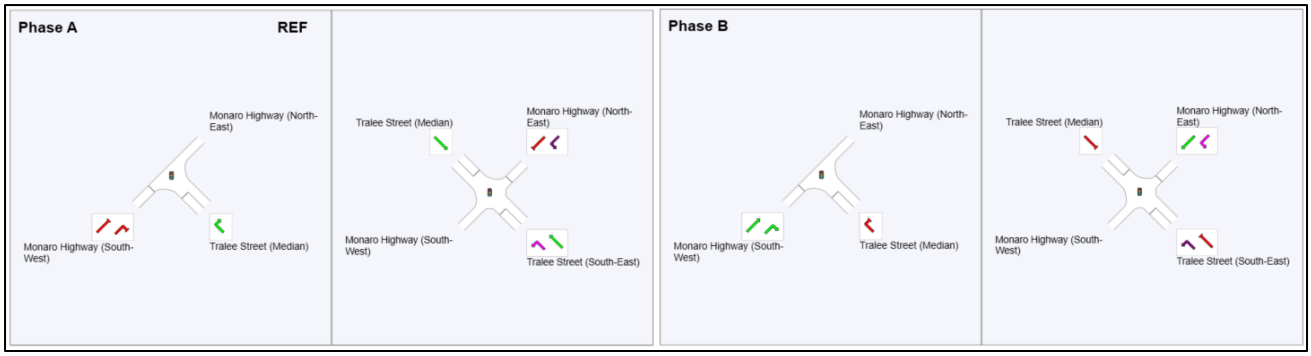


Figure 5.4: SIDRA Phasing: Monaro Highway / Tralee Street – PM Peak

Table 5.2 summarises analysis results, with detailed outputs provided at **Appendix E**.

Table 5.2: SIDRA Results: Monaro Highway / Tralee Street – Potential Upgraded Layout

Peak	Intersection	Degree of Saturation (DOS)	Average Delay (s)	Level of Service	95th %ile Queue Length (m)	Median 95th %ile Queue Length (m)
2031 Background + Development						
AM	Northern	0.90	5.9	LOS A	472.4	9.9
	Southern	0.90	55.3	LOS E	315.3	56.7
PM	Northern	0.38	4.1	LOS A	52.4	0.8
	Southern	0.90	22.5	LOS C	378.4	36.5

The results presented above suggest that the upgraded intersection would perform within typical performance thresholds for a signalised intersection (i.e. DOS<0.90) during the ultimate horizon.

However, as stated previously, the proposed development is expected to have limited impacts on intersection performance and does not trigger the need for upgrades.

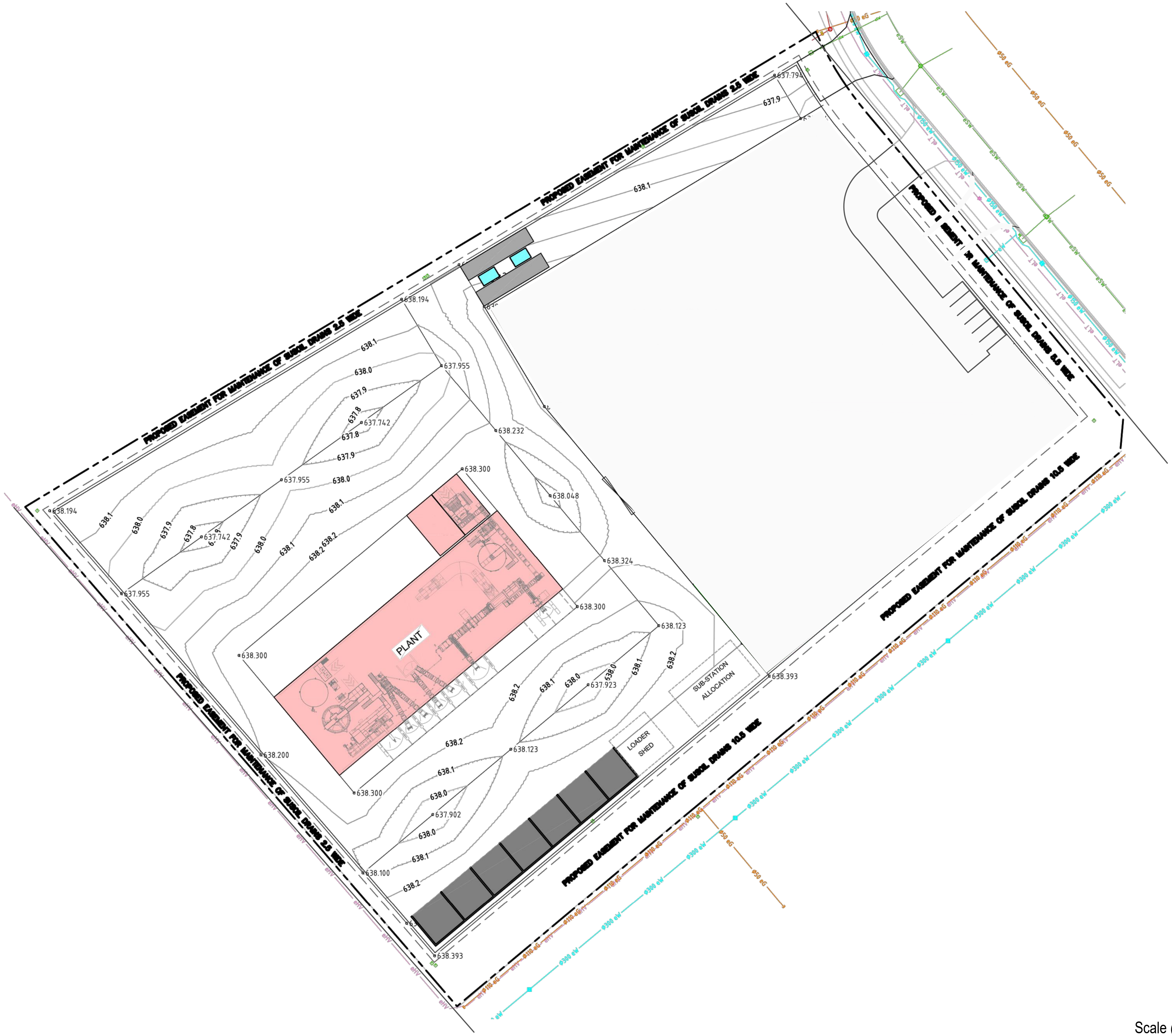
6. SUMMARY

Key findings are summarised below:

- The development does not trigger the need for modifications to the existing active transport network or the exiting public transport network
- The proposed driveway crossover arrangements are acceptable from a traffic perspective
- The proposed car parking provision complies with the ACT PLA Parking and Vehicular Access Code 2012
- The proposed servicing arrangements are acceptable from a traffic engineering perspective
- The site layout arrangements we reviewed comply with AS2890.1 and AS2890.2.
- Minor changes / refinements to the plans are likely to be made to part of more detailed development planning. It is understood that Flexible would be accepting of a condition requiring the site layout to comply with AS2890
- The development will have negligible impacts at the Monaro Highway / Tralee Street intersection. As such, no road network upgrades works are required to offset development traffic impacts.

Based on the findings of this report, we are of the view that there are no traffic engineering or transport planning related matters to preclude approval of the development.

Appendix A: Development Plans



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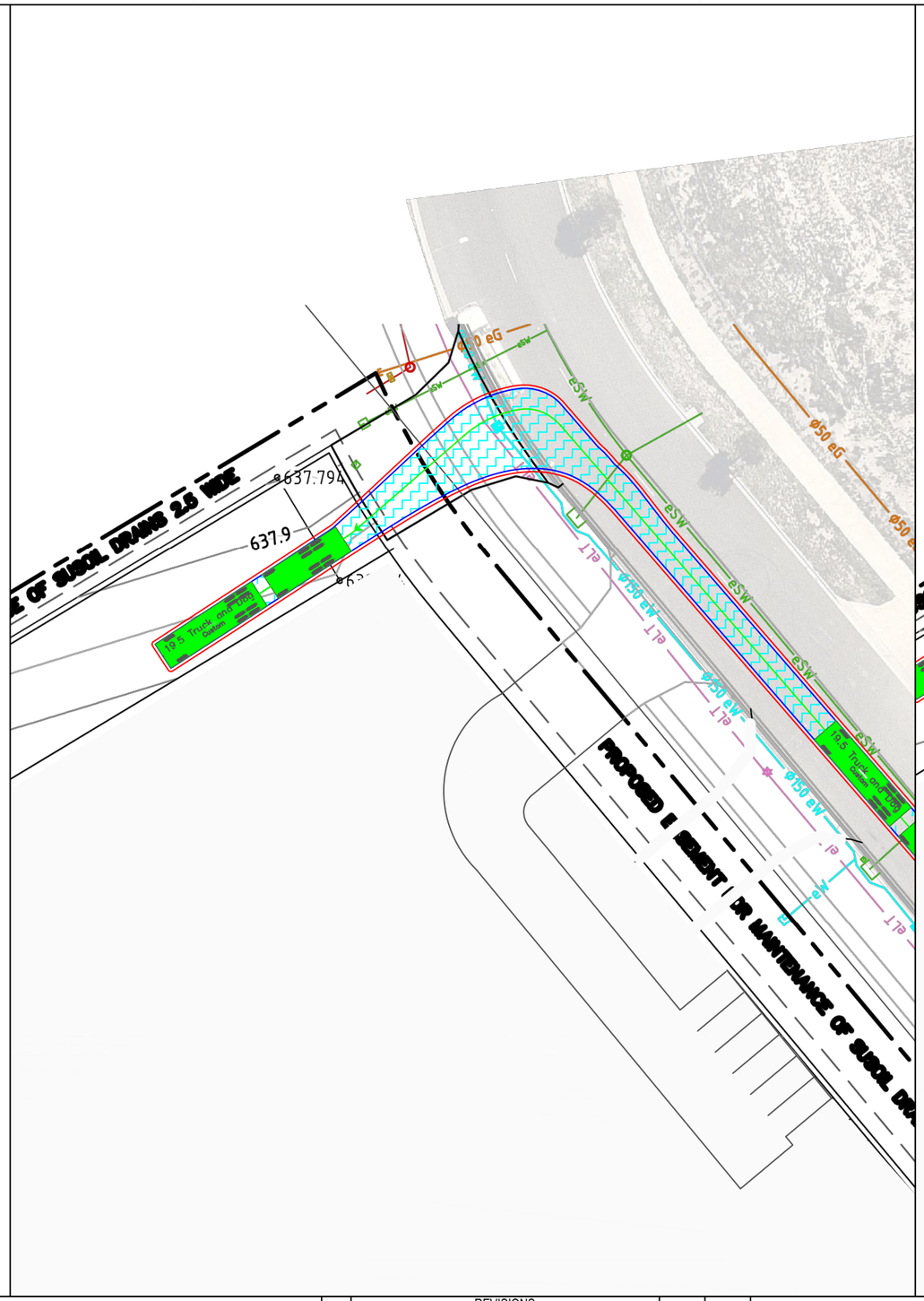
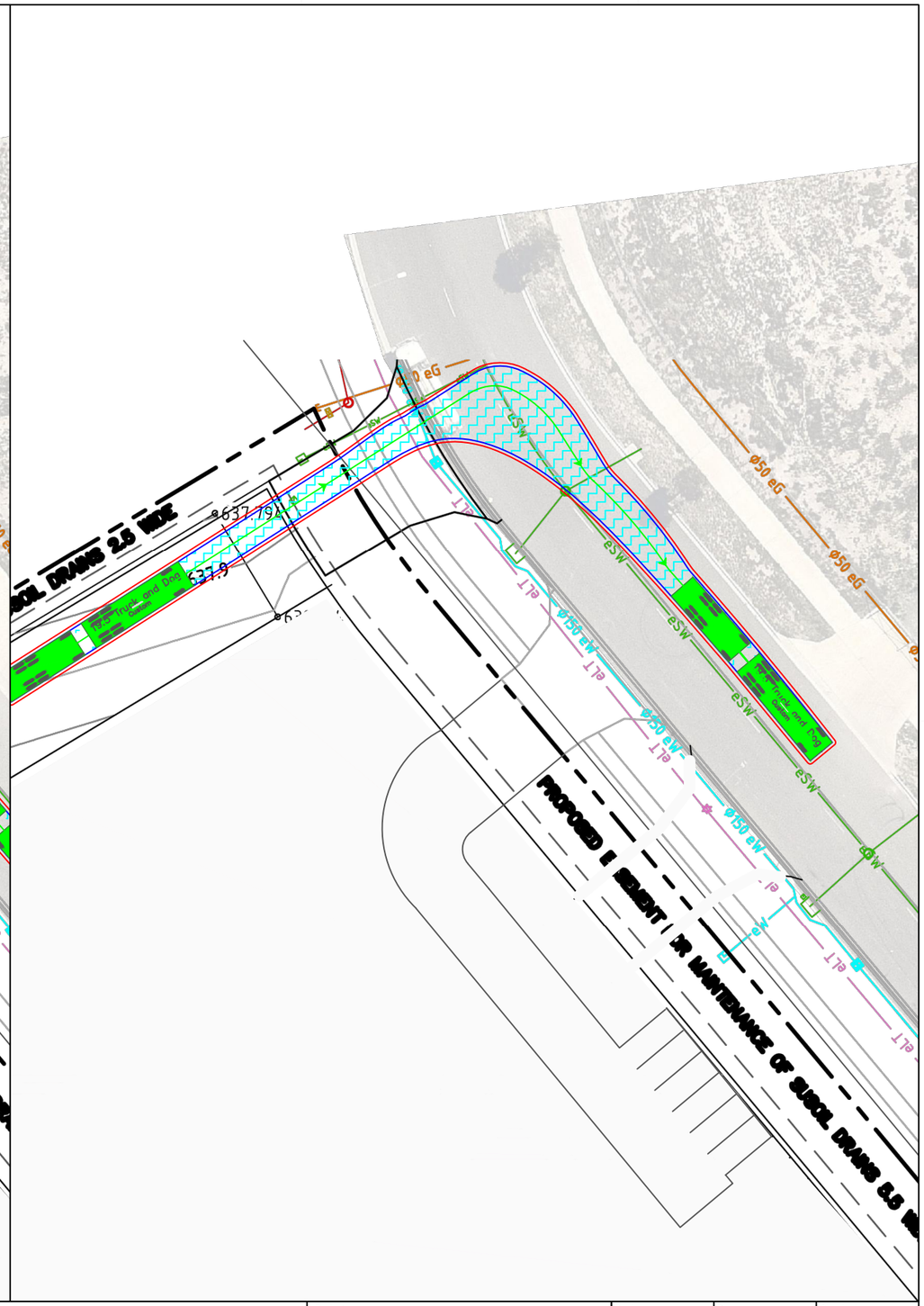
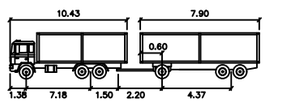
Appendix B: Swept Path Diagrams







