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Transport and Accessibility Impact Assessment

Marsden Park New High School and Melonba New Primary School

State Significant Development No. 41372302

Prepared for School Infrastructure NSW

3 February 2023

Revision 2

221021 & 221022

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Executive Summary

This Transport and Accessibility Impact Assessment (TAIA) addresses the traffic and transport design parameters, investigations, and outcomes for the proposed construction of **Marsden Park High School (MPHS) and Melonba Public School (MPS)**.

The holistic transport strategy for the site prioritises active transport (i.e. walking and cycling) and public transport over private vehicle travel. This is consistent with NSW state government policy and is a core part of School Infrastructure NSW's ongoing commitment to sustainable transport strategies for its projects. Active transport will be one of the most critical strategies for the primary school, while public transport will be critical to the high school and to staff across both schools.

This strategy has been proposed to, and discussed with, both Blacktown City Council and Transport for NSW during ongoing liaison through a Transport Working Group for the project, meeting a number of times throughout 2022. The transport strategy for the project has been refined during that period in response to feedback received.

The current revision of this document also includes updates in response to submissions from Council, Transport for NSW, and the Department of Planning during the EIS exhibition phase.

In order to encourage and prioritise active transport, it is proposed to provide external infrastructure improvements such as zebra crossings new perimeter footpaths. The scope of these works has been developed following consultation with Blacktown City Council and Transport for NSW. The scope and provision of the relevant upgrades has been prioritised based on the anticipated level of usage and the level of improvement provided.

For cyclists, bicycle storage and end-of-trip facilities are proposed. Bicycle storage is proposed at *Educational Facilities Standards & Guidelines* (EFSG) rates for students (84 spaces for MPHS, 60 spaces for MPS), and an additional 40 spaces for staff. End-of-trip facilities for staff shall be provided in the form of 6 showers with change areas, plus lockers, in accordance with *NSW Planning Guidelines for Walking and Cycling* in a combined facility for MPHS and MPS staff.

Public transport is a substantial part of the MPHS transport strategy and will be addressed through provision of a new indented bus bay along the eastern frontage of the site at Kaluta Avenue. The bay would serve northbound buses only (on the school side of the road) and would operate in conjunction with southbound services at other nearby public bus stops. The bus bay would have capacity for approximately 5 buses. The proposed bus bay, and potential resultant changes to the existing bus routes in the area, have been discussed with Transport for NSW during consultation for this proposal.

Loading docks, waste collection areas, and service vehicle access will be required for the schools. We have been advised that the waste collection areas should be designed for 12.5m Heavy Rigid Vehicles, and this would also be sufficient for all potential deliveries and service vehicles coming to the sites. Waste collection will occur in a combined waste storage and collection zone accessed from Galah Street. An additional deliveries facility is also provided within the staff car park for vehicles up to 8.8m Medium Rigid Vehicles.

Drop-off and pick-up by car ("kiss & ride") is expected to occur, however this is a low priority mode in the transport strategy and is to be discouraged and supplemented by active and public transport. Nevertheless, potential demands must be safely accommodated. Indented parking bays are proposed to be constructed along Swallowtail Street (for MPS) and Kaluta Avenue (for MPHS). Each of these zones is also proposed to accommodate a portion of accessible parking (designed in accordance with Australian Standard AS2890.6) to facilitate support unit classes with special needs. The kiss & ride locations have been discussed with Council and Transport for NSW during consultation for the project and will be subject to ongoing design development post-SSDA and formal approval through the Local Traffic Committee within Blacktown City Council.

Car parking is the lowest priority travel mode for the project. No car parking will be provided for students or visitors to the sites (any students or visitors travelling by car will need to find their own on-street parking). Car parking for staff is proposed to be provided to allow an estimated 80% of staff to travel by car, with parking

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for 65% as driver and an estimated 15% as passenger (carpooling). The proposal provides a combined car park for MPHS and MPS staff with 142 spaces accessed from Galah Street. The car park will likely be controlled with a sliding gate security facility; however, the precise access controls may be subject to future design development. The proposed car parking rate and supporting transport strategies were discussed with Council and Transport for NSW during consultation for this SSDA. While Council believes that the parking provision should be higher, Transport for NSW recommended that it should be lower, and this final proposal seeks to strike a balance on consideration of all factors (including non-traffic factors such as open play space provisions) in determining a final car parking capacity.

Preliminary versions of a School Transport Plan (STP) and Construction Traffic Management Plan (CTMP) have been prepared as part of this report. Following approval of this SSD project, it is anticipated that these documents and other detailed design elements will be required to be finalised as conditions of development consent.

The proposed development is considered suitable on account of the overall transport strategy and the analysis undertaken for the traffic and transport elements of the site and its surrounds.

