Tomago Estate
Transport Verification Study

Prepared for:

Northbank Enterprise Hub Pty Ltd

1 December 2023

The Transport Planning Partnership

Tomago Estate
Transport Verification Study

Client: Northbank Enterprise Hub Pty Ltd

Version: V05

Date: 1 December 2023

TTPP Reference: 23031

Quality Record

Version	Date	Prepared by	Reviewed by	Approved by	Signature
V01	22/05/23	Ashish Tamhane	Ken Hollyoak	Ken Hollyoak	Ken Hollyoak
V02	10/08/23	Jessica Ng	Ken Hollyoak	Ken Hollyoak	Ken Hollyoak
V03	15/08/23	Jessica Ng	Ken Hollyoak	Ken Hollyoak	Ken Hollyoak
V04	29/11/23	Jessica Ng	Ken Hollyoak	Ken Hollyoak	Ken Hollyoak
V05	1/12/23	Jessica Ng	Ken Hollyoak	Ken Hollyoak	

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APPENDICES

1 Introduction

1.1 Background

On 7 August 2009, development consent was granted by NSW Department of Planning, Industry and Environment for Tomago Estate (Lot 22 DP 1150980 and Lot 210-212 DP 1174939) for the subdivision of the site for industrial purposes, bulk earthworks across the site and the establishment of a WesTrac Facility and associated infrastructure.

The Transport Planning Partnership (TTPP) has been engaged by Northbank Enterprise Hub Pty Ltd to prepare a transport verification study for Stages 2 and 3 to address Consent Condition 24 of MP07_0086-Mod 3 (dated 18 August 2021).

Consent Condition 24 of MP07_0086-Mod 3 (dated 18 August 2021) requires the following:

Prior to the commencement of construction of Stages 2 and 3 the Applicant must provide a transport verification study that:

- ***a) be submitted to the Planning Secretary for approval prior to construction of Stage 2 and 3;***
- ***b) is undertaken by a suitability qualified traffic engineer;***
- ***c) has been prepared in consultation with TfNSW and Council;***
- ***d) includes current traffic counts and 10 year traffic growth projections;***
- ***e) details traffic generation rates for each stage;***
- ***f) demonstrates that the site access would accommodate traffic generated by Stages 2 and 3; and***
- ***g) if required, details any upgrades required to Tomago Road and the site access to accommodate Stages 2 and 3.***

This transport verification study has been prepared with consideration of the above matters.

This report has also been prepared in consultation with TfNSW and Council. A copy of this consultation is provided in Appendix A.

As part of this consultation, Urbis has also consulted with Department of Planning who has confirmed that the intent of Condition 24 is to review the functionality of the site access and confirm it can accommodate traffic generated by Stages 2 and 3. Therefore, further modelling at other intersections (e.g. Tomago Road / Pacific Highway and Tomago Road / Old Punt Road intersections) is not deemed required for the purpose of this verification study.

It should be noted that the Stage 2 site was sold in 2017 and therefore, this transport verification study only seeks Project Approval for Stage 3 works.

1.2 Report Structure

The remainder of the report is set out as follows:

- Chapter 2 discusses the existing conditions including a description of the subject site.
- Chapter 3 provides a brief description of the proposed development.
- Chapter 4 examines the traffic generation and its impact.
- Chapter 5 presents the conclusions of the assessment.

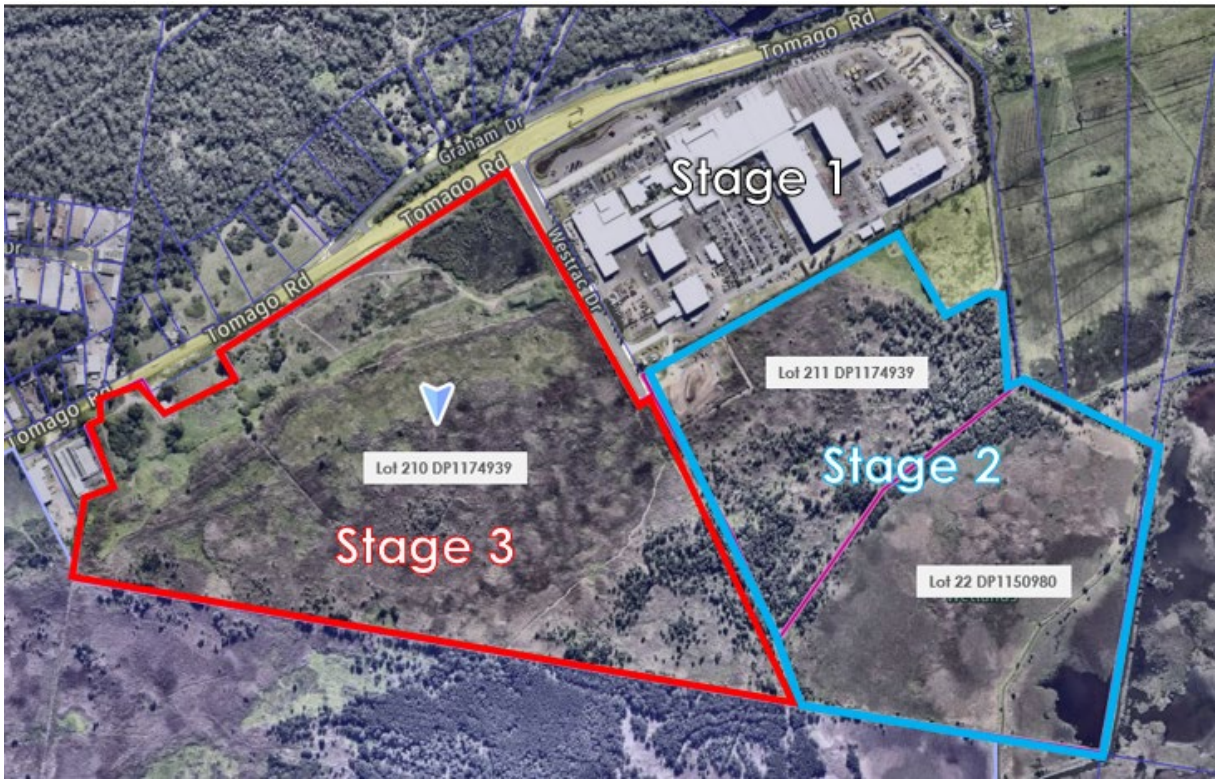
2 Existing Conditions Assessment

2.1 Site Location

The Stage 3 site is located at 2 Westrac Drive Tomago (Lot 210 DP1174939) with a net developable area of 33.8 hectares. It falls under the local government area of Port Stephens Council (Council). The site is currently zoned as *IN1 – General Industrial* pursuant to State Environmental Planning Policy (Precincts – Regional) 2021).

The site forms part of the broader Tomago Estate (the Project), which is split into three stages. The location of the Stage 3 site, relative to abutting Stage 1 and 2 sites, is shown in Figure 2.1.

Figure 2.1: Project Site Location



Source: Nearmap (2023)

2.2 Transport Network

2.2.1 Surrounding Road Network

Tomago Road (MR302): Tomago Road is a classified State Road under care and control of TfNSW. It operates as sub-arterial road providing connection to local sub regions of Hexham and Williamtown. Near the site Tomago Road is a two-lane two-way road with 3.5m travel lanes and sealed shoulders of varying width. Additional turning lanes are provided at the

intersection with Westrac Drive. Posted speed limit on Tomago Road along the frontage of the subject site is 80 km/h in both directions.