19.5 Truck and Dog

meters

First Unit Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 45.3
First Unit Track	: 2.44	Articulating Angle	: 70.0
Trailer Track	: 2.44		

DESIGN VEHICLE

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Issue	REVISIONS Revisions/Descriptions	Drawn	Date
001	SWEPT PATH ANALYSIS	A.A	07.02.2020

Scale @ A3 0 5 10 15 20 25 1:500

ENGINEERING CERTIFICATION (RPEQ)

Name	Signature	No.	Date

Project: 36 COURANGA CRES HUME TIA

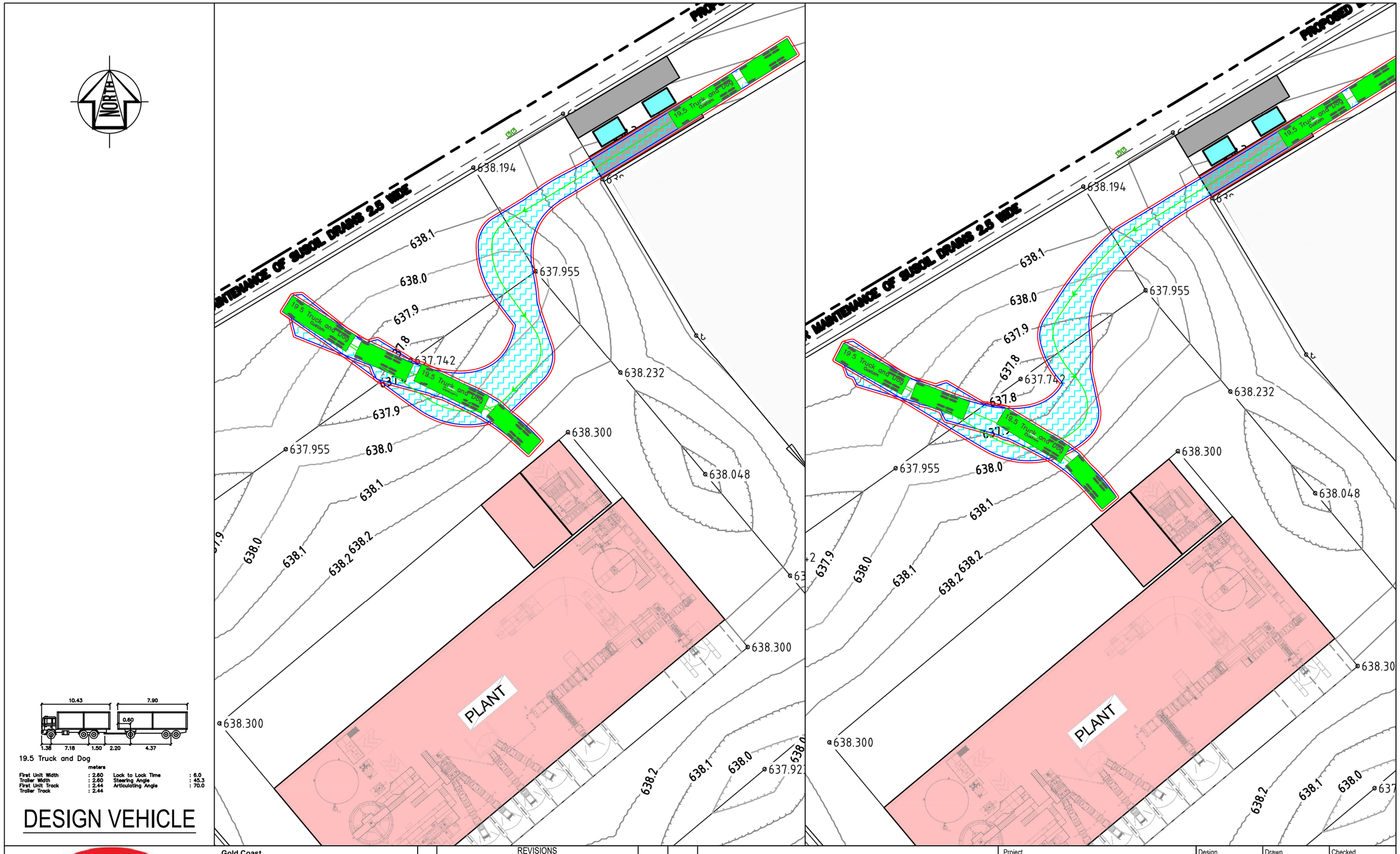
Title: 19.5m TRUCK AND DOG SWEPT PATH ANALYSIS

Design	Drawn	Checked
A.L	A.L	N.E

CONCEPT ONLY

Date: 07.02.2020

Project Number	Sheet Number	Issue
P4092	1	001



19.5 Truck and Dog

meters

First Unit Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 45.3
First Unit Track	: 2.44	Articulating Angle	: 70.0
Trailer Track	: 2.44		

DESIGN VEHICLE

Gold Coast
Suite 26, 58 Riverwalk Avenue, Robina QLD 4226
P: (07) 5562-5377
W: www.bitziosconsulting.com.au
Brisbane
Level 2, 428 Upper Edward Street, Spring Hill 4000
P: (07) 3831-4442
E: admin@bitziosconsulting.com.au
Sydney
Studio 203, 3 Gladstone Street, Newtown NSW 2042
P: (02) 9557 6202

Issue	REVISIONS Revisions/Descriptions	Drawn	Date
001	SWEPT PATH ANALYSIS	A.A	07.02.2020

Scale @ A3 0 5 10 15 20 25 1:500

ENGINEERING CERTIFICATION (RPEQ)

Name	Signature	No.	Date

Project: 36 COURANGA CRES HUME TIA

Title: 19.5m TRUCK AND DOG SWEPT PATH ANALYSIS

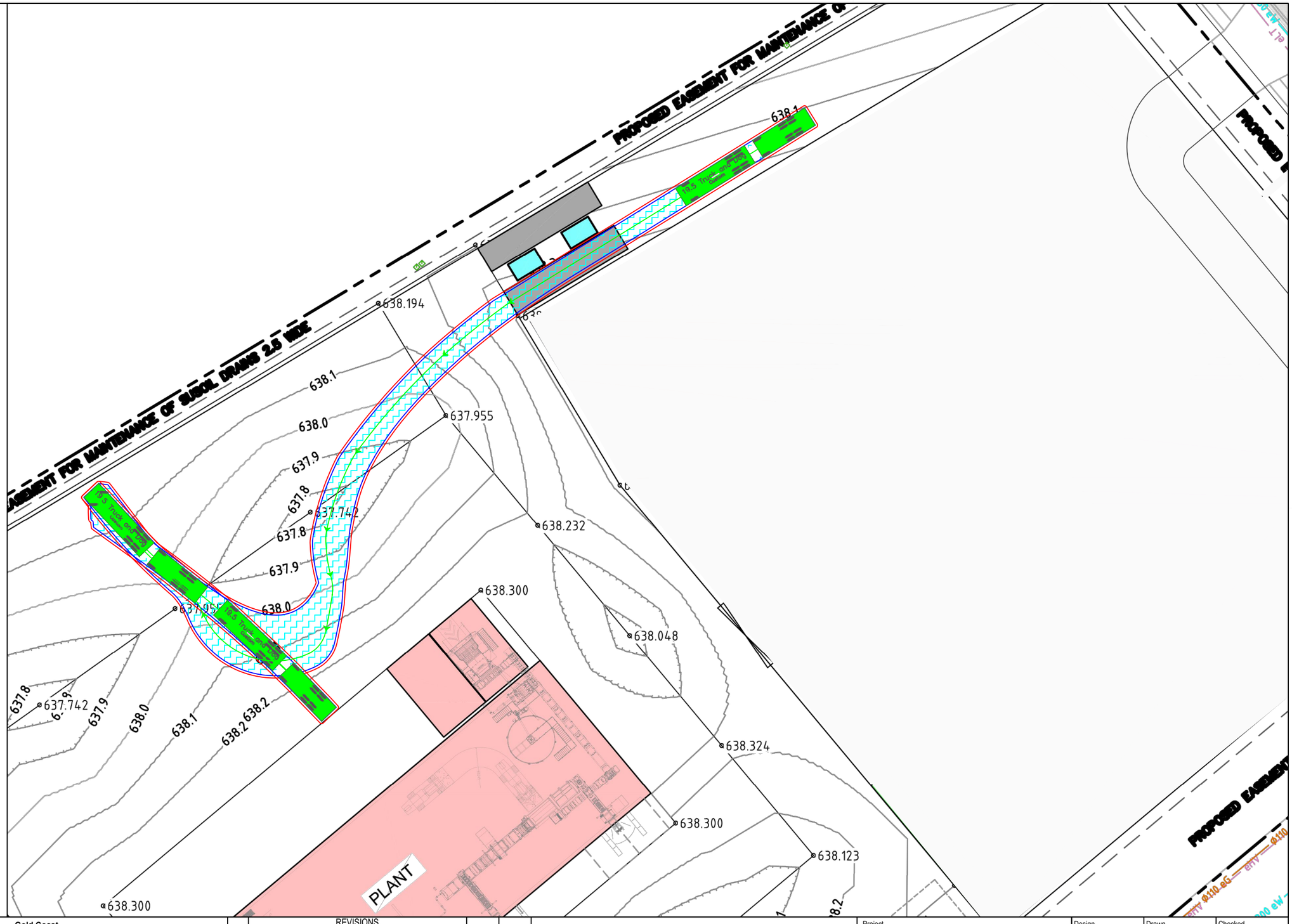
Design	Drawn	Checked
A.L	A.L	N.E

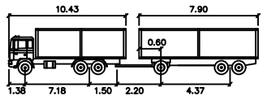
CONCEPT ONLY

Date: 07.02.2020

Project Number	Sheet Number	Issue
P4092	2	001

NORTH





19.5 Truck and Dog

meters

First Unit Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 45.3
First Unit Track	: 2.44	Articulating Angle	: 70.0
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Issue	REVISIONS Revisions/Descriptions	Drawn	Date
001	SWEPT PATH ANALYSIS	A.A	07.02.2020

Scale @ A3 — 0 5 10 15 20 25 — 1:500

ENGINEERING CERTIFICATION (RPEQ)

Name	Signature	No.	Date

Project: 36 COURANGA CRES HUME TIA

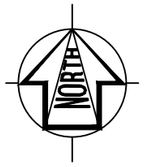
Title: 19.5m TRUCK AND DOG SWEPT PATH ANALYSIS