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Contents

Executive Summary **2**

Contents **4**

1 Introduction **7**

1.1 Background and Scope 7
1.2 Project Overview 7
1.3 Transport Assessment Basis 7
1.4 Guidelines and References 9
1.5 Response to SEARs 9
1.6 Authority Consultation 11
1.7 Response to Submissions 11

2 Existing Transport Network **27**

2.1 Site Overview 27
2.2 Road Hierarchy 28
2.3 Land Use 31
2.4 Site Access 33
2.5 School Catchment 33
2.6 Public Transport 37
2.7 Active Transport 38
2.8 Car Parking 39
2.9 Network Performance 39
2.10 Intersection Analysis 43

3 Proposed Development **45**

3.1 Overall Works 45
3.2 Site Access 46
3.3 Pedestrian Facilities 47
3.4 Cyclist Facilities 48
3.5 Public Transport Access 49
3.6 Service Vehicle Access 49
3.7 Pick-up and Drop-off (Kiss & Ride) 50
3.8 Car Parking 51

4 Operational Impacts **52**

4.1 Transport Hierarchy 52
4.2 Travel Demands 52

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4.3 Traffic Generation 54
4.4 Trip Distribution 56
4.5 Future Traffic Condition 61
4.6 Pedestrian Impacts 65
4.7 Public Transport 65
4.8 Pick-up and Drop-off 66
4.9 Car Parking 68
4.10 Service and Loading 71
4.11 Cumulative Impacts 72
4.12 Road Safety 72
5 Mitigation Measures 73
5.1 Infrastructure Upgrades 73
5.2 Operations and Management 73
6 Construction Traffic and Pedestrian Management Plan 74
6.1 Construction Operation 74
6.2 Construction Traffic Management 75
6.3 Cumulative Local Impacts 77
7 Conclusion 78
7.1 Findings 78
Appendix A Swept Path Analysis 80
Appendix B Traffic and Transport Data 81
Appendix C Traffic Modelling Results 82
Appendix D School Transport Plan 83
Appendix E Background Traffic Growth Calculations 84
Appendix F Sight Distance Diagrams 85

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1 Introduction

1.1 Background and Scope

TTW has been engaged by School Infrastructure NSW (SINSW) to provide traffic and transport engineering consultancy services for the proposed new Marsden Park High School (MPHS) and new Melonba Primary School (MPS) located at 20 Kaluta Avenue and 10 Swallowtail Street, Melonba, respectively.

This Transport and Accessibility Impact Assessment (TAIA) has been developed to assess and address the traffic and transport impacts of the proposed development and define the key traffic-related design elements of the proposal. The TAIA has been prepared in support of a state significant development application (SSDA) for the project, and in response to the Secretary's Environmental Assessment Requirements (SEARs) for the site, which have been detailed in Section 1.5 of this report.

A School Transport Plan (STP) and a Construction Traffic and Pedestrian Management Plan (CTPMP) have been prepared and included as part of this document. These plans satisfy item 9 of the SEARs requirements for the SSDA however are considered preliminary in nature and would be finalised post-approval as a condition of consent.

1.2 Project Overview

This SSDA seeks construction of two new schools, Marsden Park High School, and Melonba Primary School, located at 20 Kaluta Avenue and 10 Swallowtail Street, Melonba, respectively. The schools will cater for 3,000 students and 219 staff. A more detailed project description is provided in Section 3.1.

1.3 Transport Assessment Basis

1.3.1 Capacity and Operations

For the purposes of the design and assessment for all traffic and transport elements of the project, the changes to student and staff capacities as a result of the project are the primary input and main assessment criteria. These are as identified in Table 1.1:

Table 1.1: Proposed School Capacities

User Group	Marsden Park High School	Melonba (new primary school)
Students	2,000	1,000
Staff	151	68

1.3.2 School Catchment Boundaries

For the purposes of this transport assessment the proposed catchment area is considered, which are shown in Figure 1.1 for both schools. Future student intakes can be reasonably expected to live within the catchment (in accordance with state government and school policy).

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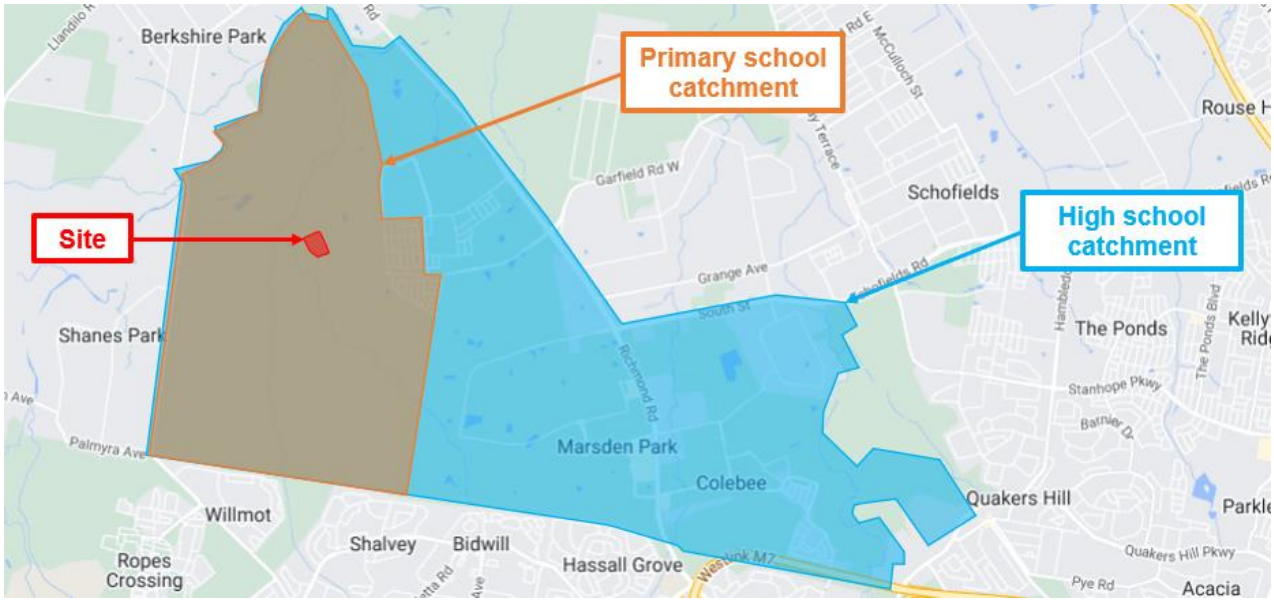