Westrac Drive: Westrac Drive is a local 400m long no through industrial road under care and control of Port Stephens Council. It operates as a local road providing vehicular access to the properties along its frontage. Near the site Westrac Drive is a two-lane two-way sealed road with 14-metre-wide carriageway between kerb and gutter. Whilst additional tuning lanes and centreline marking is provided near the intersection with Tomago Road, Westrac Drive is not line marked past the intersection and provides single lane in each direction. There is no posted speed limit on Westrac Drive. No parking restriction is in place along both either side of Westrac Drive.

Pacific Highway (MR302): The Pacific Highway (SH10) is part of the State Highway Network and is under care and control of TfNSW. It operates as major arterial road connecting regional areas on northern NSW to Newcastle and Sydney. Near the site Tomago Road is a two-lane two-way road with 3.5m travel lanes and sealed shoulders of varying width. Posted speed limit on The Pacific Highway is 80 km/h in both directions. Pacific Highway and Tomago Road intersection is a signalised Intersection.

2.3 Existing Vehicular Access

There are existing vehicular crossovers on Tomago Road along the Site 3 frontage. Under the current approval for the site, no direct vehicular access is permitted to and from Tomago Road. Therefore, all vehicular access will have to be achieved via Westrac Drive.

2.4 Traffic Volumes

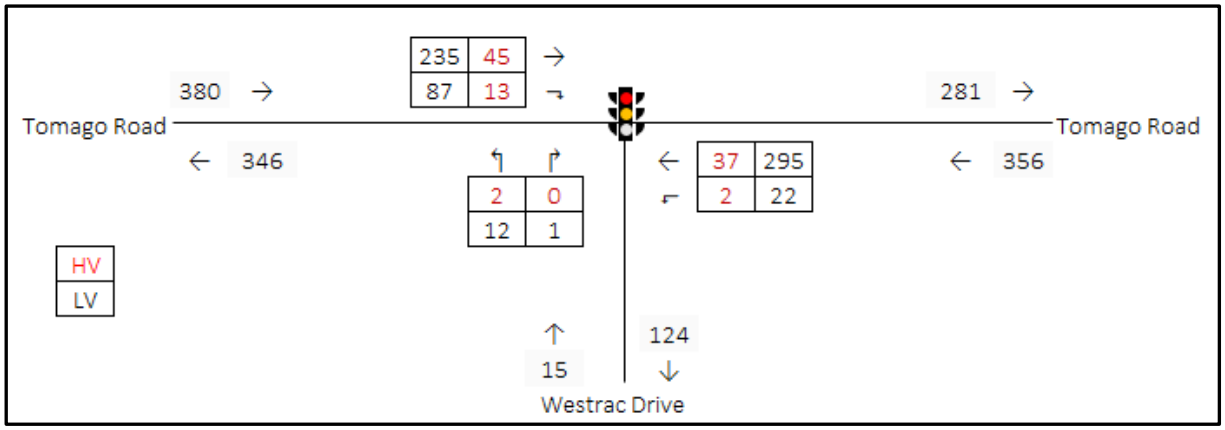
TTPP commissioned traffic counts survey at the intersection of Tomago Road / Westrac Drive in the vicinity of the site on Wednesday 3 May 2023 during the following peak periods:

- 6:00am and 9:00am
- 3:00pm and 6:00pm.

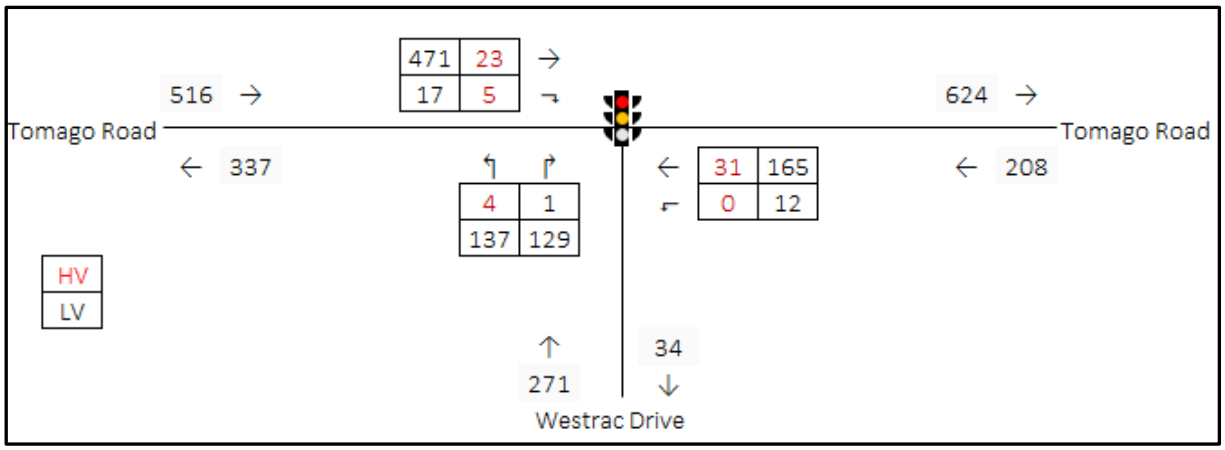
The AM and PM peak hours occurred at 6:00am to 7:00am and 3:45pm to 4:45pm respectively. The AM and PM peak hour traffic volumes at the Tomago Road / Westrac Drive intersection are shown in Figure 2.2.

Figure 2.2: Existing AM/PM Peak Traffic Volumes

AM Peak: (6:00am – 7:00am)



PM Peak: (3:45pm – 4:45pm)



2.5 Road Capacity

The capacity of urban and rural roads is generally determined by the capacity of intersections. Table 4.3 and 4.4 of the NSW *"Guide to Traffic Generating Developments"* provides some guidance on mid-block capacities for urban roads and levels of service, as shown in Figure 2.3.

Figure 2.3: Guide to Traffic Generating Developments – Mid-Block Capacities

Table 4.3
Typical mid-block capacities for urban roads with interrupted flow

Type of Road	One-Way Mid-block Lane Capacity (pcu/hr)	
Median or inner lane:	Divided Road	1,000
	Undivided Road	900
Outer or kerb lane:	With Adjacent Parking Lane	900
	Clearway Conditions	900
	Occasional Parked Cars	600
4 lane undivided:	Occasional Parked Cars	1,500
	Clearway Conditions	1,800
4 lane divided:	Clearway Conditions	1,900

Table 4.4
Urban road peak hour flows per direction

Level of Service	One Lane (veh/hr)	Two Lanes (veh/hr)
A	200	900
B	380	1400
C	600	1800
D	900	2200
E	1400	2800

Based on the table above and noting both Tomago Road and Westrac Drive are urban two-way two-lane urban roads (although they widen out to provide additional lanes at the Westrac Drive intersection) would have a midblock capacity of up to 900 vehicles per lane per hour per direction with a level of service D being acceptable on arterial and sub arterial roads. Looking at the current traffic volumes on both Tomago Road and Westrac Drive, both the roads have spare capacity to accommodate additional development traffic.