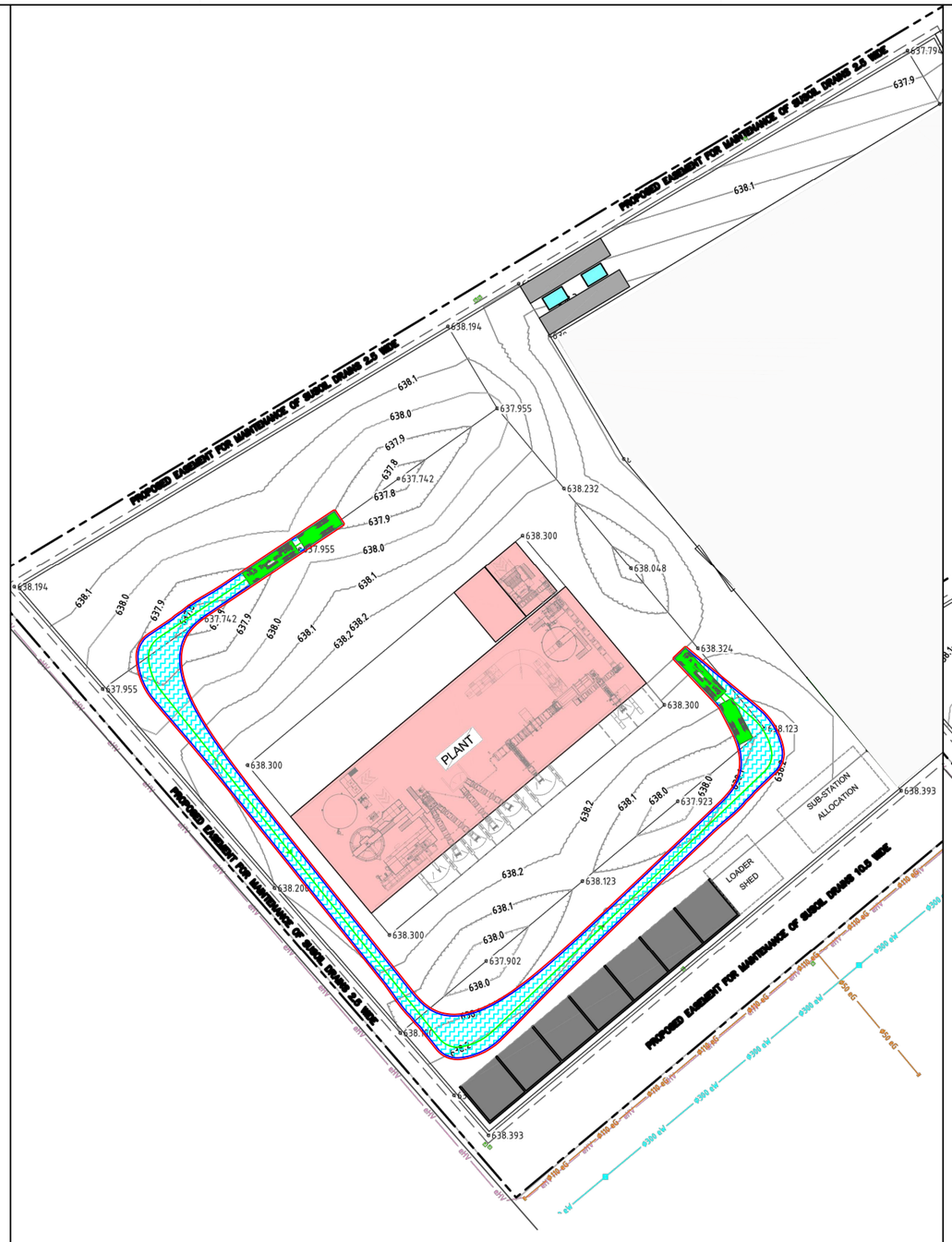
Design	Drawn	Checked
A.L	A.L	N.E

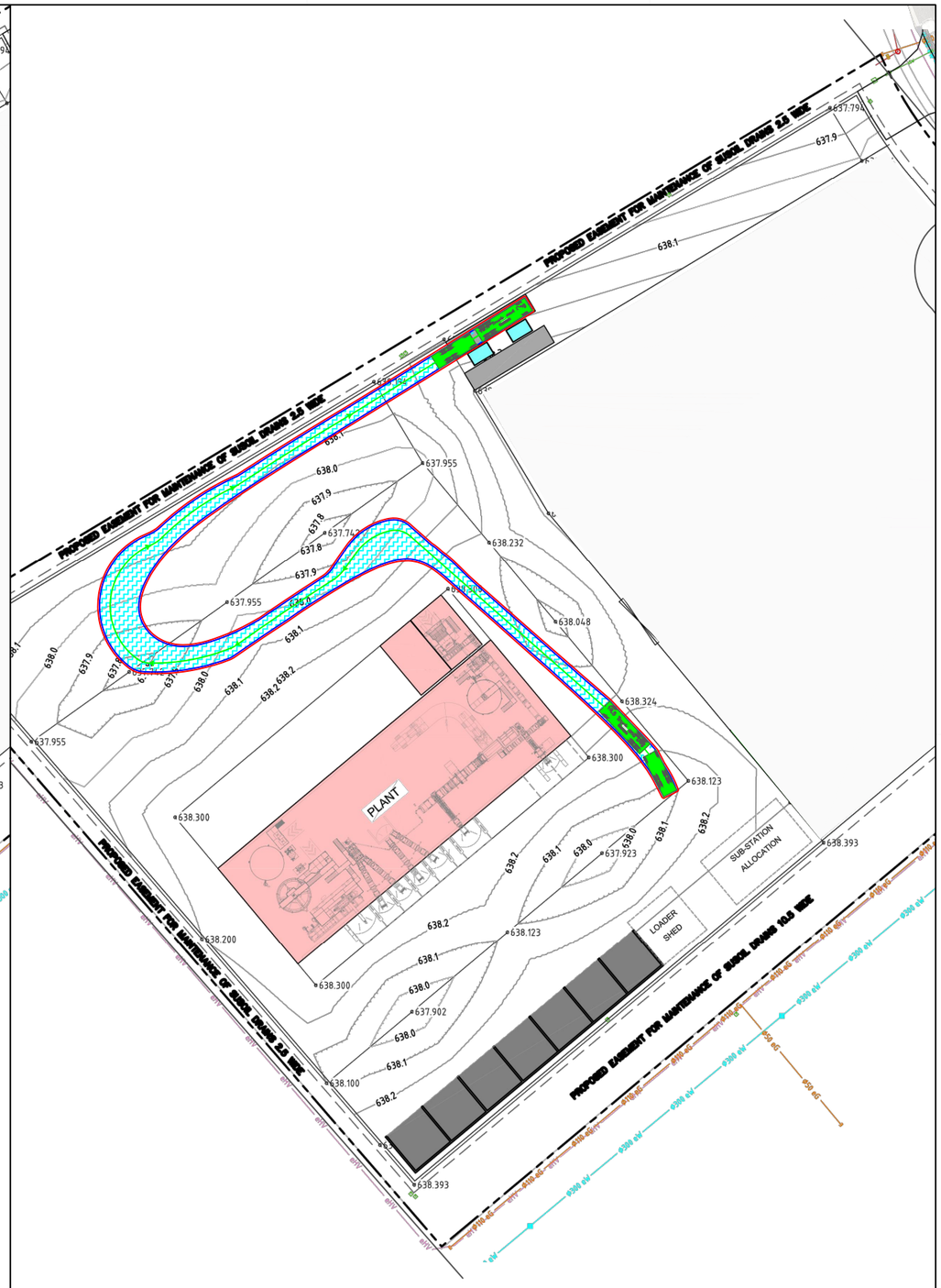
CONCEPT ONLY

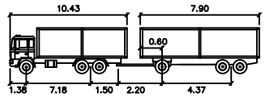
Date: 07.02.2020

Project Number	Sheet Number	Issue
P4092	3	001









19.5 Truck and Dog

meters

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Trailer Width	: 2.60	Steering Angle	: 45.3
First Unit Track	: 2.44	Articulating Angle	: 70.0
Trailer Track	: 2.44		

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Issue	REVISIONS Revisions/Descriptions	Drawn	Date
001	SWEPT PATH ANALYSIS	A.A	07.02.2020

Scale @ A3 0 10 20 30 40 50 1:1000

ENGINEERING CERTIFICATION (RPEQ)

Name	Signature	No.	Date

Project: 36 COURANGA CRES HUME TIA

Title: 19.5m TRUCK AND DOG SWEPT PATH ANALYSIS

Design	Drawn	Checked
A.L	A.L	N.E

CONCEPT ONLY

Date: 07.02.2020

Project Number	Sheet Number	Issue
P4092	4	001

Appendix C: Traffic Survey Data

TDC
Traffic Data & Control

SURVEY INFORMATION

Site ID:	1			
Location:	Monaro Hwy & Tralee St, Hume			
Date:	28 / Feb / 2017			
Time Period 1:	07:00	to	09:00	1/3/17
Time Period 2:	15:00	to	17:00	28/2/17

Primary Classes:

1. Light Vehicles
2. Trucks
3. None
4. None
5. None

Secondary Classes:

1. Pedestrians
2. None

Weather Conditions 1: Fine

Weather Conditions 2: Fine

Intersection Legs:

North	Ch	Monaro Hwy SB
East	Ch	Tralee St WB
South	Ch	Monaro Hwy NB
West	Ch	

Output time interval: 15 mins

MAP

Site ID: 1

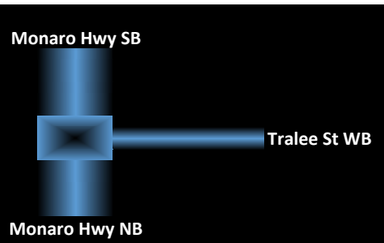
Location: Monaro Hwy & Tralee St, Hume

Date: 01-Mar-17

Period 1 Time: 7:00 AM to 9:00 AM

Weather: Fine

Period 1 Peak Hour: 7:45 AM to 8:45 AM



TDC Traffic Data & Control

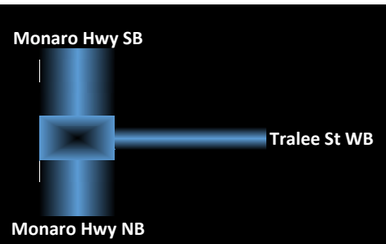
TOTALS AND PEAKS

Period 1 Total	86	46	1847	220	0	0	0	77	51	44	14	0	0	0	6445	149	324	41	0	0	0	9344	2199	186	6959
Period 1 Peak Hr	28	25	1066	124	0	0	0	39	20	19	4	0	0	0	3459	75	121	23	0	0	0	5003	1243	82	3678

	Monaro Hwy SB	Monaro Hwy SB	Monaro Hwy SB	Monaro Hwy SB	Monaro Hwy SB	Monaro Hwy SB	Monaro Hwy SB	Tralee St WB	Tralee St WB	Tralee St WB	Tralee St WB	Tralee St WB	Tralee St WB	Tralee St WB	Monaro Hwy NB	Monaro Hwy NB	Monaro Hwy NB	Monaro Hwy NB	Monaro Hwy NB	Monaro Hwy NB	Monaro Hwy NB	GRAND TOTAL	Monaro Hwy SB	Tralee St WB	Monaro Hwy NB
	Left	Left	Through	Through	U-turn	U-turn	Cross 1	Left	Left	Right	Right	U-turn	U-turn	Cross 1	Through	Through	Right	Right	U-turn	U-turn	Cross 1		TOTAL	TOTAL	TOTAL
Time Starting	Light Vehicles	Trucks	Light Vehicles	Trucks	Light Vehicles	Trucks	Pedestrians	Light Vehicles	Trucks	Light Vehicles	Trucks	Light Vehicles	Trucks	Pedestrians	Light Vehicles	Trucks	Light Vehicles	Trucks	Light Vehicles	Trucks	Pedestrians	TOTALS	All Classes	All Classes	All Classes
07:00	25	5	179	32	0	0	0	7	10	10	2	0	0	0	697	20	79	5	0	0	0	**1071**	241	29	801
07:15	14	7	175	24	0	0	0	7	11	6	4	0	0	0	749	15	58	7	0	0	0	**1077**	220	28	829
07:30	11	6	200	17	0	0	0	13	3	7	2	0	0	0	868	16	48	2	0	0	0	**1193**	234	25	934
07:45	8	7	293	34	0	0	0	9	5	4	1	0	0	0	945	18	43	3	0	0	0	**1370**	342	19	1009
08:00	9	10	249	30	0	0	0	11	4	4	2	0	0	0	891	23	26	8	0	0	0	**1267**	298	21	948
08:15	6	4	263	28	0	0	0	11	3	9	0	0	0	0	779	21	32	8	0	0	0	**1164**	301	23	840
08:30	5	4	261	32	0	0	0	8	8	2	1	0	0	0	844	13	20	4	0	0	0	**1202**	302	19	881
08:45	8	3	227	23	0	0	0	11	7	2	2	0	0	0	672	23	18	4	0	0	0	**1000**	261	22	717

Site ID: 1
Location: Monaro Hwy & Tralee St, Hume
Date: 28-Feb-2017
Period 2 Time: 3:00 PM to 5:00 PM
Weather: Fine

Period 2 Peak Hour: 4:00 PM to 5:00 PM



TDC Traffic Data & Control

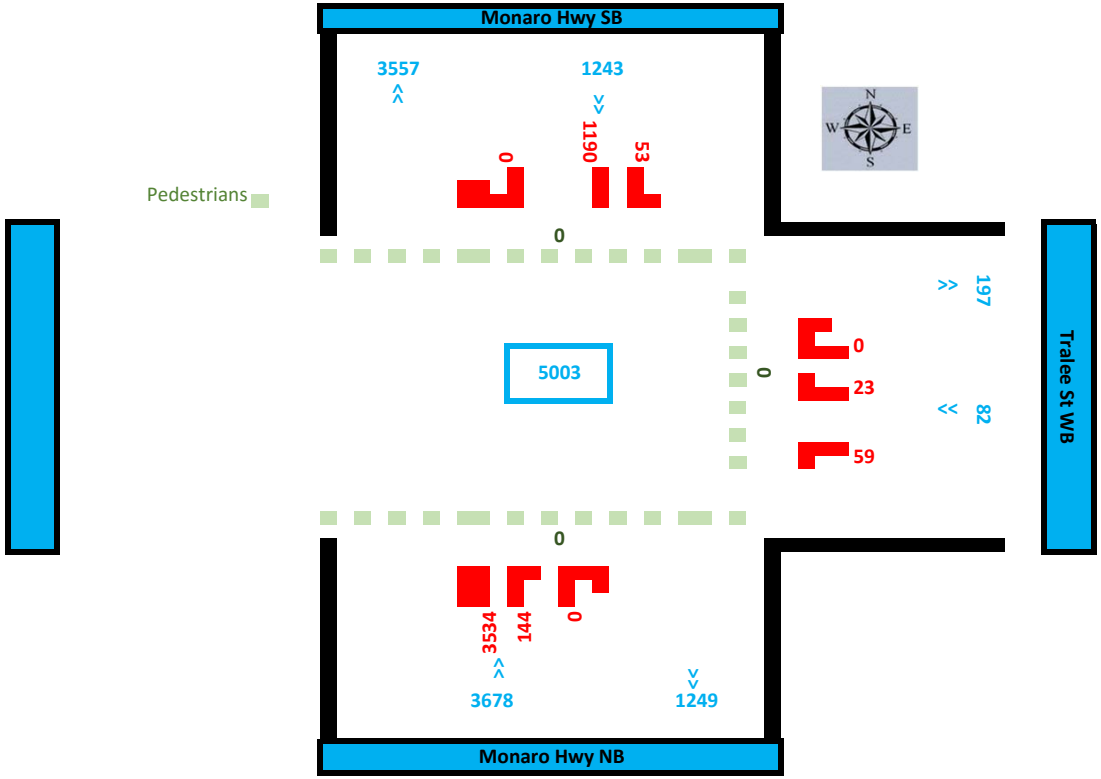
TOTALS AND PEAKS

Period 2 Total	47	70	4558	127	0	0	0	244	21	88	9	0	0	0	2324	173	130	61	0	0	0	7852	4802	362	2688
Period 2 Peak Hr	18	34	2762	52	0	0	0	127	9	27	1	0	0	0	1174	72	46	32	0	0	0	4354	2866	164	1324