Figure 1.1: School Catchment Boundaries

As advised by SINSW

These catchment boundaries may change from time to time through the life of the development or prior to commencement of operations. School transport should be reviewed on a regular basis as outlined in the School Transport Plan.

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1.4 Guidelines and References

The traffic and transport strategy for the project has been prepared in the context of and with knowledge of a variety of relevant documents, standards, and guidelines listed below.

- Australian Standards, including:
    - AS2890 – Parking facilities
- Austroads Guidelines, including:
    - Guide to Road Design
    - Guide to Road Safety
    - Guide to Traffic Management
- RTA/RMS Guide to Traffic Generating Developments, including:
    - Roads and Maritime Service Trip Generating Surveys – Schools – Analysis Report (GTA, 25 August 2014)

Additional documentation reviewed from relevant local jurisdictions includes:

- Blacktown Development Control Plan 2015 (DCP)
- Blacktown City Council Growth Centre Precincts Development Control Plan 2010 (Growth Centres DCP)
- Educational Facilities Standards & Guidelines (EFSG)

1.5 Response to SEARs

The Secretary's Environmental Assessment Requirements (SEARs) issued in respect of SSD-41372302 were issued on 28 April 2022 by the Department of Planning and Environment (DPE). The requirements for a Transport and Accessibility Impact Assessment are shown in Table 1.2 and have been addressed in various sections of this report as referenced.

Table 1.2: Response to SEARs

Requirements	Comments and References
9. Provide a transport and accessibility impact assessment, which includes:	
An analysis of the existing transport network, including the road hierarchy and any pedestrian, bicycle or public transport infrastructure, current daily and peak hour vehicle movements, and existing performance levels of nearby intersections.	Road hierarchy – Section 2.2 Pedestrian infrastructure – Section 2.7 Bicycle infrastructure – Section 2.7 Public transport – Section 2.6 Car parking – Section 2.8 Existing transport volumes – Section 2.9 Existing intersection performance – Section 2.10
Details of the proposed development, including pedestrian and vehicular access arrangements (including swept path analysis of the largest vehicle and height clearance), parking arrangements and rates (including bicycle and end-of-trip facilities), drop-off/pick-up-zone(s) and bus bays (if applicable), and provisions for servicing and loading/unloading.	Pedestrian and cyclist access – Section 3.2 Vehicular access – Section 3.2 Car parking – Section 3.8 Cyclist facilities – Section 3.4 Drop-off and pick-up zones – Section 3.7 Bus bays – Section 3.5 Service vehicles – Section 3.6 Swept path analysis – Appendix A

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Requirements	Comments and References
Analysis of the impacts of the proposed development (including justification for the methodology used), including predicted model split, a forecast of additional daily and peak hour multimodal network flows as a result of the development (using industry standard modelling), potential queuing in drop-off/pick-up zones and bus bays during peak periods, identification of potential traffic impacts on road capacity, intersection performance and road safety (including pedestrian and cyclist conflict), and any cumulative impact from surrounding approved developments.	Modal split – Section 4.2 Multi-modal trip generation – Section 4.2 Drop-off and pick-up zones – Section 4.2 Bus bays – Section 4.6 Traffic impacts – Section 4.5 Road safety – Section 4.11 Cumulative impacts – Section 4.10 Sight distance diagrams – Appendix F
Measure to mitigate any traffic impacts, including details of any new or upgraded infrastructure to achieve acceptable performance and safety, and timing, viability and mechanisms (including proposed arrangements with local councils or government agencies) of delivery of any infrastructure improvements in accordance with relevant standards.	Infrastructure upgrades – Section 5.1 Operations and management – Section 5.2
Measure to promote sustainable travel choices for employees, students and visitors, such as connection into existing walking and cycling network, minimising car parking provision, encouraging car share and public transport, providing adequate bicycle parking and high quality end-of-trip facilities, and implementing a Green Travel plan.	School Transport Plan – Appendix D
A preliminary operational traffic and access management plan for the development, including drop-off/pick-up zones, bus bays and their operations.	School Transport Plan – Appendix D
Provide a Construction Traffic Management Plan detailing predicted construction vehicle movements, routes, access and parking arrangements, coordination with other construction occurring in the area, and how impacts on existing traffic, pedestrian and bicycle networks would be managed and mitigated.	Construction Traffic Management Plan – Section 6