2.6 Road Network Improvements

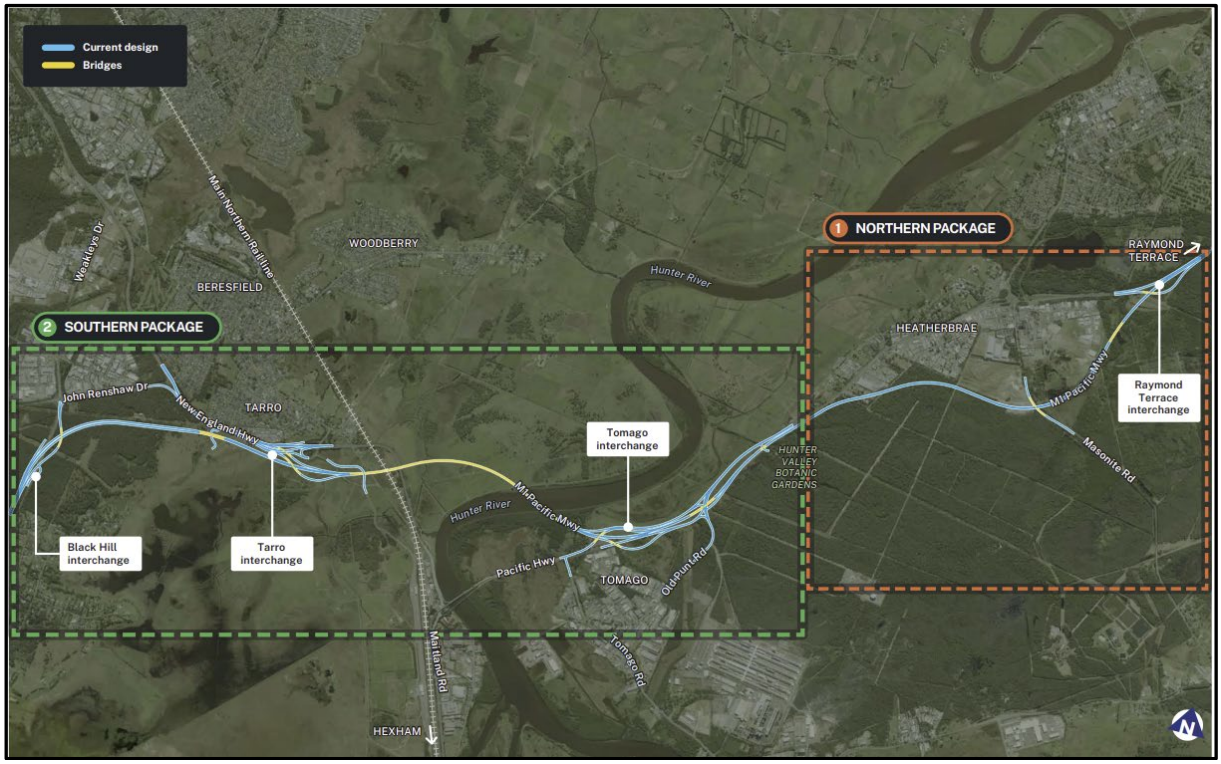
As part of the Stage 1 Project Approval, Tomago Road was upgraded to ensure appropriate design to accommodate additional traffic generated by the Project. This included the installation of 5.5km of street lighting on Tomago Road between the site and the intersection with Pacific Highway. Intersection upgrade works were also completed as part of Stage 1 works, including a channelised right turn and auxiliary left turn treatments at the access location off Tomago Road.

It is understood that TfNSW has plans to upgrade Tomago Road into a dual carriageway. The Project has made appropriate land allocation for any future widening of Tomago Road as part of the new signalised access location.

Further to this, the M1 Pacific Motorway extension project received planning approval from the NSW Minister of Planning and Homes on 8 November 2022 and the Federal Minister for the Environment and Water on 13 February 2023. Early work for the M1 Pacific Motorway extension to Raymond Terrace will start over the coming months and there are widening, and intersection works at various locations along the project.

The proposed route will have an interchange constructed between east of Tomago Road west of Old Punt Road and The Pacific Highway, as shown in Figure 2.4.

Figure 2.4: Proposed Interchange on Tomago Road



Source: TfNSW Project Update

2.7 Public Transport

There are no established public transport facilities available in the vicinity of the site. None of the local bus companies run regular routes along Tomago Road. The nearest bus stops are located on Nelson Bay Road near the Cabbage Tree Road roundabout, approximately 9km from the site. The construction of the Tomago Road/ Westrac Drive signalised intersection included provision of bus zones on Tomago Road. However, it is not currently used but have been provided should in near future a bus service run past the site.

2.8 Walking and Cycling Infrastructure

Being a rural area there are no formal footpaths provided along Tomago Road or Westrac Drive except those at the Tomago Road signalised intersection and from the Westrac facility main entrance on Westrac Drive. Elsewhere pedestrians will be required to use unformed verges or road shoulder where necessary.

Similarly, there are no designated on and off-road cycleways in the area except at the signalised intersection of Tomago Road and Westrac Drive where green on-road cycle lanes are provided. Cyclist can either use the road shoulders or share the traffic lane where necessary.

3 Proposed Development

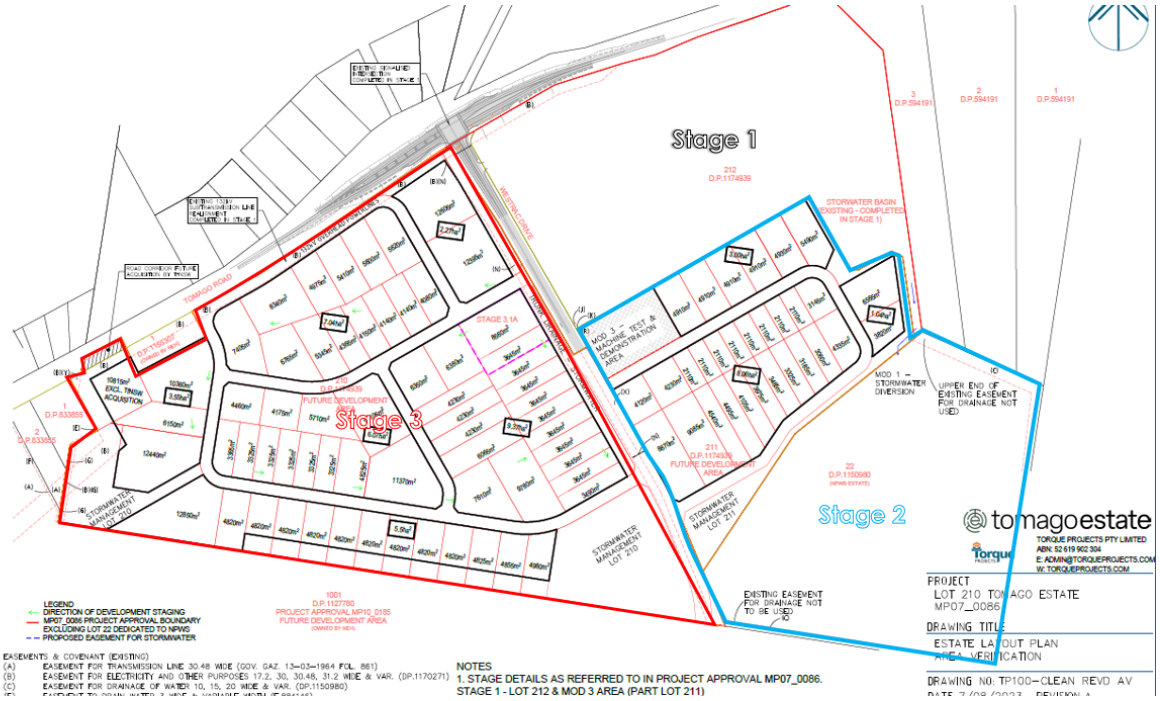
3.1 Proposal Description

The Project involves the subdivision of the site for industrial purposes, bulk earthworks across the site and the establishment of a WesTrac Facility and associated infrastructure.

This transport verification study only seeks approval for Stage 3 works.