	Monaro Hwy SB	Monaro Hwy SB	Monaro Hwy SB	Monaro Hwy SB	Monaro Hwy SB	Monaro Hwy SB	Monaro Hwy SB	Tralee St WB	Tralee St WB	Tralee St WB	Tralee St WB	Tralee St WB	Tralee St WB	Tralee St WB	Monaro Hwy NB	Monaro Hwy NB	Monaro Hwy NB	Monaro Hwy NB	Monaro Hwy NB	Monaro Hwy NB	Monaro Hwy NB	GRAND TOTAL	Monaro Hwy SB	Tralee St WB	Monaro Hwy NB
	Left	Left	Through	Through	U-turn	U-turn	Cross 1	Left	Left	Right	Right	U-turn	U-turn	Cross 1	Through	Through	Right	Right	U-turn	U-turn	Cross 1		TOTAL	TOTAL	TOTAL
Time Starting	Light Vehicles	Trucks	Light Vehicles	Trucks	Light Vehicles	Trucks	Pedestrians	Light Vehicles	Trucks	Light Vehicles	Trucks	Light Vehicles	Trucks	Pedestrians	Light Vehicles	Trucks	Light Vehicles	Trucks	Light Vehicles	Trucks	Pedestrians	TOTALS	All Classes	All Classes	All Classes
15:00	11	8	376	24	0	0	0	52	3	22	1	0	0	0	246	44	23	5	0	0	0	**815**	419	78	318
15:15	7	3	431	17	0	0	0	15	2	15	0	0	0	0	271	18	16	9	0	0	0	**804**	458	32	314
15:30	5	13	487	14	0	0	0	19	5	15	3	0	0	0	329	24	16	10	0	0	0	**940**	519	42	379
15:45	6	12	502	20	0	0	0	31	2	9	4	0	0	0	304	15	29	5	0	0	0	**939**	540	46	353
16:00	6	14	590	23	0	0	0	29	2	9	1	0	0	0	263	28	13	4	0	0	0	**982**	633	41	308
16:15	1	8	677	5	0	0	0	26	1	6	0	0	0	0	302	23	15	8	0	0	0	**1072**	691	33	348
16:30	3	7	720	13	0	0	0	29	4	6	0	0	0	0	301	11	10	9	0	0	0	**1113**	743	39	331
16:45	8	5	775	11	0	0	0	43	2	6	0	0	0	0	308	10	8	11	0	0	0	**1187**	799	51	337

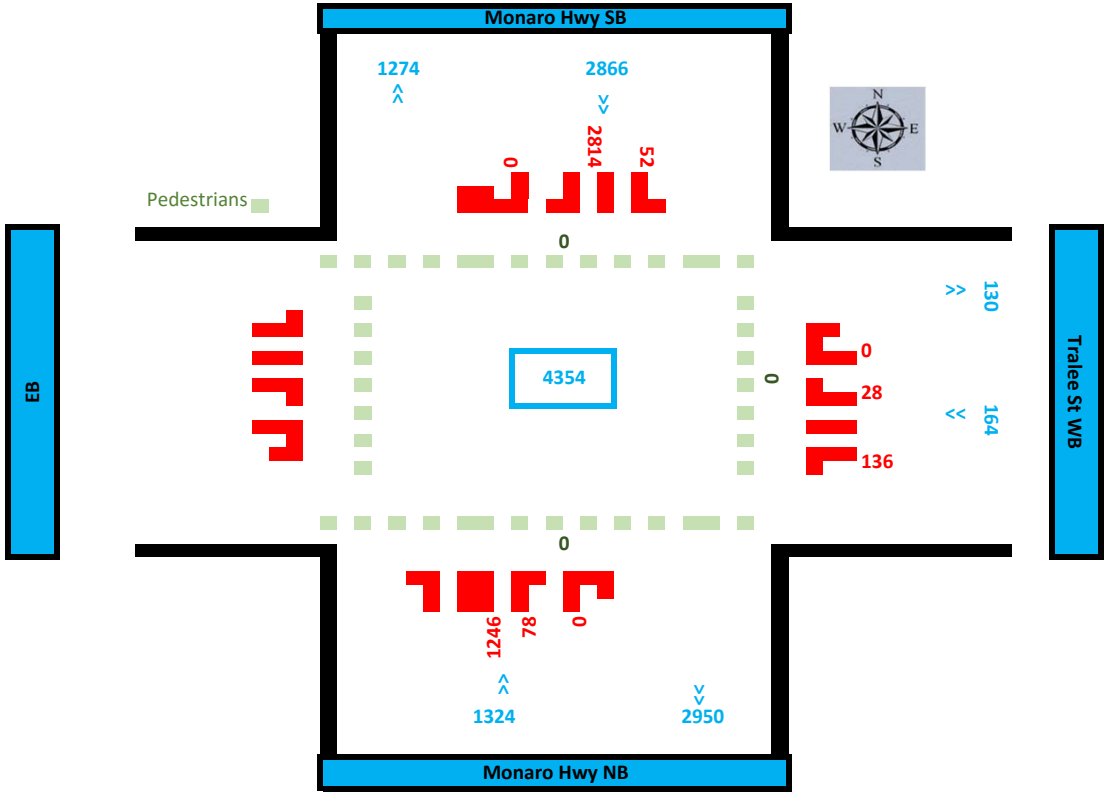
Turning Movement Count Summary

Site ID:	1
Location:	Monaro Hwy & Tralee St, Hume
Date:	1/03/2017
Surveyed Time:	7:00 AM to 9:00 AM
Weather:	Fine
Data for hour starting:	7:45 AM to 8:45 AM
Vehicle Class:	ALL VEHICLES



Turning Movement Count Summary

Site ID:	1
Location:	Monaro Hwy & Tralee St, Hume
Date:	1/03/2017
Surveyed Time:	3:00 PM to 5:00 PM
Weather:	Fine
Data for hour starting:	4:00 PM to 5:00 PM
Vehicle Class:	ALL VEHICLES



Appendix D: Design Traffic Volumes

Table 1: Background Information

Element	From	To	Comment
Proposed Operating Hours	700	1800	Monday to Friday, 50 weeks per year
Road Network AM Peak	745	845	From Survey Data
Road Network PM Peak	1600	1700	From Survey Data

Table 2: Traffic Generation (Source: Flexible Australia)

Vehicles Types / Components	Annual Trips	Daily Trips	AM Peak		PM Peak	
			% of Daily	Trips	% of Daily	Trips
Truck: Inward Movement						
Truck: Street Sweeping	6,316	25	20%	5	20%	5
Truck: Hydromud	1,356	5	20%	1	20%	1
Truck: Stormwater Gpt	1,864	7	20%	1	20%	1
Truck: Golf Course bunker sand	70	0	20%	0	20%	0
Truck: Outward Movement						
Truck: Litter	516	2	20%	0	20%	0
Truck: Aggregate	316	1	20%	0	20%	0
Truck: Organic	628	3	20%	1	20%	1
Truck: Sand	962	4	20%	1	20%	1
Truck: Clay / Soil	564	2	20%	0	20%	0
Truck: Water / Reuse	9,536	38	20%	8	20%	8
TOTAL TRUCK MOVEMENTS	22,128	89		18		18
Staff & Miscellaneous Deliveries	7,000	28	30%	8	30%	8
TOTAL VEHICLE MOVEMENTS	**29,128**	**117**		**26**		**26**

Table 3: Directional Splits (Existing Industrial Estate)

Origin / Destination (Note 1)	AM PEAK	AM %	PM PEAK	PM %
In from North East	53	19%	52	18%
In from South West	144	52%	78	27%
TOTAL IN	197	71%	130	44%
Out to North East	23	8%	28	10%
T	59	21%	136	46%
TOTAL OUT	82	29%	164	56%
TOTAL IN + OUT	**279**	**100%**	**294**	**100%**

Note 1: Bitzios assumed developent distribution will be generally as per existing distribution at study intersection

Table 4: Directional Splits (Proposed Development)

Origin / Destination (Note 1)	AM PEAK	PM PEAK
In from North East	5	5
In from South West	13	7
TOTAL IN	18	12
Out to North East	2	2
Out to South West	6	12
TOTAL OUT	8	15
TOTAL IN + OUT	**26**	**26**

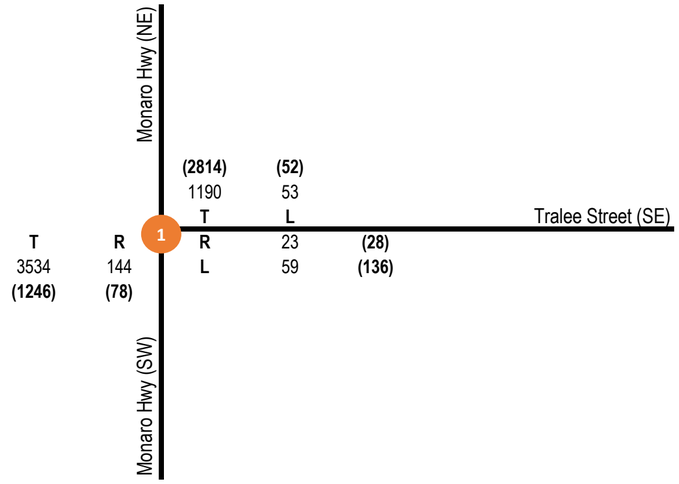
Note 1: Bitzios assumed developent distribution will be generally as per surveyed distribution at study intersection

Table 5: Traffic Growth Rate

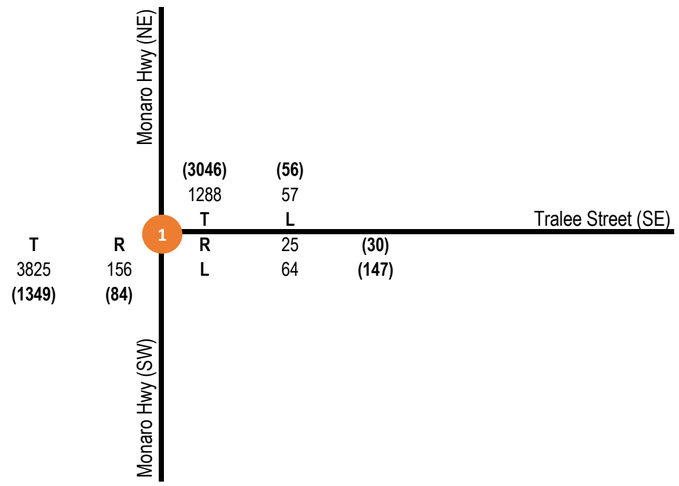
Scenario (Note 2)	Year of Opening			
	Rate	Base Yr	Future Yr	Factor
Year of Opening	2.00%	2017	2021	1.08
10 Year Design Horizon	2.00%	2017	2031	1.32

Note 2: Bitzios assumed 2% p.a. growth on all movements based on predicted population growth.