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1.6 Authority Consultation

This report has been prepared following consultation between the design team and relevant stakeholders, including the Transport Working Group which was assembled for the project. This group included project team and client representatives, Blacktown City Council, and TfNSW as relevant. Consultation events and outcomes occurred as follows:

- **12 May 2022**
    - A teleconference meeting was held with representatives from Council and TfNSW.
    - The project's general transport strategy and strategic context were introduced. The meeting discussed the key transport challenges for the project, the early concepts for a multi-modal transport strategy, and proposed scope of studies for transport data collection and traffic modelling.
    - Key feedback included a request for more detailed information on staff numbers. Council advised that they did not expect any additional footpaths to be provided by Council in the local precinct. TfNSW advised that buses are expected along Kaluta Avenue and Abell Road by the end of 2022 (route 747), and that funding restrictions currently limit the acquisition of new buses, but this may ease before the school opens.
- **9 June 2022**
    - A teleconference meeting was held with representatives from Council and TfNSW.
    - The more detailed mode-by-mode transport strategy and on-site proposals, including developed kiss & ride solutions and internal pedestrian links, were presented to the group and discussed.
    - Key feedback included requests from Council for the location and safety of proposed zebra crossings to be reviewed, however generally support the quantity being more than anticipated. Council would like crossings to be raised; TfNSW has no objection provided that long tapers are provided along bus routes. TfNSW noted their support for active and public transport modes and expressed concern with the proposed 80% rate of travel by car as being too high. Council requested further information on the warrant process for pedestrian zebra crossings on local roads.
- **20 July 2022**
    - A teleconference meeting was held with representatives from Council and TfNSW.
    - The project team presented responses to previous requests for additional information including enrolment forecasts and pedestrian movements, provided more detailed information on proposed roadworks and parking restrictions, and an update on vehicular access point design.
    - Key feedback included concerns from Council around the safety of on-street accessible parking, and advice that the proposal would be assessed in the context of end-state enrolments. Council noted that they had no problem with the implementation of No Stopping zones where required around driveways. TfNSW noted that they had no complaints with the proposed bus infrastructure and that consultation should continue, with bus delivery timeframes of around 6-12 months. TfNSW supported post-approval documentation for the School Transport Plan and Travel Access Guide and noted that an on-site review of School Zone speed limits would take place 2-3 months prior to opening.

1.7 Response to Submissions

The Environmental Impact Statement (EIS) was publicly exhibited on the NSW Planning Portal from 18 October 2022 to 14 November 2022. All submissions have been placed on the Planning Portal website.

Table 1.3 lists the submissions relating to this traffic and transport assessment and provides responses to each of the key items raised (or references to sections of documentation that have been updated).

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Table 1.3: Response to Submissions

Item	Submission Author	Key Items	Comments and References
1	**Department of Planning & Environment**	Provide an updated assessment that considers a realistic mode share of private vehicle use by staff. The assessment must also consider the implications for additional traffic movements and car parking requirements. The EIS assumes a very ambitious car mode share of 65%, given the limited public transport access to the site and notably in comparison to other schools located in the North West Growth Area (Glenwood High School - 92% and John Palmer Public School - 99%). This mode share reduction (on that observed at other related schools), relies upon a very high car passenger mode share of 15%, with surveys at the Glenwood High School indicating that no staff carpool, while at John Palmer this figure was 1%.	The total assumed mode share of private vehicle use by staff is 80%, compared to other schools above 90%. While this is a noteworthy shift, it is not considered unreasonable and is necessary in order to achieve the sustainable transport goals of the project. Results from Glenwood HS and John Palmer PS reflect schools which do not have any school transport plan or sustainability strategies (e.g. car-pooling) in place. Case studies have been undertaken at the recently opened Galungara Public School (within the City of Blacktown LGA) and Concord High School (within the Canada Bay LGA). At Galungara PS, a kiss & ride mode share of 51% has been achieved, demonstrating an excellent outcome in comparison to a 70% target and showing that these scales of travel mode split are achievable. At Concord HS, a bus mode share of 57% has been achieved, exceeding the number of students living within 400m of a bus to school and demonstrating the willingness and ability of students to access bus services. Public transport access to the Marsden Park site is already considered reasonably good (with 17 bus arrivals in the AM peak and 15 bus departures in the PM peak) and this is expected to increase in the future with additional public bus services to be provided by TfNSW (as advised to the project team during Transport Working Group consultation), providing excellent opportunities for staff and students both in the short-term and longer-term. For both staff and students, uptake of sustainable travel behaviour may be gradual, and the mode shift will take place over time. However, the student and staff populations will similarly grow gradually over time. During the early operating life of the school, mode shift may be above the target values, but for a reduced population.
2	**Department of Planning & Environment**	Provide updated student mode share assumptions that have been reassessed based on travel patterns of similar schools within the North West Growth Area and City of Blacktown LGA, to consider more realistic private vehicle mode share. The overall assessment of traffic impacts must be further updated based on these assumptions, with respect to traffic movements and drop-off/pick-up requirements.	As detailed in Section 4.2 of this report, mode share assumptions have been developed in the context of current habits at schools within the LGA such as John Palmer PS and also outside the LGA such as Cumberland HS and Carlingford West PS, with important differences relative to those existing sites. Within the City of Blacktown LGA, case studies have been undertaken at the recently opened Galungara Public School. These case studies show that even with a target kiss & ride mode share of 70%, an actual kiss & ride mode share of just 51% has been demonstrated to be achieved. This achievement is significant for a highly car dependent LGA and demonstrates that reduced car usage and real mode shift is achievable in this area. It is important to note that the sustainable transport strategy for this development, which is aligned with State Government strategies and priorities, seeks to change travel behaviour rather than maintaining the status quo. Therefore, mode share assumptions for the future conditions are deliberately different to existing travel habits at other sites, either local or across the broader Sydney metro region. On this basis, the overall traffic assumptions and impacts remain unchanged in the current revision of this report.