Stage 3 of the development is proposed on Lot 210 DP 1174939 opposite the Westrac facility, as shown in Figure 3.1.

Figure 3.1: Proposed Site Layout Plan



Vehicle access to the site would be provided off Westrac Drive via the new signalised intersection at Tomago Road and Westrac Drive. This is consistent with the Project Approval for the site. All existing vehicular crossovers on Tomago Road would be removed accordingly.

4 Traffic Assessment

4.1 Traffic Generation

Traffic generation rates for the proposed development has been sourced from the TfNSW Guide to Traffic Generating Developments (GTGD) 2002 and their technical direction containing updated traffic surveys (TDT 2013/ 04a).

On this basis, the following vehicle trip rates for business parks and industrial estates in regional areas have been adopted:

- Weekday AM Peak = 0.70 per 100m^2 of GFA.
- Weekday PM Peak = 0.78 per 100m^2 of GFA

It should be noted that this transport verification study only seeks approval for Stage 3. However, for the purpose of this assessment, Stage 2 has been included to assess the cumulative impacts of the development.

TTPP has reviewed the detailed survey data contained in the TfNSW study for industrial areas / business parks, which suggest that the gross floor area (GFA) is generally less than 30 percent of the overall site area.

In this case, assuming GFA equates to 30 per cent of the site area, the following GFA for each stage would apply:

- *Stage 2*
  - 12.1 Ha x 10,000m^2 x 0.30 = 36,300m^2 GFA
- *Stage 3*
  - 33.8 Ha x 10,000m^2 x 0.30 = 101,400m^2 GFA

Table 4.1 presents a summary of the peak hour traffic generation for each stage.

Table 4.1: Traffic Generation Estimate

Peak Period	Design Trip Rate (trips per 100m2 GFA)	Traffic Generation (vph)		Total (vph)
		Stage 2 (36,300m^2)	Stage 3 (101,400m^2)	
AM	0.70	254	710	**964**
PM	0.78	283	791	**1,074**

Table 4.1 indicates that the Project could generate a traffic generation potential of 964 vph and 1,074 vph during the AM and PM peaks respectively. This traffic generation includes both Stage 2 and 3 works.

4.2 Heavy Vehicle Assumptions

For the purpose of the assessment, existing heavy vehicle proportions as shown in Figure 2.2 have been adopted in the future case modelling. The average heavy vehicle proportion at the Tomago Road / Westrac Drive intersection is about 10 per cent in the AM Peak and 8 per cent in the PM Peak.

A sensitivity analysis has also been undertaken based on "higher" heavy vehicle assumptions, as follows:

- 70% heavy vehicle proportion to/from the site
- 30% light vehicle proportion to/from the site
- Tomago Road through movements remain as per existing heavy vehicle proportions.

This has been included in the traffic modelling in Section 4.5.3.1.

4.3 Trip Distribution and Assignment

The following trip distribution assumptions have been adopted:

- **AM peak:**
  - Inbound Trips: 85% of total trip generation
  - Outbound Trips: 15% of total trip generation
- **PM peak:**
  - Inbound Trips: 15% of total trip generation
  - Outbound Trips: 85% of total trip generation.

The directional assignment of trips could vary depending upon local conditions, surrounding road configuration and preferred route choice. On this basis, it has been assumed that 75 percent of the traffic entering (or leaving) the site will be travelling to/from Tomago Road (west) and 25 percent to/from Tomago Road (east).

Table 4.2 presents a summary of the proposed development traffic distribution across the surrounding road network for each stage.

Table 4.2: Trip Generation Distribution

Direction from Site	Distribution	Stage 2				Stage 3			
		AM Peak		PM Peak		AM Peak		PM Peak	
		In (0.85)	Out (0.15)	In (0.15)	Out (0.85)	In (0.85)	Out (0.15)	In (0.15)	Out (0.85)
West via Tomago Road	0.75	161	29	32	180	452	80	89	504
East via Tomago Road	0.25	54	10	11	60	151	27	30	168
Total		**215**	**39**	**43**	**240**	**603**	**107**	**119**	**672**

4.4 Background Traffic Growth

For the purpose of this assessment and to account for the cumulative impact of the other development in the area a background growth of 3% per annum has been adopted for the traffic on Tomago Road from previous Traffic Impact Assessment report by Intersect Traffic.

4.5 Traffic Impact Assessment

4.5.1 Overview

Intersection capacity analysis has been conducted at the Tomago Road / Westrac Drive signalised intersection to assess the traffic implications arising from the proposal.

Three traffic scenarios have been assessed and are detailed as follows:

- Scenario 0 (S0) - existing base using the surveyed traffic flows in Figure 2.2
- Scenario 1 (S1) – S0 above plus a 10-year growth factor as outlined in Section 4.4
- Scenario 2 (S2) – S1 above plus the additional development traffic for both Stage 2 and 3.

Traffic signal phasing data was also obtained from TfNSW at the Tomago Road / Westrac Drive intersection and on-site inspections were used to validate and calibrate the existing base traffic models. Future traffic modelling scenarios have been based on "Optimum Cycle Time" in the SIDRA model to replicate SCATS conditions in the future.

The traffic modelling outputs have also been updated to the newer version of SIDRA INTERSECTION Version: 9.1.5.224.

4.5.2 Level of Service Criteria

The intersection capacity analysis has been undertaken using SIDRA Intersection 9.1 modelling software to ascertain the intersection performance at the Tomago Road / Westrac Drive signalised intersection.

Table 4.3 shows the criteria that SIDRA adopts in assessing the level of service.

Table 4.3: SIDRA Level of Service Criteria

Level of Service (LoS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode.
F	Greater than 70	Unsatisfactory, requires additional capacity	Unsatisfactory, requires other control mode or major treatment

Reference: TfNSW Traffic Modelling Guidelines 2013, Table 14.4

4.5.3 Traffic Modelling Results

The modelling results for the above listed scenarios in the AM and PM peaks is summarised in Table 4.4, with full movement summaries provided in Appendix B.

Table 4.4: Summary of Traffic Modelling Results at Tomago Road / Westrac Drive

Peak	S0 – 2023 Existing Base (No Dev)			S1 – 2033 Future Base (No Dev)			S2 – 2033 Future Case (With Stage 2 and 3 Dev)		
	DoS	Ave. Delay (sec)	Los	DoS	Ave. Delay (sec)	Los	DoS	Ave. Delay (sec)	Los
AM	0.28	14	A	0.46	21	B	0.81	31	C
PM	0.29	16	B	0.38	17	B	0.71	20	B

Table 5.7 indicates that the Tomago Road / Westrac Drive signalised intersection would continue to operate at an acceptable Los at C or better during both AM and PM peaks in the future with both Stage 2 and 3 development traffic.

On this basis, the traffic modelling indicates that the site access has been suitably designed to accommodate traffic generated by Stages 2 and 3. Therefore, Stage 3 works are considered acceptable from a traffic capacity perspective.

4.5.3.1 Sensitivity Analysis – Heavy Vehicle Movements

As indicated previously, a sensitivity analysis has been undertaken with increased heavy vehicle proportions at the site, that being 70 per cent heavy vehicle and 30 per cent light vehicle movements. The results of this sensitivity analysis are presented in Table 4.5.

Table 4.5: Sensitivity Analysis at Tomago Road / Westrac Drive – Heavy Vehicles

Peak	Sensitivity Analysis – 2033 Future Case (With Stage 2 and 3 Dev)		
	DoS	Ave. Delay (sec)	Los
AM	0.84	34	C
PM	0.79	28	B

Based on the sensitivity analysis with increased heavy vehicle movements to/from the site, Table 4.5 indicates that the Tomago Road / Westrac Drive signalised intersection would continue to operate at an acceptable Los at C or better during both AM and PM peaks in the future. Therefore, Stage 3 works are considered acceptable from a traffic capacity perspective, even with increased heavy vehicle proportions at the site.