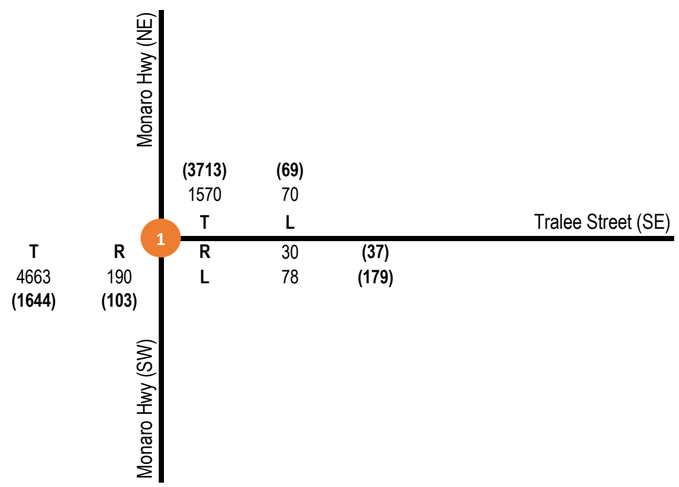
2017 Background Traffic Volumes



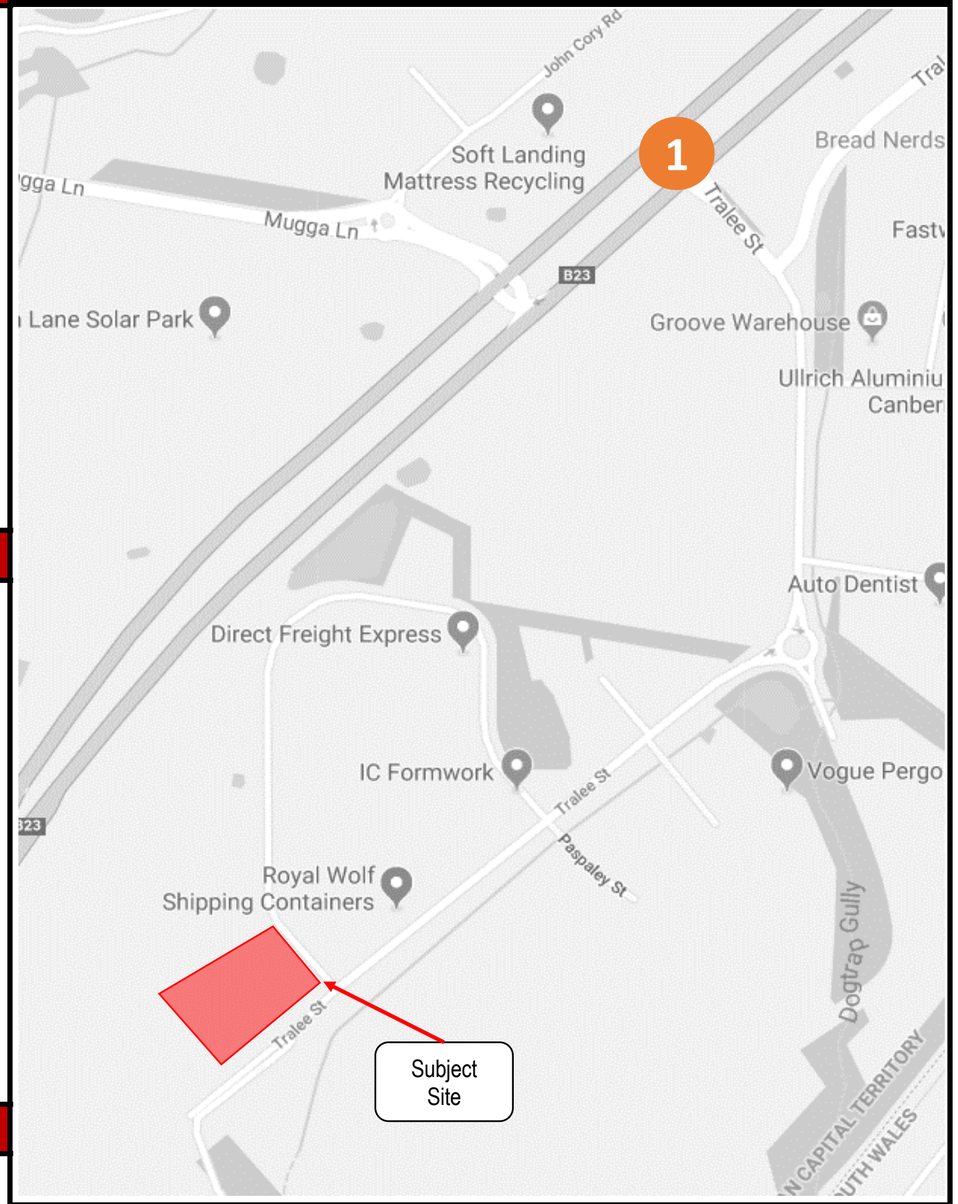
2021 Background Traffic Volumes



2031 Background Traffic Volumes



LOCALITY PLAN



SCENARIO: Background Scenarios

Sheet Notes:

* AM Peak Hour was surveyed to be 7:45am to 8:45am
* PM Peak Hour was surveyed to be 4:00pm to 5:00pm

DOCUMENT CONTROL

Job Number:	P4092	**Job Name:**	36 Couranga Cres, Hume, ACT
Prepared By:	Christy Luk	Prepared Date:	7/02/2020
Reviewed By:	Nathan Edwards	Reviewed Date:	7/02/2020
File Path:	P:\P4092 Waste Facility 36 Couranga Cres Hume ACT TIA\Technical Work\		

LEGEND

##	AM Peak Hour Volumes	T	Through Turn Movement
(##)	PM Peak Hour Volumes	R	Right Turn Movement
L	Left Turn Movement	1	Intersection ID

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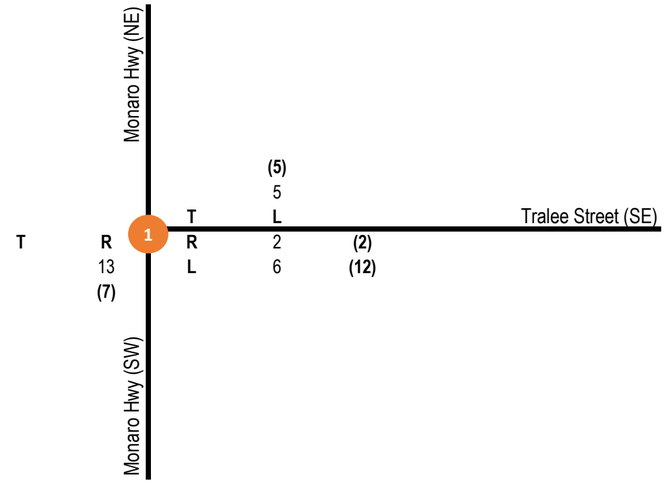
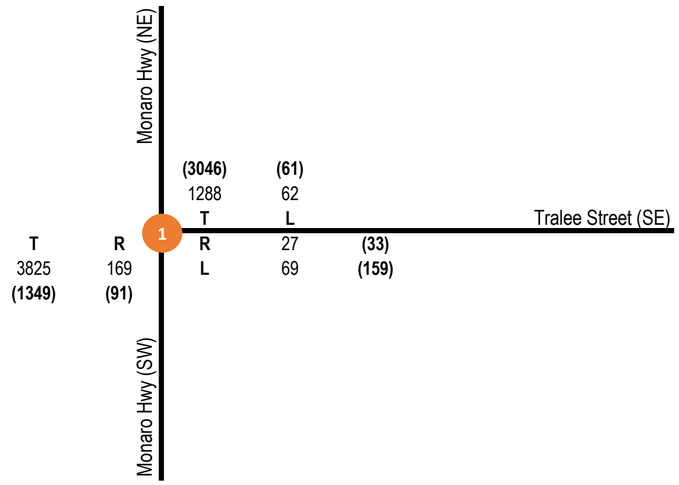
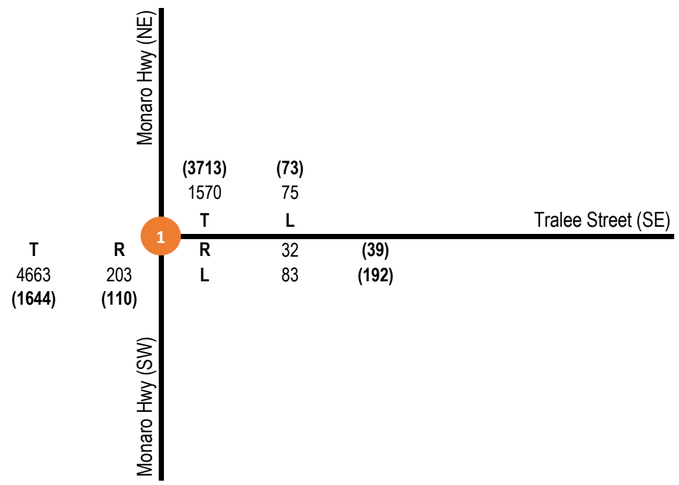
Development Traffic Volumes



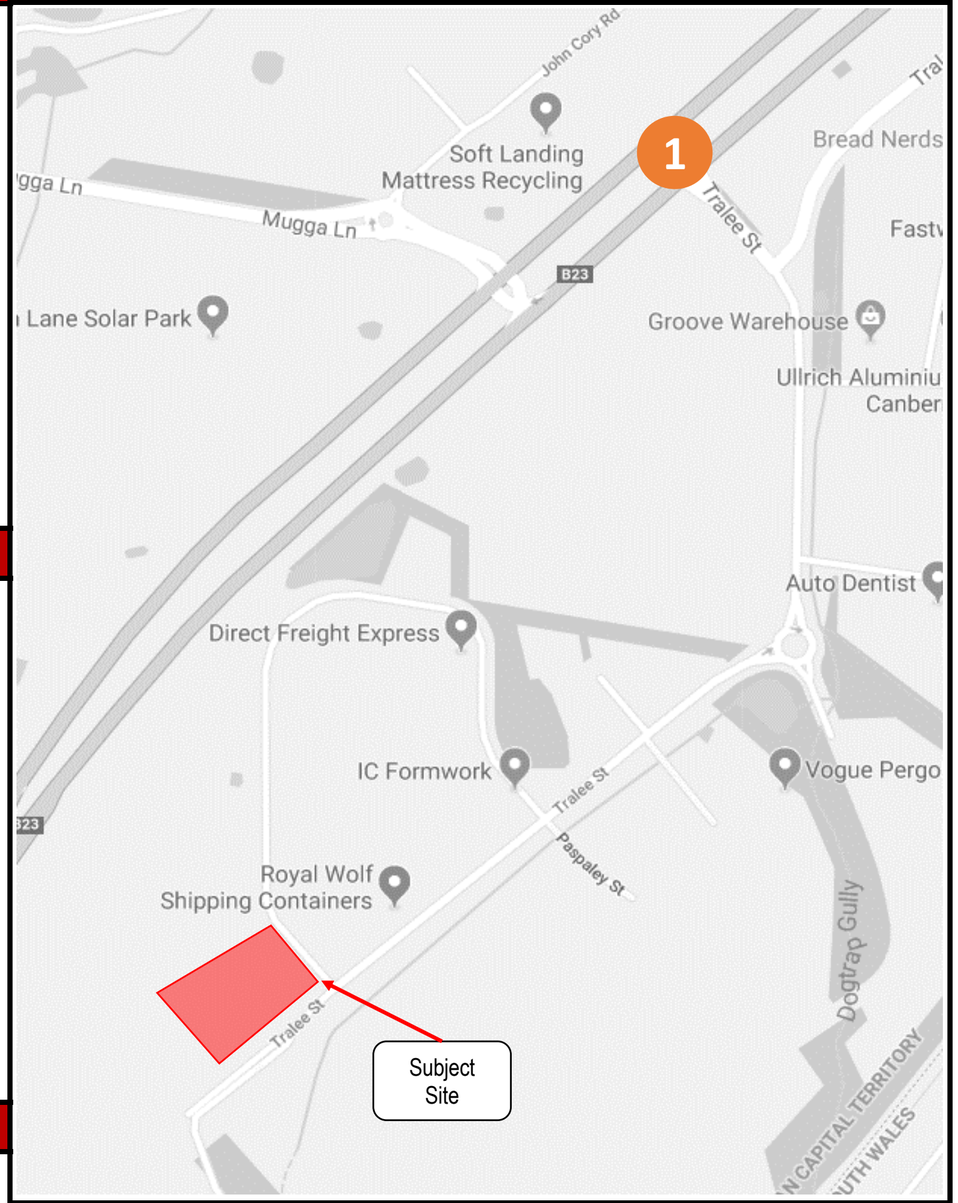
2021 Background + Development Traffic Volumes



2031 Background + Development Traffic Volumes



LOCALITY PLAN



SCENARIO: Developent Scenarios

Sheet Notes:

* AM Peak Hour was surveyed to be 8:00am to 9:00am
* PM Peak Hour was surveyed to be 4:00pm to 5:00pm

DOCUMENT CONTROL

Job Number:	P4092	**Job Name:**	36 Couranga Cres, Hume, ACT
Prepared By:	Christy Luk	Prepared Date:	7/02/2020
Reviewed By:	Nathan Edwards	Reviewed Date:	7/02/2020
File Path:	P:\P4092 Waste Facility 36 Couranga Cres Hume ACT TIA\Technical Work\		

LEGEND

##	AM Peak Hour Volumes	T	Through Turn Movement
(##)	PM Peak Hour Volumes	R	Right Turn Movement
L	Left Turn Movement	1	Intersection ID

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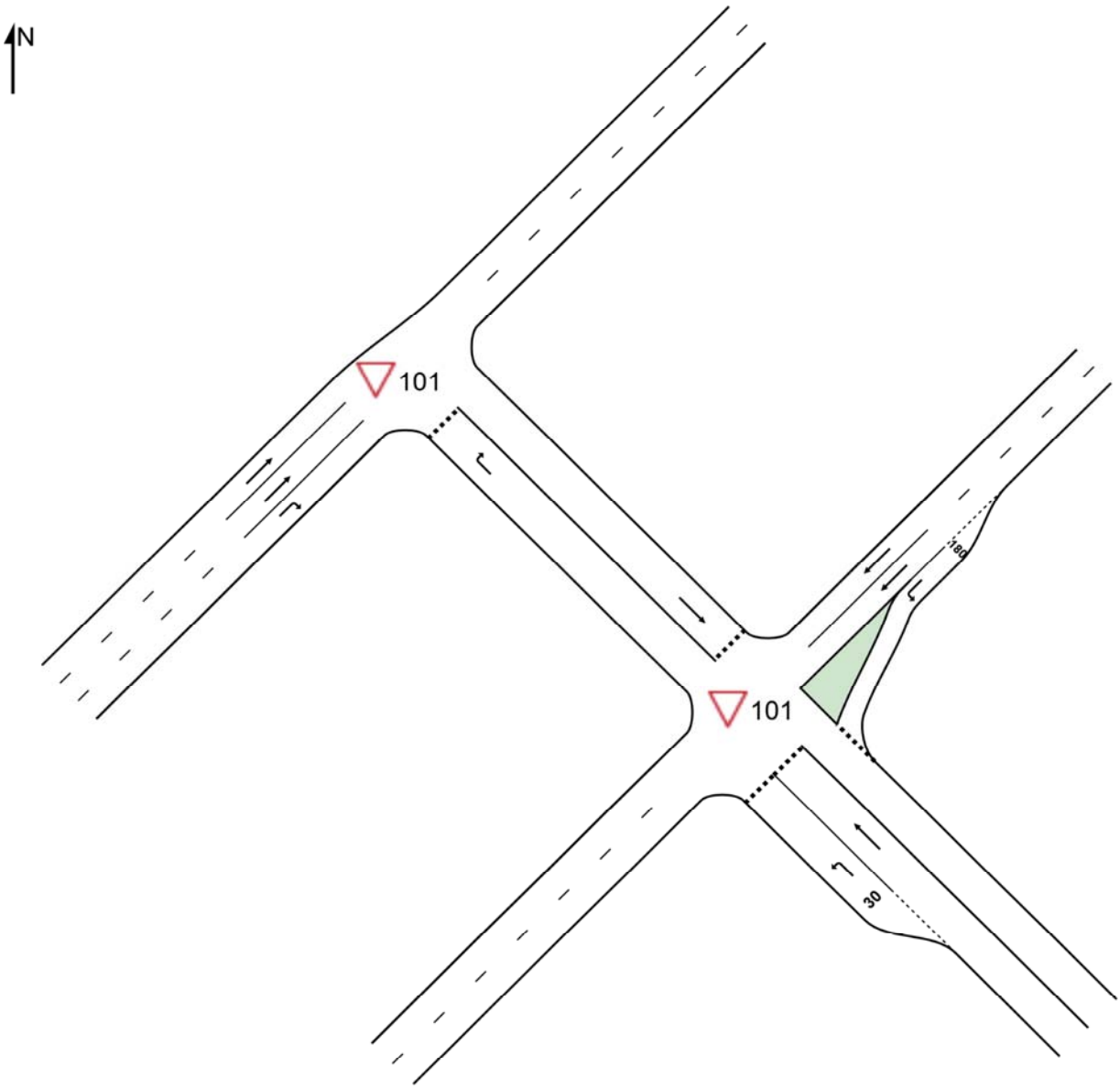
Appendix E: Detailed SIDRA Outputs