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Item	Submission Author	Key Items	Comments and References

3	**Department of Planning & Environment**	Demonstrate that on site parking is provided to meet the anticipated staff (but not limited to) car parking demands and would provide acceptable mitigations in relation to car parking impacts.	On-site parking has been provided to maintain an appropriate level of open play space, and a surrounding sustainable transport strategy has been prepared in order to support this available parking capacity.
			
			The sustainable transport strategy is the mitigation measure, including construction of:
			• A new indented bus bay with capacity for at least 5 (up to 6) buses
			• New pedestrian footpaths to the remaining three site frontages
			• Seven new wombat crossings (raised zebra crossings) at:
			  ○ Galah Street, south of Elara Boulevard
			  ○ Galah Street, north of Rakali Parade
			  ○ Galah Street, north of Swallowtail Street
			  ○ Swallowtail Street, west of Kaluta Avenue
			  ○ Kaluta Avenue, south of Periwinkle Street
			  ○ Kaluta Avenue, south of Elara Boulevard
			  ○ Elara Boulevard, west of Kaluta Avenue
			• End-of-trip facilities for staff in the form of six showers with change areas, plus lockers
			• Bicycle storage for staff, comprising 40 spaces in an enclosed space collocated with the end-of-trip facilities
			• Bicycle storage for students, comprising 84 spaces for the primary school plus 60 spaces for the high school, distributed around the site
			In addition, a School Transport Plan has been prepared which outlines ongoing management procedures for the sustainable transport strategy. The schools will also be provided with 40km/hr School Zones to all frontages, enhancing the amenity and safety of pedestrians around the site.
			
			On consideration of this strategy which reduces the car parking demand significantly lower than the DCP rates, as documented in this report, mitigation measures are not required.
			
			The relevant open play space requirement of 10m^2 per student, as per the Department of Education's *Educational Facilities Standards & Guidelines*, is achievable through the proposed design but would not be achieved if car parking were increased. This is a mandatory requirement in the EFSG.
			
			In the event of additional parking demands occurring, Section 4.9.3 of this report has demonstrated that at least 290 on-street car parking spaces exist in the local precinct, only counting non-residential street frontages (i.e. not counting parking spaces in front of any houses). With no consideration of the sustainable transport strategy and in a worst case scenario applying the staff and student component rates of the DCP, approximately 40-50% of the on-street parking would be used, leaving 50-60% or around 150 on-street parking spaces would still be available along the non-residential frontages. This is a substantial parking availability which similarly would not require any further mitigation measures.