5 Conclusion

This study examines the traffic impacts of Stage 3 of Tomago Estate, while also taking into account of Stage 2 which does not belong to Tomago Estate as it was sold in 2017.

The key findings of this report are presented below.

- The Project involves the subdivision of the site for industrial purposes, bulk earthworks across the site and the establishment of a WesTrac Facility and associated infrastructure.
- Vehicle access to the site will be provided via the Tomago Road / Westrac Drive signalised intersection. All existing vehicular crossovers on Tomago Road would be removed accordingly.
- Stage 3 is expected to generate 710vph and 791vph in the AM and PM peak respectively.
- Traffic modelling has been undertaken using SIDRA Intersection modelling software to ascertain intersection performance at Tomago Road / Westrac Drive under existing traffic and 10-year traffic growth projections.
- Traffic modelling indicates that the Tomago Road / Westrac Drive signalised intersection would continue to operate acceptable at Los C or better in the AM and PM peaks with Stage 2 and 3 development traffic.
- A sensitivity analysis (based on 70 per cent heavy vehicle and 30 per cent light vehicle movements to/from the site) also confirms that the Tomago Road / Westrac Drive signalised intersection would continue to operate acceptable at Los C or better in the AM and PM peaks with Stage 2 and 3 development traffic.
- The Tomago Road / Westrac Drive signalised intersection has been suitably designed to accommodate traffic generated by Stages 2 and 3.

This transport verification fulfils the requirement of Consent Condition 24 of MP07_0086-Mod 3 (dated 18 August 2021). It is concluded that the traffic aspects of Stages 2 and 3 would be satisfactory. The Tomago Road / Westrac Drive site access has been suitably designed to accommodate traffic generated by Stages 2 and 3.

Appendix A

Consultation Summary

Jessica Ng

From: Development North <Development.North@transport.nsw.gov.au>
Sent: Thursday, 5 October 2023 9:21 AM
To: Jessica Ng
Cc: Ken Hollyoak
Subject: RE: NTH23/00406 - Stage 3 Tomago Estate - Transport Verification for TfNSW Comment (MP07_0086)

Hi Jessica

Thank you for contacting Transport for NSW, and please accept my personal apologies for the delay in response.

It is understood that TTPP have been engaged to provide a Transport Verification Study to satisfy condition 24 of the for Tomago Estate - Major Project Approval MP07_0086 Mod 3. TfNSW has undertaken a review of the document is satisfied this intersection will perform to a satisfactory level of service moving forward.

TfNSW notes a small portion of Lot 201 DP 1174939 is burdened by a road widening proposal (originally approved 5/12/1963) and defined by Sketch 1198, shown coloured pink on the below Aerial "X". It is recommended that the area required for road should be identified on any plan of development

If you have any further enquiries regarding the above comments please do not hesitate to contact Leisa Sedger, Development Services Case Officer on 1300 207 783 or 02 9549 9485 via email at: development.north@transport.nsw.gov.au.

Kind regards

Leisa Sedger
Development Services Case Officer
Community and Place | Region North
Regional and Outer Metropolitan
Transport for NSW

T (02) 9549 9485 **E** development.north@transport.nsw.gov.au

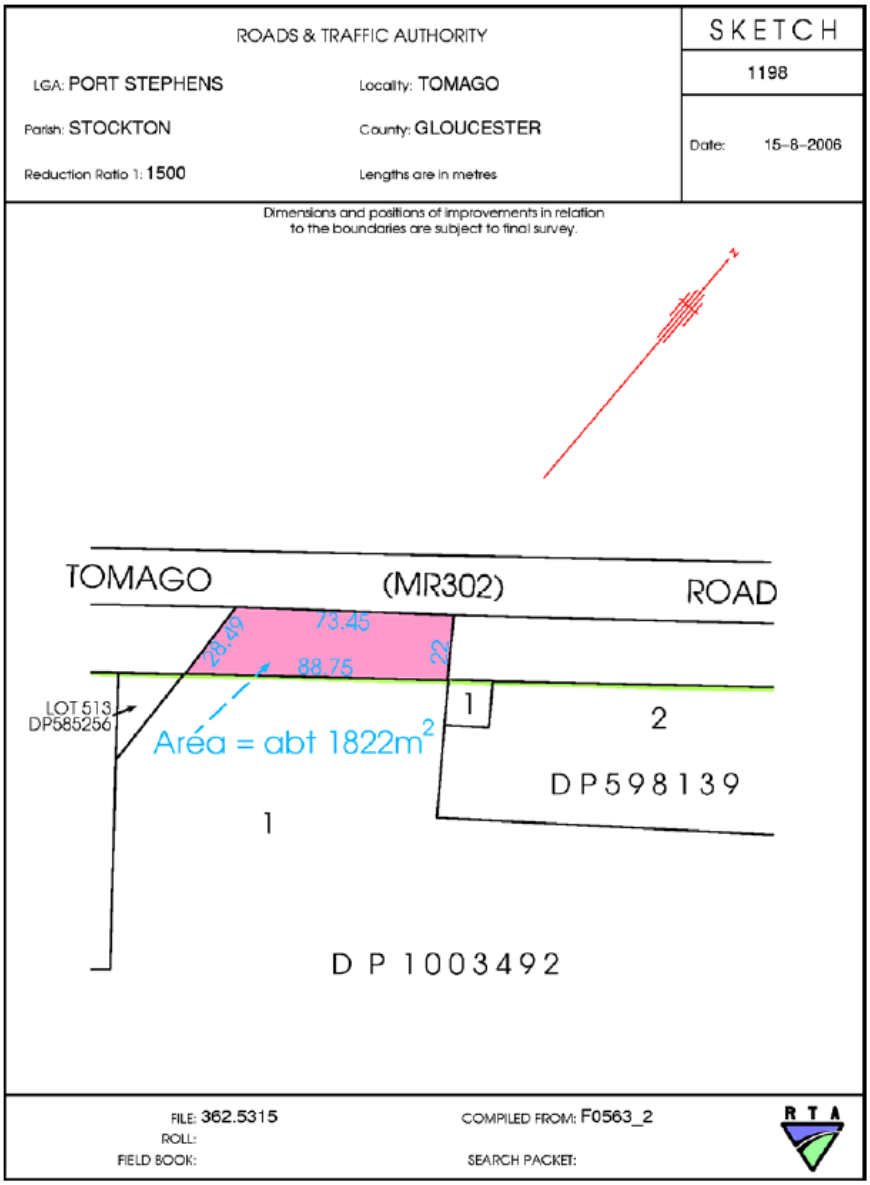
W transport.nsw.gov.au

76 Victoria Street
Grafton NSW 2460

I work flexibly. Unless it suits you, I don't expect you to read or respond to my emails outside of your normal work hours.

NSW GOVERNMENT Transport for NSW

I recognise and acknowledge that modern New South Wales is an overlay on Aboriginal land and that many of the transport routes of today follow songlines Aboriginal people have followed for tens of thousands of years. I pay my respects to the Aboriginal people of NSW and Elders past and present.



OFFICIAL

From: Jessica Ng <jessica.ng@ttpp.net.au>
Sent: Tuesday, 5 September 2023 3:51 PM
To: Development North <Development.North@transport.nsw.gov.au>
Cc: Ken Hollyoak <Ken.Hollyoak@ttpp.net.au>
Subject: RE: NTH23/00406 - Stage 3 Tomago Estate - Transport Verification for TfNSW Comment (MP07_0086)

Hi Leisa,

Apologies for the delay in getting back to you as I have been on leave.