NETWORK LAYOUT

Network: N101 [2017 AM Background]

New Network



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
▽101	NA	2017 AM Background (North)
▽101	NA	2017 AM Background (South)

MOVEMENT SUMMARY

Site: 101 [2017 AM Background (North)]

Network: N101 [2017 AM Background]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Tralee Street (Median)													
23	R2	23	17.4	23	17.4	0.212	35.5	LOS E	0.5	4.4	0.96	0.99	28.8
Approach		23	17.4	23	17.4	0.212	35.5	LOS E	0.5	4.4	0.96	0.99	28.8
SouthWest: Monaro Highway (South-West)													
31	T1	3534	2.1	3534	2.1	0.909	0.4	LOS A	0.0	0.0	0.00	0.00	77.3
32	R2	144	16.0	144	16.0	0.085	7.1	LOS A	0.0	0.0	0.00	0.64	48.5
Approach		3678	2.7	3678	2.7	0.909	0.6	NA	0.0	0.0	0.00	0.03	76.7
All Vehicles		3701	2.8	3701	2.8	0.909	0.9	NA	0.5	4.4	0.01	0.03	76.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.0 %
Number of Iterations: 5 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2017 AM Background (South)]

Network: N101 [2017 AM Background]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (South-East)													
21	L2	59	33.9	59	33.9	0.062	8.8	LOS A	0.3	2.5	0.57	0.70	44.2
22	T1	23	17.4	23	17.4	0.019	7.2	LOS A	0.1	0.7	0.65	0.68	34.0
Approach		82	29.3	82	29.3	0.062	8.3	LOS A	0.3	2.5	0.60	0.70	43.1
NorthEast: Monaro Highway (North-East)													
24	L2	53	47.2	53	47.2	0.047	8.8	LOS A	0.2	1.7	0.25	0.58	53.5
25	T1	1190	10.4	1190	10.4	0.326	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
Approach		1243	12.0	1243	12.0	0.326	0.4	LOS A	0.2	1.7	0.01	0.02	78.8
NorthWest: Tralee Street (Median)													
28	T1	144	17.4	144	17.4	0.118	5.4	LOS A	0.6	4.4	0.67	0.77	35.7
Approach		144	17.4	144	17.4	0.118	5.4	LOS A	0.6	4.4	0.67	0.77	35.7
All Vehicles		1469	13.5	1469	13.5	0.326	1.3	NA	0.6	4.4	0.11	0.14	74.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.0 %
Number of Iterations: 5 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2017 PM Background (North)]

Network: N101 [2017 PM Background]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (Median)													
23	R2	28	17.4	28	17.4	0.024	4.6	LOS A	0.1	0.4	0.41	0.69	52.2
Approach		28	17.4	28	17.4	0.024	4.6	LOS A	0.1	0.4	0.41	0.69	52.2
SouthWest: Monaro Highway (South-West)													
31	T1	1246	2.1	1246	2.1	0.321	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
32	R2	78	16.0	78	16.0	0.062	7.1	LOS A	0.0	0.0	0.00	0.64	48.5
Approach		1324	2.9	1324	2.9	0.321	0.4	NA	0.0	0.0	0.00	0.04	78.9
All Vehicles		1352	3.2	1352	3.2	0.321	0.5	NA	0.1	0.4	0.01	0.05	78.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.5 %
Number of Iterations: 10 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2017 PM Background (South)]

Network: N101 [2017 PM Background]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Tralee Street (South-East)													
21	L2	136	33.9	136	33.9	0.842	78.6	LOS F	5.1	45.7	0.98	1.34	19.1
22	T1	28	17.4	28	17.4	0.244	44.7	LOS E	0.8	6.5	0.97	1.00	10.3
Approach		164	31.1	164	31.1	0.842	72.8	LOS F	5.1	45.7	0.98	1.29	18.4
NorthEast: Monaro Highway (North-East)													
24	L2	52	47.2	52	47.2	0.043	8.5	LOS A	0.2	1.6	0.18	0.56	54.0
25	T1	2814	10.4	2814	10.4	0.770	0.3	LOS A	0.0	0.0	0.00	0.00	79.0
Approach		2866	11.1	2866	11.1	0.770	0.4	LOS A	0.2	1.6	0.00	0.01	78.6
NorthWest: Tralee Street (Median)													
28	T1	78	17.4	78	17.4	1.086	264.5	LOS F	8.8	70.8	1.00	1.58	2.5
Approach		78	17.4	78	17.4	1.086	264.5	LOS F	8.8	70.8	1.00	1.58	2.5
All Vehicles		3108	12.3	3108	12.3	1.086	10.9	NA	8.8	70.8	0.08	0.12	62.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.5 %
Number of Iterations: 10 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2021 AM Background (North)]

Network: N101 [2021 AM Background]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Tralee Street (Median)													
23	R2	25	17.4	25	17.4	0.971	334.3	LOS F	3.1	24.7	1.00	1.12	5.4
Approach		25	17.4	25	17.4	0.971	334.3	LOS F	3.1	24.7	1.00	1.12	5.4
SouthWest: Monaro Highway (South-West)													
31	T1	3825	2.1	3825	2.1	0.984	1.6	LOS A	0.0	0.0	0.00	0.00	69.5
32	R2	156	16.0	156	16.0	0.093	7.1	LOS A	0.0	0.0	0.00	0.64	48.5
Approach		3981	2.7	3981	2.7	0.984	1.8	NA	0.0	0.0	0.00	0.03	69.1
All Vehicles		4006	2.8	4006	2.8	0.984	3.9	NA	3.1	24.7	0.01	0.03	65.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.0 %
Number of Iterations: 5 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2021 AM Background (South)]

Network: N101 [2021 AM Background]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (South-East)													
21	L2	64	33.9	64	33.9	0.072	9.2	LOS A	0.3	2.9	0.60	0.73	43.8
22	T1	25	17.4	25	17.4	0.022	7.6	LOS A	0.1	0.8	0.67	0.71	33.2
Approach		89	29.3	89	29.3	0.072	8.7	LOS A	0.3	2.9	0.62	0.72	42.7
NorthEast: Monaro Highway (North-East)													
24	L2	57	47.2	57	47.2	0.052	8.9	LOS A	0.2	1.9	0.26	0.58	53.5
25	T1	1288	10.4	1288	10.4	0.353	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
Approach		1345	12.0	1345	12.0	0.353	0.4	LOS A	0.2	1.9	0.01	0.02	78.7
NorthWest: Tralee Street (Median)													
28	T1	156	17.4	156	17.4	0.142	5.8	LOS A	0.6	5.2	0.69	0.82	34.8
Approach		156	17.4	156	17.4	0.142	5.8	LOS A	0.6	5.2	0.69	0.82	34.8
All Vehicles		1590	13.5	1590	13.5	0.353	1.4	NA	0.6	5.2	0.11	0.14	74.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.0 %
Number of Iterations: 5 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2021 PM Background (North)]

Network: N101 [2021 PM Background]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (Median)													
23	R2	30	17.4	30	17.4	0.027	4.8	LOS A	0.1	0.5	0.45	0.72	51.9
Approach		30	17.4	30	17.4	0.027	4.8	LOS A	0.1	0.5	0.45	0.72	51.9
SouthWest: Monaro Highway (South-West)													
31	T1	1349	2.1	1349	2.1	0.347	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
32	R2	84	16.0	84	16.0	0.050	7.1	LOS A	26.5	211.0	0.00	0.64	48.5
Approach		1433	2.9	1433	2.9	0.347	0.4	NA	26.5	211.0	0.00	0.04	78.9
All Vehicles		1463	3.2	1463	3.2	0.347	0.5	NA	26.5	211.0	0.01	0.05	78.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.9 %
Number of Iterations: 7 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2021 PM Background (South)]

Network: N101 [2021 PM Background]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (South-East)													
21	L2	147	33.9	147	33.9	1.399	445.3	LOS F	32.2	290.9	1.00	2.94	4.7
22	T1	30	17.4	30	17.4	0.452	94.9	LOS F	1.5	11.8	0.99	1.03	5.3
Approach		177	31.1	177	31.1	1.399	385.9	LOS F	32.2	290.9	1.00	2.61	4.7
NorthEast: Monaro Highway (North-East)													
24	L2	56	47.2	56	47.2	0.046	8.5	LOS A	0.2	1.7	0.18	0.57	53.9
25	T1	3046	10.4	3046	10.4	0.834	0.4	LOS A	0.0	0.0	0.00	0.00	78.5
Approach		3102	11.1	3102	11.1	0.834	0.6	LOS A	0.2	1.7	0.00	0.01	78.1
NorthWest: Tralee Street (Median)													
28	T1	84	17.4	84	17.4	2.543	1521.4	LOS F	12.4	99.4	1.00	2.30	0.4
Approach		84	17.4	84	17.4	2.543	1521.4	LOS F	12.4	99.4	1.00	2.30	0.4
All Vehicles		3363	12.3	3363	12.3	2.543	58.9	NA	32.2	290.9	0.08	0.20	32.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.9 %
Number of Iterations: 7 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2031 AM Background (North)]

Network: N101 [2031 AM Background]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Tralee Street (Median)													
23	R2	30	17.4	30	17.4	5.000	3859.9	LOS F	12.4	99.4	1.00	1.31	0.5
Approach		30	17.4	30	17.4	5.000	3859.9	LOS F	12.4	99.4	1.00	1.31	0.5
SouthWest: Monaro Highway (South-West)													
31	T1	4663	2.1	4663	2.1	1.200	42.4	LOS E	0.0	0.0	0.00	0.00	16.0
32	R2	190	16.0	190	16.0	0.113	7.1	LOS A	0.0	0.0	0.00	0.64	48.5
Approach		4853	2.7	4853	2.7	1.200	41.1	NA	0.0	0.0	0.00	0.02	16.1
All Vehicles		4883	2.8	4883	2.8	5.000	64.5	NA	12.4	99.4	0.01	0.03	13.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 3.8 %
Number of Iterations: 10 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2031 AM Background (South)]

Network: N101 [2031 AM Background]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (South-East)													
21	L2	78	33.9	78	33.9	0.110	10.6	LOS B	0.5	4.2	0.66	0.82	42.7
22	T1	30	17.4	30	17.4	0.073	9.1	LOS A	0.2	1.2	0.73	0.85	30.4
Approach		108	29.3	108	29.3	0.110	10.2	LOS B	0.5	4.2	0.68	0.83	41.3
NorthEast: Monaro Highway (North-East)													
24	L2	70	47.2	70	47.2	0.066	9.1	LOS A	0.2	2.4	0.30	0.60	53.3
25	T1	1570	10.4	1570	10.4	0.430	0.1	LOS A	0.0	0.0	0.00	0.00	79.8
Approach		1640	12.0	1640	12.0	0.430	0.5	LOS A	0.2	2.4	0.01	0.03	78.7
NorthWest: Tralee Street (Median)													
28	T1	190	17.4	190	17.4	0.238	7.9	LOS A	1.1	8.7	0.78	0.91	31.5
Approach		190	17.4	190	17.4	0.238	7.9	LOS A	1.1	8.7	0.78	0.91	31.5
All Vehicles		1938	13.5	1938	13.5	0.430	1.7	NA	1.1	8.7	0.13	0.16	74.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 3.8 %
Number of Iterations: 10 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2031 PM Background (North)]

Network: N101 [2031 PM Background]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Tralee Street (Median)													
23	R2	37	17.4	6	17.4	0.007	5.4	LOS A	0.0	0.1	0.54	0.72	51.2
Approach		37	17.4	6[N1]	17.4	0.007	5.4	LOS A	0.0	0.1	0.54	0.72	51.2
SouthWest: Monaro Highway (South-West)													
31	T1	1644	2.1	1644	2.1	0.423	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
32	R2	103	16.0	103	16.0	0.061	7.1	LOS A	82.8	659.2	0.00	0.64	48.5
Approach		1747	2.9	1747	2.9	0.423	0.4	NA	82.8	659.2	0.00	0.04	78.8
All Vehicles		1784	3.2	1753[N1]	3.3	0.423	0.5	NA	82.8	659.2	0.00	0.04	78.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.9 %
Number of Iterations: 7 (maximum specified: 10)

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 101 [2031 PM Background (South)]