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Item	Submission Author	Key Items	Comments and References
z	**Department of Planning & Environment**	Provide an updated assessment with revised traffic modelling that includes the background traffic growth increase of 135%, rather than the adopted 35% in the EIS. The EIS utilises a growth factor of 1.35 derived from the Traffic and Transport Assessment for Marsden Park. Application of this growth factor is equivalent to a total growth of 135% rather than 35% and must be applied to revised SIDRA modelling accordingly.	We have reviewed the original traffic modelling submitted for the EIS and agree with DPE's review of the application of growth factors. All traffic models have been updated in the latest iteration of this report, reflected in the results presented at Section 2.10, Section 4.5, and Appendix C. Based on a detailed review of the original reference document (Traffic and Transport Assessment – Marsden Park Precinct, AECOM, April 2013) the growth factor of 135% has now been correctly applied to the precinct west of Richmond Road. For through traffic along Richmond Road itself, forecast traffic growth along this corridor is lower (as per the AECOM report) due to a higher proportion of pre-existing traffic and a growth factor of 20% for through traffic has been applied. Section 4.5 of this report details the application of the 20% and 135% growth factors to Richmond Road and the remainder of the precinct respectively. The latest modelling results do show congestion at some locations in some scenarios (forecast through to 2032). However, the analysis also clearly demonstrates that the impact of the proposed development is generally minimal in comparison to the impacts of background growth, and that future congestion which may occur on some parts of the road network is not attributable to the school development and would occur regardless of this SSD project. The most significant changes in traffic model performance and congestion occur between the 2022 and 2032 'non-development' scenarios, with relatively minimal change for the comparable 'with development' scenarios.
5	**Department of Planning & Environment**	Provide updated traffic modelling that analyses the impacts to arterial and regional roads, including Richmond Road. The updated analysis should consider the significant increase in school size proposed in the EIS, compared to the originally considered school size in the traffic modelling supporting the Marsden Park precinct.	The traffic modelling for both existing and future conditions has been extended to include Richmond Road, with intersections at both Elara Boulevard and Abell Road. Modelling results are provided in Section 2.10, Section 4.5, and Appendix C. All forecast traffic associated with this SSD application for the school has been treated as additional traffic, on top of existing traffic and the application of background growth factors. Therefore, the change in size of school compared to the original traffic modelling is irrelevant because (for the purposes of traffic modelling) this proposal assumes that the subject school is additional to anything previously assumed or identified. In any case, the earlier precinct traffic modelling did not identify (or at least did not publicly identify) an assumed capacity for this school site. A capacity of 840 students (K-12) was assumed for the Northbourne Drive school site, now the St Luke's Catholic College. In 2021[1], there were 810 primary school students and 418 high school students. While this enrolment exceeds the capacity originally assumed for the precinct traffic modelling, the traffic volumes associated with this level of enrolment would have been counted in the 2022 traffic counts undertaken for this SSD application. Therefore, no adjustments to the traffic modelling would be required, particularly when considering that the population growth factors are applied to the current traffic counts including that higher enrolment, rather than applying growth factors to any original traffic volume assumptions.

[1] As per the annual school reports published by the school. https://www.stlukesmarsdenpark.catholic.edu.au/About-Us/Annual-School-Reports

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Item	Submission Author	Key Items	Comments and References
6	**Department of Planning & Environment**	Further consultation should be undertaken with TfNSW and bus operator(s) to confirm that the anticipated bus demands can be accommodated.	Consultation has been undertaken with TfNSW in May 2022, June 2022, and July 2022 through the Transport Working Group process, as detailed in Section 1.6 of this report. Consultation dates and details were also outlined in the Community Engagement report provided with the EIS (Appendix D). During consultation to-date, TfNSW provided feedback on the anticipated bus services and demands, and the outcome of these discussions is reflected in the level of bus services assumed in the EIS and RtS. Further consultation will take place during the operating life of the development to ensure that TfNSW is made aware of year-to-year enrolment intakes and is able to respond to the level of demand. No further consultation is required at this stage.
7	**Department of Planning & Environment**	Further analysis must be provided on the suitability of the walking/cycling network, including potential upgrades required to facilitate access to the site where sections of the expected route network remain incomplete.	Council has advised that the walking/cycling network will be provided as per the precinct master plan, which provides footpaths on both sides of all streets as a minimum, with collector roads providing a footpath and a shared path. The master plan was designed to accommodate access to a school site at this location. Completion of the broader pedestrian and cyclist network is the responsibility of Council and should be completed as early as possible. Council has indicated that the footpaths in any part of the developing precincts is typically undertaken once residential construction is approximately 80% complete, which appears to be the case in the local area. Therefore, footpaths are expected to be provided long before commencement of operation of the school in 2025. This project itself will provide 7 wombat crossings (raised zebra crossings) plus footpath upgrades to the 3 remaining site frontages in order to facilitate access to the site, which will be completed and opened prior to occupation of the schools.
8	**Blacktown City Council**	Insufficient car parking is provided. Additional parking spaces could be created by providing either a basement carpark below or an additional elevated parking level above the proposed carpark to address the shortfall of parking spaces.	On-site parking has been provided to maintain an appropriate level of open play space, and a sustainable transport strategy has been prepared in order to support this available parking capacity. The transport strategy includes new bus infrastructure, new cycling infrastructure, new pedestrian infrastructure, and a School Transport Plan for ongoing management. The sustainable transport strategy for this development, which is aligned with State Government strategies and priorities, seeks to change travel behaviour rather than maintaining the status quo. Conversely to BCC's comments, TfNSW noted during the Transport Working Group consultation (TWG #3, 20/07/2022) that they believe the proposal provides too much parking and have re-iterated this in their SSDA submission. Council has also noted at item (c) of their submission that heat islands and heat waves are of significant concerns. An elevated car park would result in more significant heat island issues on the site. An elevated or basement car park would involve significant levels of embodied carbon which would contribute to climate change and the worsening of future heatwaves. Council has noted at item (d) of their submission that the character of the area should be a consideration for the project. Construction of a multi-storey car park would be considered incompatible with the character of the local area, including the riparian / parkland zone opposite Galah Street.