I tried calling you back in relation to your voice message last week noting TfNSW's request for an extension to provide comments by 29th September. If there is any way to expedite TfNSW's feedback, it would be much appreciated.

I note Ken has already issued a copy of our SIDRA file to you for review. Please however find attached updated SIDRA file for TfNSW which includes a minor update.

Any questions, please let us know.

Thanks,

Jessica Ng

Associate

p: +61 2 8437 7800 m: +61 466 345 992
a: Suite 402, 22 Atchison Street, St Leonards NSW 2065
w: www.ttpp.net.au e: Jessica.Ng@ttpp.net.au

My core work days are Tuesday, Wednesday and Thursday.
I work flexible hours. If you receive an email from me outside of regular business hours, I'm sending it a time that suits me, and I am not expecting you to read or reply until normal business hours.

OFFICIAL

From: Development North <Development.North@transport.nsw.gov.au>
Sent: Tuesday, August 22, 2023 11:47 AM
To: Jessica Ng <jessica.ng@ttpp.net.au>
Cc: Ken Hollyoak <Ken.Hollyoak@ttpp.net.au>
Subject: NTH23/00406 - Stage 3 Tomago Estate - Transport Verification for TfNSW Comment (MP07_0086) [Filed 05 Sep 2023 13:33]

Hi Jessica
Thank you for contacting Transport for NSW, I have been assigned as the Case Officer for this matter and can be contacted on my number below.
To enable a comprehensive review of the Verification Report, would it be possible to obtain a copy of the SIDRA file please?
Thank you

Leisa Sedger
Development Services Case Officer
Community and Place | Region North
Regional and Outer Metropolitan

Jessica Ng

From: Bridget Jenkins <Bridget.Jenkins@portstephens.nsw.gov.au> on behalf of Development Engineering <Development.Engineering@portstephens.nsw.gov.au>
Sent: Monday, 21 August 2023 3:00 PM
To: Ken Hollyoak
Cc: Jessica Ng; Bryn Cotterill; Joe Gleeson
Subject: RE: Stage 3 Tomago Estate - Transport Verification for Council Comment (MP07_0086) [Filed 05 Sep 2023 13:33]

Good afternoon Ken,

Thank you for your email.
Please see below comments as requested.

Traffic issues identified:

1. No modelling or analysis has been undertaken for the Tomago Road / Pacific Highway intersection or for the Tomago Road / Old Punt Road intersections. Both of these intersections currently experience severe congestion in the afternoon peak periods.

If you have any questions, please don't hesitate to contact me.

Kind regards,

PORT STEPHENS COUNCIL

Bridget Jenkins
F&S Business Support Officer

p 02 4988 0409 | m 0418 435 215
w portstephens.nsw.gov.au

From: Ken Hollyoak <Ken.Hollyoak@ttpp.net.au>
Sent: Monday, 21 August 2023 10:44 AM
To: Bridget Jenkins <Bridget.Jenkins@portstephens.nsw.gov.au>
Cc: Jessica Ng <jessica.ng@ttpp.net.au>
Subject: FW: Stage 3 Tomago Estate - Transport Verification for Council Comment (MP07_0086)

Hi Bridget

Jess is on leave at the moment but would it be possible to get comments by end of August please ?

Kind Regards

Ken Hollyoak

Director

p: +61 2 8437 7800 m: +61 422 005 405

a: Suite 402, 22 Atchison Street, St Leonards NSW 2065

w: www.ttpp.net.au e: Ken.Hollyoak@ttpp.net.au

From: Bridget Jenkins <Bridget.Jenkins@portstephens.nsw.gov.au> **On Behalf Of** Development Engineering
Sent: Thursday, August 17, 2023 11:12 AM
To: Jessica Ng <jessica.ng@ttpp.net.au>
Cc: Ken Hollyoak <Ken.Hollyoak@ttpp.net.au>
Subject: RE: Stage 3 Tomago Estate - Transport Verification for Council Comment (MP07_0086)

Good morning Jessica,

Thank you for your email.
This has been allocated to our Development Engineering Team for review, who will provide comments to you as soon as the review is complete.

Can you please advise if there is a timeframe or date by which you would prefer the comments to be returned?

Thank you & kind regards,

Bridget Jenkins
F&S Business Support Officer

p 02 4988 0409 | **m** 0418 435 215
w portstephens.nsw.gov.au

PORT STEPHENS COUNCIL

From: Jessica Ng <jessica.ng@ttpp.net.au>
Sent: Wednesday, 16 August 2023 10:57 AM
To: Development Engineering <Development.Engineering@portstephens.nsw.gov.au>
Cc: Ken Hollyoak <Ken.Hollyoak@ttpp.net.au>
Subject: Stage 3 Tomago Estate - Transport Verification for Council Comment (MP07_0086)

Hi there,

TTPP has been engaged by Northbank Enterprise Hub Pty Ltd to prepare a Transport Verification Study for Tomago Estate as per consent approval MP07_0086-Mod 3 dated 18 August 2021.

As part of this, a transport verification study will need to be prepared in consultation with TfNSW and Council, as per Consent Condition 24 of the consent approval.

On this basis, please find **attached** transport verification study for your review comment. We would be grateful for your feedback/response on this.

Any questions, please let us know.

Thanks,
Jessica Ng

Associate
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a: Suite 402, 22 Atchison Street, St Leonards NSW 2065
w: www.ttpp.net.au e: Jessica.Ng@ttpp.net.au