Network: N101 [2031 PM Background]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Tralee Street (South-East)													
21	L2	179	33.9	179	33.9	29.833	26087.0	LOS F	171.4	1548.6	1.00	1.45	0.1
22	T1	37	17.4	37	17.4	6.167	5076.7	LOS F	33.5	269.6	1.00	1.35	0.1
Approach		216	31.1	216	31.1	29.833	22488.0	LOS F	171.4	1548.6	1.00	1.43	0.1
NorthEast: Monaro Highway (North-East)													
24	L2	69	47.2	69	47.2	0.059	8.6	LOS A	0.2	2.1	0.21	0.57	53.8
25	T1	3713	10.4	3713	10.4	1.017	11.5	LOS B	0.0	0.0	0.00	0.00	53.7
Approach		3782	11.1	3782	11.1	1.017	11.4	LOS B	0.2	2.1	0.00	0.01	53.7
NorthWest: Tralee Street (Median)													
28	T1	103	17.4	103	17.4	17.167	14738.3	LOS F	12.4	99.4	1.00	1.42	0.0
Approach		103	17.4	103	17.4	17.167	14738.3	LOS F	12.4	99.4	1.00	1.42	0.0
All Vehicles		4101	12.3	4101	12.3	29.833	1565.1	NA	171.4	1548.6	0.08	0.12	2.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.9 %
Number of Iterations: 7 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2021 AM Design (North)]

Network: N101 [2021 AM Design]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (Median)													
23	R2	27	17.4	27	17.4	1.050	371.9	LOS F	4.0	32.0	1.00	1.18	4.8
Approach		27	17.4	27	17.4	1.050	371.9	LOS F	4.0	32.0	1.00	1.18	4.8
SouthWest: Monaro Highway (South-West)													
31	T1	3825	2.1	3825	2.1	0.984	1.6	LOS A	0.0	0.0	0.00	0.00	69.5
32	R2	169	16.0	169	16.0	0.100	7.1	LOS A	0.0	0.0	0.00	0.64	48.5
Approach		3994	2.7	3994	2.7	0.984	1.8	NA	0.0	0.0	0.00	0.03	69.1
All Vehicles		4021	2.8	4021	2.8	1.050	4.3	NA	4.0	32.0	0.01	0.03	64.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.0 %
Number of Iterations: 5 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2021 AM Design (South)]

Network: N101 [2021 AM Design]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (South-East)													
21	L2	69	33.9	69	33.9	0.078	9.2	LOS A	0.3	3.1	0.60	0.74	43.8
22	T1	27	17.4	27	17.4	0.024	7.6	LOS A	0.1	0.9	0.67	0.71	33.2
Approach		96	29.3	96	29.3	0.078	8.7	LOS A	0.3	3.1	0.62	0.73	42.7
NorthEast: Monaro Highway (North-East)													
24	L2	62	47.2	62	47.2	0.057	9.0	LOS A	0.2	2.1	0.28	0.59	53.4
25	T1	1288	10.4	1288	10.4	0.353	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
Approach		1350	12.1	1350	12.1	0.353	0.5	LOS A	0.2	2.1	0.01	0.03	78.7
NorthWest: Tralee Street (Median)													
28	T1	169	17.4	169	17.4	0.153	5.9	LOS A	0.7	5.7	0.69	0.82	34.8
Approach		169	17.4	169	17.4	0.153	5.9	LOS A	0.7	5.7	0.69	0.82	34.8
All Vehicles		1615	13.7	1615	13.7	0.353	1.5	NA	0.7	5.7	0.12	0.15	74.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.0 %
Number of Iterations: 5 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2021 PM Design (North)]

Network: N101 [2021 PM Design]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (Median)													
23	R2	33	17.4	33	17.4	0.030	4.8	LOS A	0.1	0.6	0.45	0.73	51.9
Approach		33	17.4	33	17.4	0.030	4.8	LOS A	0.1	0.6	0.45	0.73	51.9
SouthWest: Monaro Highway (South-West)													
31	T1	1349	2.1	1349	2.1	0.347	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
32	R2	91	16.0	91	16.0	0.054	7.1	LOS A	31.4	250.1	0.00	0.64	48.5
Approach		1440	3.0	1440	3.0	0.347	0.5	NA	31.4	250.1	0.00	0.04	78.8
All Vehicles		1473	3.3	1473	3.3	0.347	0.6	NA	31.4	250.1	0.01	0.06	78.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.9 %
Number of Iterations: 7 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2021 PM Design (South)]

Network: N101 [2021 PM Design]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Tralee Street (South-East)													
21	L2	159	33.9	159	33.9	1.513	538.6	LOS F	39.9	360.3	1.00	3.25	4.0
22	T1	33	17.4	33	17.4	0.498	101.0	LOS F	1.6	13.2	0.99	1.03	5.0
Approach		192	31.1	192	31.1	1.513	463.4	LOS F	39.9	360.3	1.00	2.87	4.0
NorthEast: Monaro Highway (North-East)													
24	L2	61	47.2	61	47.2	0.051	8.5	LOS A	0.2	1.9	0.19	0.57	53.9
25	T1	3046	10.4	3046	10.4	0.834	0.4	LOS A	0.0	0.0	0.00	0.00	78.5
Approach		3107	11.1	3107	11.1	0.834	0.6	LOS A	0.2	1.9	0.00	0.01	78.0
NorthWest: Tralee Street (Median)													
28	T1	91	17.4	91	17.4	2.754	1703.2	LOS F	12.4	99.4	1.00	2.36	0.4
Approach		91	17.4	91	17.4	2.754	1703.2	LOS F	12.4	99.4	1.00	2.36	0.4
All Vehicles		3390	12.4	3390	12.4	2.754	72.5	NA	39.9	360.3	0.09	0.24	29.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.9 %
Number of Iterations: 7 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2031 AM Design (North)]

Network: N101 [2031 AM Design]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (Median)													
23	R2	32	17.4	32	17.4	5.333	4148.7	LOS F	12.4	99.4	1.00	1.32	0.4
Approach		32	17.4	32	17.4	5.333	4148.7	LOS F	12.4	99.4	1.00	1.32	0.4
SouthWest: Monaro Highway (South-West)													
31	T1	4663	2.1	4663	2.1	1.200	42.4	LOS E	0.0	0.0	0.00	0.00	16.0
32	R2	203	16.0	203	16.0	0.121	7.1	LOS A	0.0	0.0	0.00	0.64	48.5
Approach		4866	2.7	4866	2.7	1.200	41.0	NA	0.0	0.0	0.00	0.03	16.1
All Vehicles		4898	2.8	4898	2.8	5.333	67.8	NA	12.4	99.4	0.01	0.04	13.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 3.8 %
Number of Iterations: 10 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2031 AM Design (South)]

Network: N101 [2031 AM Design]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (South-East)													
21	L2	83	33.9	83	33.9	0.117	10.6	LOS B	0.5	4.5	0.66	0.83	42.7
22	T1	32	17.4	32	17.4	0.078	9.2	LOS A	0.2	1.3	0.74	0.86	30.3
Approach		115	29.3	115	29.3	0.117	10.2	LOS B	0.5	4.5	0.68	0.83	41.3
NorthEast: Monaro Highway (North-East)													
24	L2	75	47.2	75	47.2	0.072	9.2	LOS A	0.3	2.6	0.31	0.61	53.2
25	T1	1570	10.4	1570	10.4	0.430	0.1	LOS A	0.0	0.0	0.00	0.00	79.8
Approach		1645	12.1	1645	12.1	0.430	0.5	LOS A	0.3	2.6	0.01	0.03	78.6
NorthWest: Tralee Street (Median)													
28	T1	203	17.4	203	17.4	0.254	8.1	LOS A	1.2	9.5	0.79	0.91	31.3
Approach		203	17.4	203	17.4	0.254	8.1	LOS A	1.2	9.5	0.79	0.91	31.3
All Vehicles		1963	13.7	1963	13.7	0.430	1.8	NA	1.2	9.5	0.13	0.17	73.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 3.8 %
Number of Iterations: 10 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101 [2031 PM Design (North)]

Network: N101 [2031 PM Design]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Tralee Street (Median)													
23	R2	39	17.4	6	17.4	0.007	5.4	LOS A	0.0	0.1	0.54	0.72	51.1
Approach		39	17.4	6[N1]	17.4	0.007	5.4	LOS A	0.0	0.1	0.54	0.72	51.1
SouthWest: Monaro Highway (South-West)													
31	T1	1644	2.1	1644	2.1	0.423	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
32	R2	110	16.0	110	16.0	0.065	7.1	LOS A	89.5	712.6	0.00	0.64	48.5
Approach		1754	3.0	1754	3.0	0.423	0.5	NA	89.5	712.6	0.00	0.04	78.7
All Vehicles		1793	3.3	1760[N1]	3.4	0.423	0.5	NA	89.5	712.6	0.00	0.04	78.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.9 %
Number of Iterations: 7 (maximum specified: 10)

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 101 [2031 PM Design (South)]

Network: N101 [2031 PM Design]

2017 AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

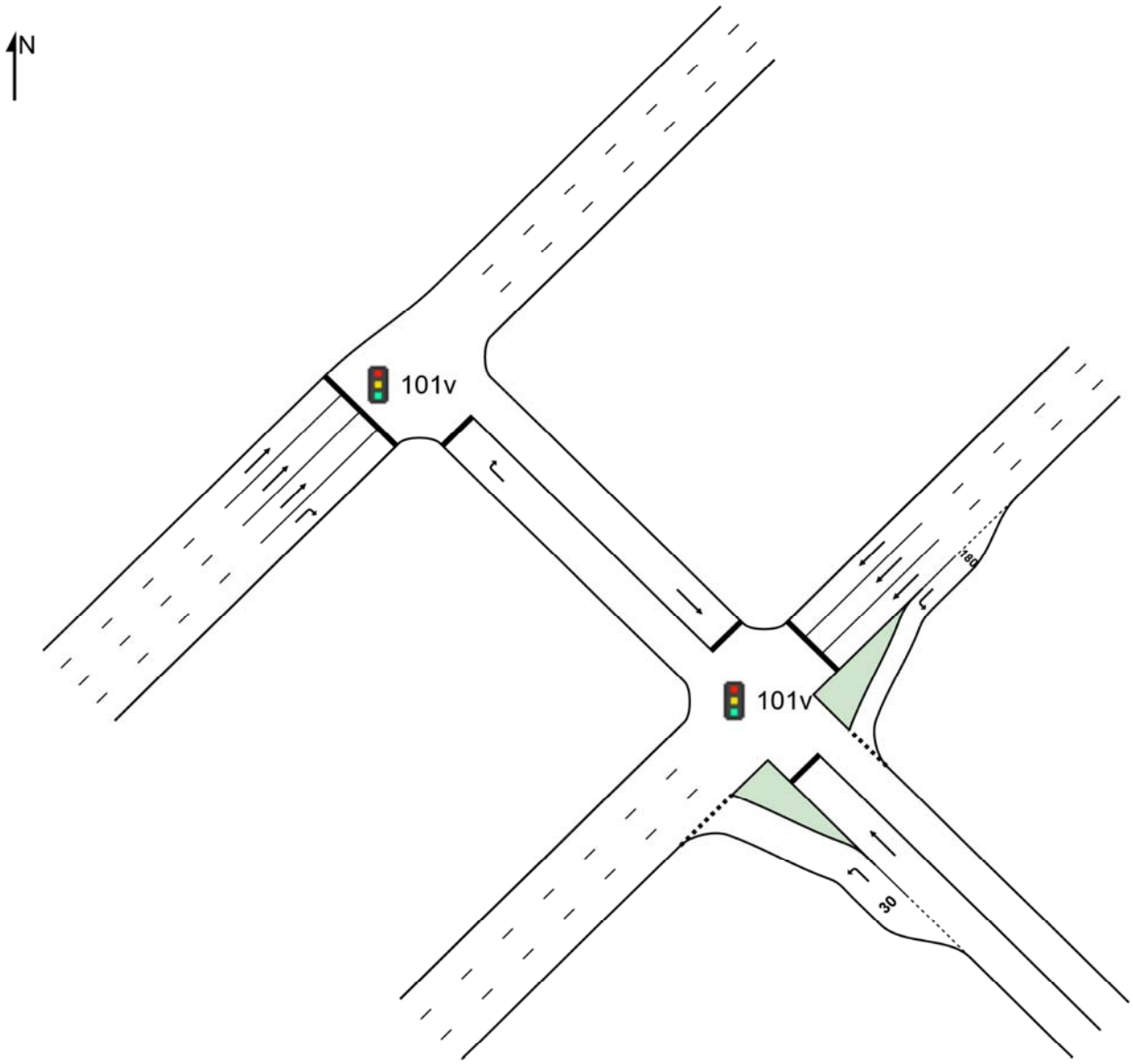
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Tralee Street (South-East)													
21	L2	192	33.9	192	33.9	32.000	28032.4	LOS F	184.1	1663.4	1.00	1.45	0.1
22	T1	39	17.4	39	17.4	6.500	5366.6	LOS F	35.6	286.1	1.00	1.36	0.1
Approach		231	31.1	231	31.1	32.000	24205.7	LOS F	184.1	1663.4	1.00	1.43	0.1
NorthEast: Monaro Highway (North-East)													
24	L2	73	47.2	73	47.2	0.062	8.6	LOS A	0.2	2.3	0.22	0.57	53.7
25	T1	3713	10.4	3713	10.4	1.017	11.5	LOS B	0.0	0.0	0.00	0.00	53.7
Approach		3786	11.1	3786	11.1	1.017	11.4	LOS B	0.2	2.3	0.00	0.01	53.7
NorthWest: Tralee Street (Median)													
28	T1	110	17.4	110	17.4	18.333	15782.0	LOS F	12.4	99.4	1.00	1.43	0.0
Approach		110	17.4	110	17.4	18.333	15782.0	LOS F	12.4	99.4	1.00	1.43	0.0
All Vehicles		4127	12.4	4127	12.4	32.000	1786.0	NA	184.1	1663.4	0.09	0.13	1.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.9 %
Number of Iterations: 7 (maximum specified: 10)