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Item	Submission Author	Key Items	Comments and References
9	**Blacktown City Council**	There appears to be boundary adjustment along Swallowtail Street and Kaluta Avenue for the new indented on-street parallel parking spaces.	Correct. No further comment.
10	**Blacktown City Council**	In the pre-DA meeting we advised that all surrounding roads should have 11m carriageway. Only Kaluta Avenue fronting the development has a width of 11m. Other streets surrounding the development (Elara Blvd, Galah St and Swallowtail St) have a width of 9m. These narrow roads will create traffic and parking congestion in future.	The subject site has been identified as a proposed school site in all master planning for the Marsden Park / Melonba precinct. On this basis, the road network was designed with a Collector road (11m) along Kaluta Avenue and Local roads (9m) to all other frontages, as illustrated in Section 2.2 of this report (see Figure 2.3). The project is already proposing to widen Swallowtail Street from 9m to 10.2m (widening of 1.2m) to accommodate accessible kiss & ride in particular, but also to serve the general kiss & ride function. This is a significant increase from the 9m width intended in the master plan. Further widening of this road, and any widening of Elara Boulevard and Galah Street, would increase traffic speeds and we recommend that narrower roads be retained as a traffic calming measure. Further widening of roads may also require additional boundary adjustments (refer comments above) which would reduce the available play space on site, requiring reductions to the provision of on-site car parking in order to maintain allowable play space ratios.
11	**Blacktown City Council**	According to the Growth Centre DCP, the proposed development requires 219 staff parking, 60 student parking and 30 visitors parking. Applicant has provided only 142 off-street parking spaces which are allocated solely for staff. There is a short fall of 167 parking spaces. This is a significant short fall. The applicant's traffic consultant justifies the short fall in parking citing available on-street car parking on the surrounding streets and multi model transport. We do not agree with these justifications.	On-site parking has been designed and located to provide adequate car parking on-site while maintain sufficient space for other infrastructure, including an appropriate level of open play space. A surrounding sustainable transport strategy has been prepared in order to support this available parking capacity. The transport strategy includes new bus infrastructure, new cycling infrastructure, new pedestrian infrastructure, and a School Transport Plan for ongoing management. The sustainable transport strategy for this development, which is aligned with State Government strategies and priorities, seeks to change travel behaviour rather than maintaining the status quo. When the sustainable transport strategy is considered and fully applied, there is no parking shortfall and no usage of on-street parking, given the good availability of multi-modal transport options both now and in future. Even if the strategy is only partially applied or effective, the parking shortfall would be substantially lower than the assumptions made by the Growth Centres DCP. Section 4.9.3 of this report has demonstrated that at least 290 on-street car parking spaces exist in the local precinct, only counting non-residential street frontages (i.e. not counting parking spaces in front of any houses), of which approximately 150 spaces would be available even if the Growth Centre DCP parking demand assumptions were fully applied (which, based on the sustainable transport strategy, we do not consider to be reasonable). This is a substantial availability of parking, which would be available in addition to all residential frontages (which are not counted in the calculations above).

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Item	Submission Author	Key Items	Comments and References
12	**Blacktown City Council**	The applicant has proposed designated accessible parking on the surrounding streets. We do not support this accessible parking on the street for safety reasons. Accessible parking for parents/student should be provided within the off-street parking area.	Accessible drop-off and pick-up has been proposed on-street to be equitable and equal with the remainder of general-use kiss & ride facilities for the broader student population. Provision or requirement for accessible drop-off and pick-up to occur in a separate location such as the staff car park may be inequitable. Additionally, the on-street locations are specifically aligned to be adjacent to the SELU classes. Off-street parking in the main car park would be further from the SELU classes and less practical for access. The proposed accessible parking on-street is designed and would be provided fully in accordance with Australian Standard AS2890.5 and AS2890.6, which is designed specifically for this purpose with the safety of users in mind. On-street provisions (as opposed to off-street provisions) also reduce the number of vehicle movements at site driveways, which reduces the potential for pedestrian-vehicle interaction which is a significant safety risk. Providing accessible drop-off and pick-up in the staff car park would encroach into play space to accommodate the additional footprint which would not be acceptable, or would require a reduction to the staff parking capacity, which we do not believe would be acceptable to Council. Accessible on-street parking has precedent within the Blacktown LGA. Existing locations include 30 Campbell Street, Blacktown; 9 Kildare Road, Blacktown (both sides of road), 14 Main Street, Blacktown; 209 Beames Avenue, Mount Druitt; 2 Themeda Avenue, Rouse Hill (marked 5-minute accessible spaces).
13	**Blacktown City Council**	The applicant has proposed 7 pedestrians crossing around the proposed development. The applicant is to engage a traffic consultant to determine suitable places on the roads for the wombat crossing. The applicant's traffic consultant should consult with the nearby residents to determine a suitable location. All wombat crossings require separate approval from Council through Local Traffic Committee process. All wombat crossings are to be provided at no cost to Council and should include street lighting as required.	The justification for the proposed crossing locations is fully documented in this report, including pedestrian demands in Section 4.4.3, and was discussed at great length with Council through the pre-lodgement Transport Working Group consultation stream. Council acknowledged during consultation (TWG #2, 09/06/2022) that they were happy that the project is providing more zebra crossings than was anticipated. Crossings will be provided at no cost to Council and will include street lighting. The SSDA was on exhibition for comment by local residents, which included all details of the proposed pedestrian crossing locations. There were no objections to the SSDA lodged by any residents, on any grounds. Of the comments received, one submission mentioned pedestrian crossing locations and a concern at a loss of street parking outside their house. As the submission name was withheld and address redacted, it is not possible to accurately determine the location, however based on the requested change in location (to Kaluta Avenue and Wagtail Street) it is assumed that the submission relates to the proposed crossing on Kaluta Avenue near Periwinkle Street. The location currently proposed in the EIS is along the direct route from the schools through to the pedestrian footbridge between Betula Parade and Meehan Terrace. The current proposal is also located close to the corner of the school site which will provide more convenient access for a higher proportion of users, with fewer pedestrian required to divert or back-track to reach the crossing (thereby also reducing the likelihood of jaywalking or unsafe crossings). The suggested alternative location mentioned in the submission would not achieve these outcomes.