ttpp
transport planning

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Appendix B

SIDRA Movement Summaries

MOVEMENT SUMMARY

Site: 101 [Tomago Road / Westrac Drive AM 2023 (Site Folder: Base 2023)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Tomago Road / Westrac Drive
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westrac Drive															
1	L2	All MCs	15	14.3	15	14.3	0.011	17.2	LOS B	0.1	1.0	0.64	0.62	0.64	42.7
3	R2	All MCs	1	0.0	1	0.0	* 0.005	30.3	LOS C	0.0	0.2	0.90	0.58	0.90	38.3
Approach			16	13.3	16	13.3	0.011	18.0	LOS B	0.1	1.0	0.66	0.62	0.66	42.3
East: Tomago Road															
4	L2	All MCs	25	8.3	25	8.3	0.024	12.4	LOS A	0.3	2.2	0.42	0.68	0.42	49.8
5	T1	All MCs	349	11.1	349	11.1	* 0.275	15.6	LOS B	3.7	28.8	0.76	0.62	0.76	59.9
Approach			375	11.0	375	11.0	0.275	15.4	LOS B	3.7	28.8	0.74	0.63	0.74	59.2
West: Tomago Road															
11	T1	All MCs	295	16.1	295	16.1	0.135	5.3	LOS A	1.8	14.3	0.44	0.36	0.44	71.9
12	R2	All MCs	105	13.0	105	13.0	* 0.256	34.1	LOS C	1.6	12.6	0.93	0.74	0.93	37.9
Approach			400	15.3	400	15.3	0.256	12.9	LOS A	1.8	14.3	0.57	0.46	0.57	58.9
All Vehicles			791	13.2	791	13.2	0.275	14.2	LOS A	3.7	28.8	0.65	0.54	0.65	58.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Westrac Drive												
P1	Full	1	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
East: Tomago Road												
P2	Full	1	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
West: Tomago Road												
P4	Full	1	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
All Pedestrians		3	3	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Tomago Road / Westrac Drive PM 2023 (Site Folder: Base 2023)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Tomago Road / Westrac Drive
Site Category: Base Year
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westrac Drive															
1	L2	All MCs	148	2.8	148	2.8	0.082	13.2	LOS A	1.1	8.1	0.55	0.67	0.55	47.0
3	R2	All MCs	137	0.8	137	0.8	* 0.278	23.8	LOS B	3.3	23.0	0.83	0.75	0.83	41.3
Approach			285	1.8	285	1.8	0.278	18.3	LOS B	3.3	23.0	0.68	0.71	0.68	44.1
East: Tomago Road															
4	L2	All MCs	13	0.0	13	0.0	0.011	11.3	LOS A	0.1	0.9	0.38	0.66	0.38	50.6
5	T1	All MCs	206	15.8	206	15.8	* 0.250	21.1	LOS B	2.5	20.2	0.85	0.67	0.85	55.0
Approach			219	14.9	219	14.9	0.250	20.5	LOS B	2.5	20.2	0.83	0.67	0.83	54.8
West: Tomago Road															
11	T1	All MCs	520	4.7	520	4.7	0.294	11.2	LOS A	4.7	34.5	0.66	0.55	0.66	64.9
12	R2	All MCs	23	22.7	23	22.7	* 0.080	35.8	LOS C	0.4	3.0	0.93	0.68	0.93	37.1
Approach			543	5.4	543	5.4	0.294	12.3	LOS A	4.7	34.5	0.67	0.56	0.67	63.0
All Vehicles			1047	6.4	1047	6.4	0.294	15.6	LOS B	4.7	34.5	0.71	0.62	0.71	55.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Westrac Drive												
P1	Full	1	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
East: Tomago Road												
P2	Full	1	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
West: Tomago Road												
P4	Full	1	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
All Pedestrians		3	3	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Tomago Road / Westrac Drive AM 2033 (Site Folder: Base 2033)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Tomago Road / Westrac Drive
Site Category: Future Conditions 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westrac Drive															
1	L2	All MCs	15	14.3	15	14.3	0.009	14.3	LOS A	0.1	1.0	0.52	0.61	0.52	44.4
3	R2	All MCs	1	0.0	1	0.0	0.002	24.2	LOS B	0.0	0.2	0.74	0.57	0.74	41.2
Approach			16	13.3	16	13.3	0.009	14.9	LOS B	0.1	1.0	0.53	0.61	0.53	44.1
East: Tomago Road															
4	L2	All MCs	25	8.3	25	8.3	0.022	11.6	LOS A	0.3	2.2	0.36	0.67	0.36	50.4
5	T1	All MCs	455	11.1	455	11.1	*0.461	23.7	LOS B	6.6	50.9	0.88	0.73	0.88	53.0
Approach			480	11.0	480	11.0	0.461	23.1	LOS B	6.6	50.9	0.85	0.73	0.85	52.8
West: Tomago Road															
11	T1	All MCs	384	16.2	384	16.2	0.231	12.1	LOS A	3.9	31.1	0.63	0.52	0.63	63.6
12	R2	All MCs	105	13.0	105	13.0	*0.398	42.8	LOS D	2.0	15.9	0.98	0.74	0.98	34.5
Approach			489	15.5	489	15.5	0.398	18.7	LOS B	3.9	31.1	0.70	0.57	0.70	54.4
All Vehicles			985	13.2	985	13.2	0.461	20.8	LOS B	6.6	50.9	0.77	0.65	0.77	53.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Westrac Drive												
P1	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200.0	1.09
East: Tomago Road												
P2	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200.0	1.09
West: Tomago Road												
P4	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200.0	1.09
All Pedestrians		150	158	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200.0	1.09

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Tomago Road / Westrac Drive PM 2033 (Site Folder: Base 2033)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Tomago Road / Westrac Drive
Site Category: Future Conditions 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westrac Drive															
1	L2	All MCs	148	2.8	148	2.8	0.082	14.6	LOS B	1.3	9.4	0.55	0.67	0.55	46.1
3	R2	All MCs	137	0.8	137	0.8	* 0.273	26.6	LOS B	3.8	26.5	0.83	0.75	0.83	39.9
Approach			285	1.8	285	1.8	0.273	20.3	LOS B	3.8	26.5	0.68	0.71	0.68	42.9
East: Tomago Road															
4	L2	All MCs	13	0.0	13	0.0	0.010	11.3	LOS A	0.1	1.0	0.36	0.66	0.36	50.6
5	T1	All MCs	268	15.7	268	15.7	* 0.279	22.4	LOS B	3.7	29.4	0.83	0.67	0.83	54.0
Approach			281	15.0	281	15.0	0.279	21.9	LOS B	3.7	29.4	0.81	0.67	0.81	53.9
West: Tomago Road															
11	T1	All MCs	676	4.7	676	4.7	0.379	13.5	LOS A	7.5	54.3	0.69	0.59	0.69	62.5
12	R2	All MCs	23	22.7	23	22.7	* 0.093	41.5	LOS C	0.4	3.6	0.95	0.68	0.95	34.9
Approach			699	5.3	699	5.3	0.379	14.4	LOS A	7.5	54.3	0.69	0.59	0.69	61.0
All Vehicles			1265	6.7	1265	6.7	0.379	17.4	LOS B	7.5	54.3	0.72	0.64	0.72	54.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Westrac Drive												
P1	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200.0	1.09
East: Tomago Road												
P2	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200.0	1.09
West: Tomago Road												
P4	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200.0	1.09
All Pedestrians		150	158	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200.0	1.09

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: TTPP - THE TRANSPORT PLANNING PARTNERSHIP | Licence: NETWORK / 1PC | Processed: Wednesday, 29 November 2023 10:57:27 AM
Project: C:\Users\jessica.ng\OneDrive - TTPP\23031 NEH Tomago Estate\07 Modelling Files\Model\230905 - Updated SIDRA Files\NEH Tomago_Calibrated_231129 - With Sensitivity Analysis.sip9

MOVEMENT SUMMARY

Site: 101 [Tomago Road / Westrac Drive AM 2033 Base+DA (Site Folder: Base+Dev 2033)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Tomago Road / Westrac Drive
Site Category: Future Conditions 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westrac Drive															
1	L2	All MCs	129	14.3	129	14.3	0.061	11.7	LOS A	1.1	8.4	0.40	0.63	0.40	46.0
3	R2	All MCs	40	0.0	40	0.0	* 0.097	34.7	LOS C	1.4	9.9	0.83	0.71	0.83	36.5
Approach			169	10.9	169	10.9	0.097	17.1	LOS B	1.4	9.9	0.50	0.65	0.50	43.3
East: Tomago Road															
4	L2	All MCs	241	8.3	241	8.3	0.275	23.0	LOS B	6.1	45.8	0.62	0.77	0.62	44.1
5	T1	All MCs	455	11.1	455	11.1	* 0.662	38.5	LOS C	9.7	74.0	0.98	0.83	1.01	43.8
Approach			696	10.1	696	10.1	0.662	33.1	LOS C	9.7	74.0	0.85	0.81	0.88	43.9
West: Tomago Road															
11	T1	All MCs	384	16.2	384	16.2	0.188	9.9	LOS A	3.9	31.5	0.50	0.42	0.50	66.2
12	R2	All MCs	751	13.0	751	13.0	* 0.811	42.0	LOS C	18.6	145.0	0.96	0.88	1.04	35.1
Approach			1135	14.1	1135	14.1	0.811	31.1	LOS C	18.6	145.0	0.81	0.73	0.86	42.2
All Vehicles			2000	12.4	2000	12.4	0.811	30.6	LOS C	18.6	145.0	0.80	0.75	0.83	42.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Westrac Drive												
P1	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
East: Tomago Road												
P2	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
West: Tomago Road												
P4	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
All Pedestrians		150	158	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: TTPP - THE TRANSPORT PLANNING PARTNERSHIP | Licence: NETWORK / 1PC | Processed: Wednesday, 29 November 2023 10:57:39 AM
Project: C:\Users\jessica.ng\OneDrive - TTPP\23031 NEH Tomago Estate\07 Modelling Files\Model\230905 - Updated SIDRA Files\NEH Tomago_Calibrated_231129 - With Sensitivity Analysis.sip9