NETWORK LAYOUT

Network: N101 [2031 AM Design SIGNALISED]

New Network



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
101v	CCG1	2031 AM Design (North) SIGNALISED
101v	CCG1	2031 AM Design (South) SIGNALISED

Organisation: BITZIOS CONSULTING | Created: Friday, 7 February 2020 1:58:57 PM
Project: \\bitzios-srv-02\Projects\P4092 Waste Facility 36 Couranga Cres Hume ACT TIA\Technical Work\Models\Monaro Highway_Tralee St.sip7

PHASING SUMMARY (CCG)

Common Control Group: CCG1 [Signals]

Network: N101 [2031 AM Design SIGNALISED]

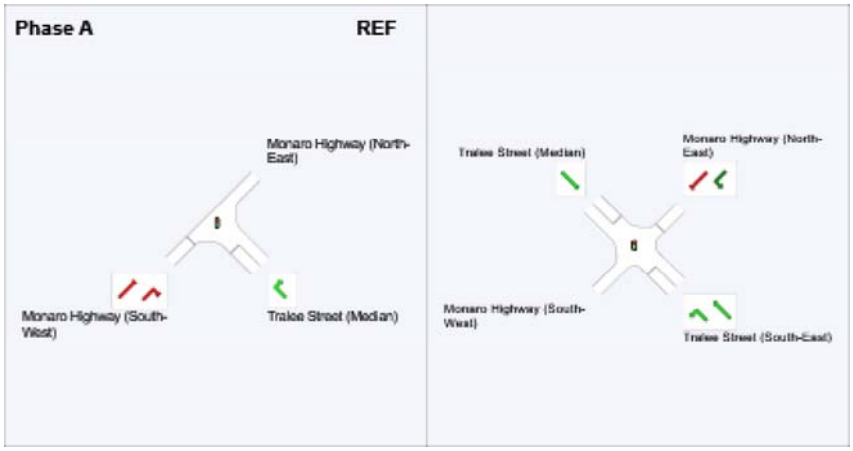
Fixed Time Coordinated Cycle Time = 150 seconds (Network Cycle Time - Program)

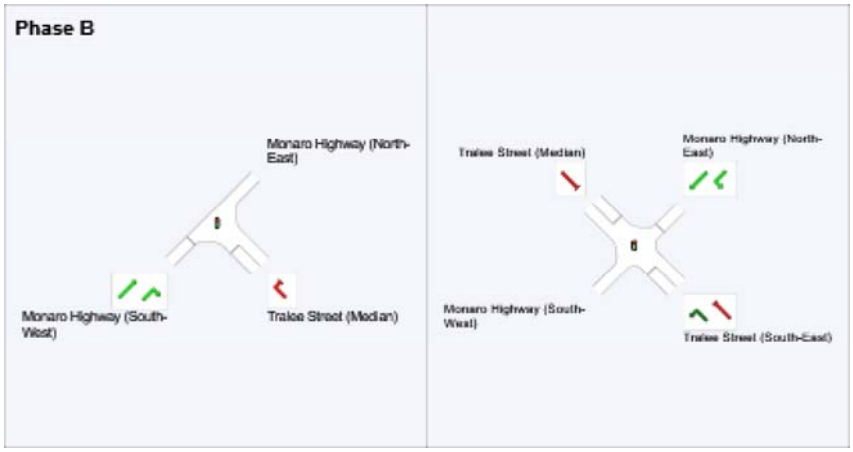
Phase Times determined by the program
Phase Sequence: CCG Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C*
Output Phase Sequence: A, B, C*
(* Variable Phase)

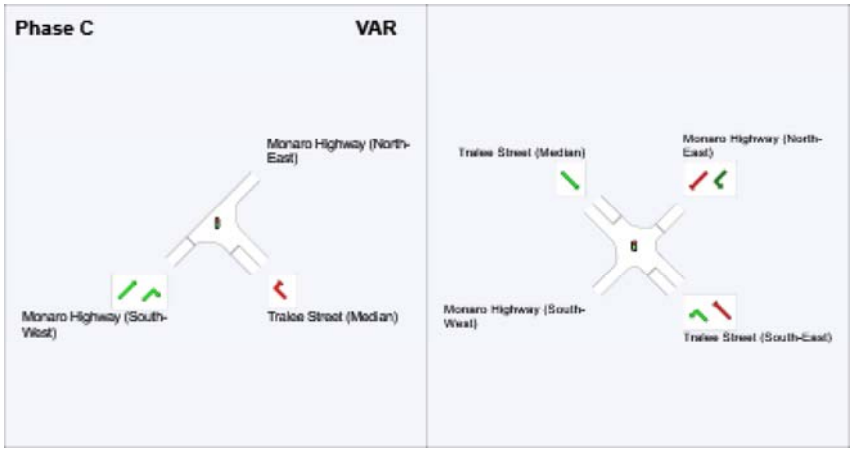
Phase Timing Results

Phase	A	B	C
Phase Change Time (sec)	0	12	66
Green Time (sec)	6	48	78
Phase Time (sec)	12	54	84
Phase Split	8%	36%	56%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.







REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

MOVEMENT SUMMARY

Site: 101v [2031 AM Design (North) SIGNALISED]

Network: N101 [2031 AM Design SIGNALISED]

2017 AM Peak
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network Cycle Time - Program)
Common Control Group: CCG1 [Signals]

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (Median)													
23	R2	32	17.4	32	17.4	0.445	32.6	LOS C	1.2	9.9	0.51	0.64	30.1
Approach		32	17.4	32	17.4	0.445	32.6	LOS C	1.2	9.9	0.51	0.64	30.1
SouthWest: Monaro Highway (South-West)													
31	T1	4663	2.1	4663	2.1	0.909	5.6	LOS A	66.3	472.4	0.66	0.64	68.3
32	R2	203	16.0	203	16.0	0.217	8.5	LOS A	2.2	17.2	0.16	0.68	44.9
Approach		4866	2.7	4866	2.7	0.909	5.8	LOS A	66.3	472.4	0.64	0.64	67.9
All Vehicles		4898	2.8	4898	2.8	0.909	5.9	LOS A	66.3	472.4	0.64	0.64	67.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 2.2 %
Number of Iterations: 10 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101v [2031 AM Design (South) SIGNALISED]

Network: N101 [2031 AM Design SIGNALISED]

2017 AM Peak
Signals - Fixed Time Coordinated Cycle Time = 150 seconds (Network Cycle Time - Program)
Common Control Group: CCG1 [Signals]

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (South-East)													
21	L2	83	33.9	83	33.9	0.101	14.1	LOS B	2.0	17.7	0.39	0.64	40.9
22	T1	32	17.4	32	17.4	0.420	80.8	LOS F	2.4	19.6	1.00	0.72	6.2
Approach		115	29.3	115	29.3	0.420	32.6	LOS C	2.4	19.6	0.56	0.67	28.0
NorthEast: Monaro Highway (North-East)													
24	L2	75	47.2	75	47.2	0.075	8.9	LOS A	0.5	5.0	0.14	0.63	53.9
25	T1	1570	10.4	1570	10.4	0.895	64.5	LOS E	41.3	315.3	1.00	1.00	33.3
Approach		1645	12.1	1645	12.1	0.895	62.0	LOS E	41.3	315.3	0.96	0.99	33.6
NorthWest: Tralee Street (Median)													
28	T1	203	17.4	203	17.4	0.177	14.4	LOS B	7.0	56.7	0.52	0.44	27.0
Approach		203	17.4	203	17.4	0.177	14.4	LOS B	7.0	56.7	0.52	0.44	27.0
All Vehicles		1963	13.7	1963	13.7	0.895	55.3	LOS E	41.3	315.3	0.89	0.91	33.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 2.2 %
Number of Iterations: 10 (maximum specified: 10)

PHASING SUMMARY (CCG)

Common Control Group: CCG1 [Signals]

Network: N101 [2031 PM Design SIGNALISED]

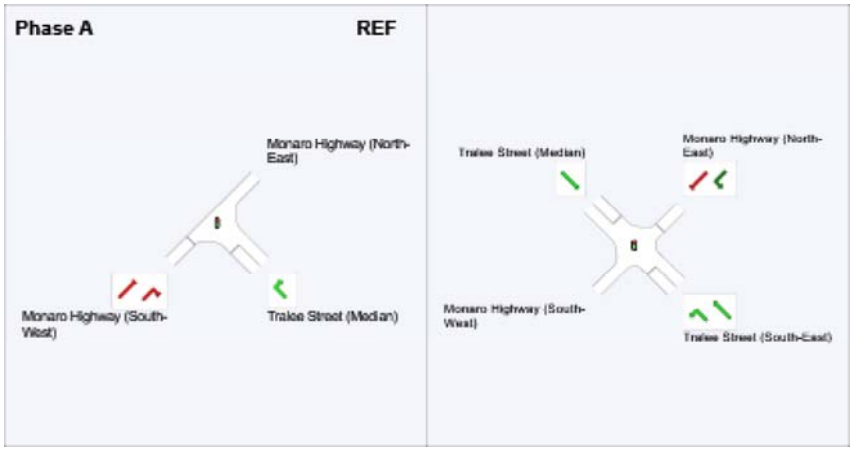
Fixed Time Coordinated Cycle Time = 80 seconds (Network Cycle Time - Program)

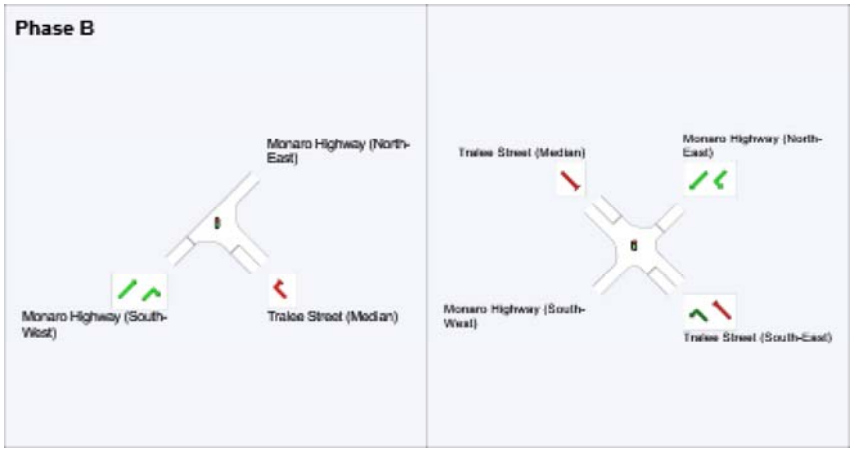
Phase Times determined by the program
Phase Sequence: CCG Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C*
Output Phase Sequence: A, B
(* Variable Phase)

Phase Timing Results

Phase	A	B
Phase Change Time (sec)	0	14
Green Time (sec)	8	60
Phase Time (sec)	14	66
Phase Split	18%	83%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.





REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red

MOVEMENT SUMMARY

Site: 101v [2031 PM Design (North) SIGNALISED]

Network: N101 [2031 PM Design SIGNALISED]

2017 AM Peak
Signals - Fixed Time Coordinated Cycle Time = 80 seconds (Network Cycle Time - Program)
Common Control Group: CCG1 [Signals]

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (Median)													
23	R2	39	17.4	39	17.4	0.217	5.3	LOS A	0.1	0.8	0.07	0.57	51.2
Approach		39	17.4	39	17.4	0.217	5.3	LOS A	0.1	0.8	0.07	0.57	51.2
SouthWest: Monaro Highway (South-West)													
31	T1	1644	2.1	1644	2.1	0.376	3.7	LOS A	7.3	52.4	0.37	0.34	72.0
32	R2	110	16.0	110	16.0	0.087	9.9	LOS A	1.1	9.0	0.28	0.69	41.7
Approach		1754	3.0	1754	3.0	0.376	4.1	LOS A	7.3	52.4	0.37	0.36	70.9
All Vehicles		1793	3.3	1793	3.3	0.376	4.1	LOS A	7.3	52.4	0.36	0.36	70.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.1 %
Number of Iterations: 5 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 101v [2031 PM Design (South) SIGNALISED]

Network: N101 [2031 PM Design SIGNALISED]

2017 AM Peak
Signals - Fixed Time Coordinated Cycle Time = 80 seconds (Network Cycle Time - Program)
Common Control Group: CCG1 [Signals]

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Tralee Street (South-East)													
21	L2	192	33.9	192	33.9	0.727	40.9	LOS D	7.7	69.9	1.00	1.02	28.1
22	T1	39	17.4	39	17.4	0.205	37.4	LOS D	1.5	11.8	0.95	0.70	12.0
Approach		231	31.1	231	31.1	0.727	40.3	LOS D	7.7	69.9	0.99	0.96	26.4
NorthEast: Monaro Highway (North-East)													
24	L2	73	47.2	73	47.2	0.065	9.1	LOS A	0.4	4.0	0.22	0.64	53.5
25	T1	3713	10.4	3713	10.4	0.904	21.1	LOS C	49.6	378.4	0.85	0.92	54.8
Approach		3786	11.1	3786	11.1	0.904	20.9	LOS C	49.6	378.4	0.83	0.92	54.8
NorthWest: Tralee Street (Median)													
28	T1	110	17.4	110	17.4	0.577	43.0	LOS D	4.5	36.5	1.00	0.79	12.9
Approach		110	17.4	110	17.4	0.577	43.0	LOS D	4.5	36.5	1.00	0.79	12.9
All Vehicles		4127	12.4	4127	12.4	0.904	22.5	LOS C	49.6	378.4	0.85	0.92	52.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.1 %
Number of Iterations: 5 (maximum specified: 10)