MOVEMENT SUMMARY

Site: 101 [Tomago Road / Westrac Drive PM 2033 Base+DA (Site Folder: Base+Dev 2033)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Tomago Road / Westrac Drive
Site Category: Future Conditions 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 66 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westrac Drive															
1	L2	All MCs	868	2.8	868	2.8	0.450	16.3	LOS B	8.7	62.2	0.66	0.76	0.66	45.8
3	R2	All MCs	377	0.8	377	0.8	* 0.709	28.9	LOS C	11.6	81.5	0.95	0.87	1.01	38.8
Approach			1245	2.2	1245	2.2	0.709	20.1	LOS B	11.6	81.5	0.75	0.79	0.77	43.4
East: Tomago Road															
4	L2	All MCs	56	0.0	56	0.0	0.047	11.9	LOS A	0.7	4.6	0.39	0.69	0.39	50.3
5	T1	All MCs	268	15.7	268	15.7	* 0.334	25.1	LOS B	3.7	29.7	0.88	0.71	0.88	52.8
Approach			324	13.0	324	13.0	0.334	22.8	LOS B	3.7	29.7	0.80	0.70	0.80	52.3
West: Tomago Road															
11	T1	All MCs	676	4.7	676	4.7	0.406	15.0	LOS B	7.5	54.6	0.73	0.62	0.73	61.6
12	R2	All MCs	151	22.7	151	22.7	* 0.571	41.7	LOS C	2.8	23.7	0.99	0.78	1.04	34.9
Approach			826	8.0	826	8.0	0.571	19.9	LOS B	7.5	54.6	0.78	0.65	0.78	54.5
All Vehicles			2396	5.7	2396	5.7	0.709	20.4	LOS B	11.6	81.5	0.76	0.73	0.78	48.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Westrac Drive												
P1	Full	50	53	27.3	LOS C	0.1	0.1	0.91	0.91	181.2	200.0	1.10
East: Tomago Road												
P2	Full	50	53	27.3	LOS C	0.1	0.1	0.91	0.91	181.2	200.0	1.10
West: Tomago Road												
P4	Full	50	53	27.3	LOS C	0.1	0.1	0.91	0.91	181.2	200.0	1.10
All Pedestrians		150	158	27.3	LOS C	0.1	0.1	0.91	0.91	181.2	200.0	1.10

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\Users\jessica.ng\OneDrive - TTPP\23031 NEH Tomago Estate\07 Modelling Files\Model\230905 - Updated SIDRA Files\NEH Tomago_Calibrated_231129 - With Sensitivity Analysis.sip9

MOVEMENT SUMMARY

Site: 101 [Tomago Road / Westrac Drive AM 2033 70% HV / 30% LV (Site Folder: Base+Dev 2033 - Sensitivity Analysis)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Tomago Road / Westrac Drive
Site Category: Future Conditions 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westrac Drive															
1	L2	All MCs	129	50.0	129	50.0	0.072	11.9	LOS A	1.1	11.1	0.38	0.62	0.38	40.3
3	R2	All MCs	40	50.0	40	50.0	* 0.154	42.2	LOS C	1.7	16.7	0.87	0.72	0.87	29.7
Approach			169	50.0	169	50.0	0.154	19.0	LOS B	1.7	16.7	0.49	0.65	0.49	37.1
East: Tomago Road															
4	L2	All MCs	241	50.0	241	50.0	0.391	32.5	LOS C	7.9	78.9	0.71	0.79	0.71	40.4
5	T1	All MCs	455	11.1	455	11.1	* 0.695	43.9	LOS D	10.9	83.5	0.99	0.85	1.04	41.1
Approach			696	24.6	696	24.6	0.695	40.0	LOS C	10.9	83.5	0.89	0.83	0.93	40.9
West: Tomago Road															
11	T1	All MCs	384	16.2	384	16.2	0.176	8.9	LOS A	3.9	31.3	0.45	0.38	0.45	67.4
12	R2	All MCs	751	50.0	751	50.0	* 0.839	45.7	LOS D	21.3	213.3	0.95	0.90	1.04	34.2
Approach			1135	38.5	1135	38.5	0.839	33.2	LOS C	21.3	213.3	0.78	0.72	0.84	41.5
All Vehicles			2000	34.7	2000	34.7	0.839	34.4	LOS C	21.3	213.3	0.80	0.75	0.84	40.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Westrac Drive												
P1	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
East: Tomago Road												
P2	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
West: Tomago Road												
P4	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
All Pedestrians		150	158	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: TTPP - THE TRANSPORT PLANNING PARTNERSHIP | Licence: NETWORK / 1PC | Processed: Wednesday, 29 November 2023 10:58:09 AM
Project: C:\Users\jessica.ng\OneDrive - TTPP\23031 NEH Tomago Estate\07 Modelling Files\Model\230905 - Updated SIDRA Files\NEH Tomago_Calibrated_231129 - With Sensitivity Analysis.sip9

MOVEMENT SUMMARY

Site: 101 [Tomago Road / Westrac Drive PM 2033 70% HV / 30% LV (Site Folder: Base+Dev 2033 - Sensitivity Analysis)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Tomago Road / Westrac Drive
Site Category: Future Conditions 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Westrac Drive															
1	L2	All MCs	868	70.0	868	70.0	0.584	23.1	LOS B	10.6	118.2	0.66	0.77	0.66	35.9
3	R2	All MCs	377	70.0	377	70.0	* 0.785	33.6	LOS C	14.7	165.1	0.94	0.93	1.08	30.5
Approach			1245	70.0	1245	70.0	0.785	26.3	LOS B	14.7	165.1	0.75	0.82	0.79	34.1
East: Tomago Road															
4	L2	All MCs	56	70.0	56	70.0	0.065	13.0	LOS A	0.7	7.9	0.34	0.68	0.34	49.3
5	T1	All MCs	268	15.7	268	15.7	* 0.379	37.9	LOS C	4.7	37.1	0.91	0.73	0.91	47.9
Approach			324	25.0	324	25.0	0.379	33.6	LOS C	4.7	37.1	0.81	0.72	0.81	48.2
West: Tomago Road															
11	T1	All MCs	676	4.7	676	4.7	0.461	21.6	LOS B	9.9	72.1	0.79	0.68	0.79	55.9
12	R2	All MCs	151	70.0	151	70.0	* 0.765	52.9	LOS D	3.7	41.2	1.00	0.87	1.24	31.2
Approach			826	16.6	826	16.6	0.765	27.3	LOS B	9.9	72.1	0.83	0.72	0.88	49.3
All Vehicles			2396	45.5	2396	45.5	0.785	27.6	LOS B	14.7	165.1	0.79	0.77	0.82	40.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Westrac Drive												
P1	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
East: Tomago Road												
P2	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
West: Tomago Road												
P4	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
All Pedestrians		150	158	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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