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Item	Submission Author	Key Items	Comments and References
14	**Blacktown City Council**	Car parking provision does not comply with Council's DCP. We will not support parking on the adjacent residential streets to accommodate the shortfall in the required parking for the school.	The proposal does not rely on on-street parking nor does the proposal anticipate a shortfall in off-street parking. Rather, a holistic sustainable transport strategy has been prepared, and is supported with both infrastructure and management solutions, to reduce the parking demand to a level that would be accommodated within the available car parking. The analysis provided in this report which refers to on-street parking availability and capacity is provided for comparison only, as described directly in Section 4.9.3 of this report. This analysis tests the assumptions of the Growth Centres TAIA, which we consider to be incorrect based on the proposed application of a sustainable transport strategy and demonstrates that even under those assumptions ample on-street parking would remain available for local residents.
15	**Blacktown City Council**	Local roads surrounding the development have a width of 9m and should not be part of bus routes.	There are no bus routes proposed along local roads. All bus activity is proposed to occur at Kaluta Avenue, which is a Collector road and 11m wide.
16	**Blacktown City Council**	The additional traffic generated by the proposed development is likely to create traffic congestion during school starting and finishing times.	(see below)
17	**Blacktown City Council**	Explain on what basis the traffic report concludes that all key intersections around the site are expected to operate satisfactorily under the proposed future scenario during both peak periods.	The TAIA has reached this conclusion on the basis of traffic modelling for all key intersections around the site, including 10-year growth projections combined with the full proposed capacity of the schools, which was fully detailed in Section 4.5 of this report. All traffic modelling has been updated in the current revision of this report in response to DPE's submission on the EIS, which raised concerns around some of the parameters used. Updated modelling with refined parameters maintains similar outcomes to the previous TAIA and demonstrates an appropriate level of impact by the school development, particularly with respect to some worsening of conditions which occurs as a result of background traffic growth regardless of this school development.
18	**NSW Government Architect**	Concerns about prioritising active transport with main entrances being placed in the middle of the long blocks and pedestrian crossings at the ends requiring long walks and cycles along the busy footpaths or on roads with not cycle lanes.	(see below)
19	**NSW Government Architect**	The active transport strategy is not aligned with the design response of the school. For example, access for students walking and cycling is through the middle of the blocks, requiring long distances without protected bike lanes. Further develop the response to ensure the safety and efficiency of walking and cycling is given priority.	The main entries to the schools are located in the middle of the blocks to cater, in an equitable way, for all traveling modes including Kiss & Drop, bus, pedestrians and cyclists. The busy entries are located away from the pedestrian crossings at the corners to prevent overcrowding and safety issues around intersections. The main entry for cyclists is on Galah Street, across from the main cycling path of the suburb along that street. The majority of the bike parking for students and end-of-trip facilities are located there.

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Item	Submission Author	Key Items	Comments and References
20	**NSW Government Architect**	The extent of active transport in the local community is unclear. Develop an evidence-based strategy that identifies safe walking and cycling routes and their arrival to the school.	The master plan for the entire precinct, which Council has advised will be provided as planned, and funded by developer contributions, provides pedestrian footpaths to both sides of all roads as a minimum. On 'Collector' roads, this is increased to a Shared Path on one side and a standard footpath on the other. Cross sections for both types of roadways are shown in Section 2.2 of this report. Therefore, formal walking and cycling routes are available throughout the entire precinct (noting that children under the age of 16 are permitted to ride bicycles on standard footpaths). This project proposes to provide 7 pedestrian zebra crossings which will facilitate safe access routes to all corners of the school site. Existing safety features along pedestrian and cyclist routes are provided throughout the broader network - e.g. pedestrian refuge islands at Abell Road, pedestrian footbridge from Betula Parade to Meehan Terrace, pedestrian refuge islands at Elara Boulevard.
21	**NSW Government Architect**	Consider exploring an option in which buses travel on an access way across the site, east-west, between the primary and secondary schools, away from nearby housing and to drop students off in the middle of the site.	A road through the site is wholly infeasible and impractical. It would occupy on the order of 4,000m2 of space (assuming a 200m wide site x 20m wide corridor) or the equivalent of the required play space for 400 students. It would sever the two schools and result in a poor outcome for the overall site / campus. It would compromise the available bulk play space which can be used for large sports fields. It would introduce safety issues by requiring students to cross an additional internal roadway and have direct interaction with heavy vehicles within the site. It would road widening to Elara Boulevard and Galah Street (not just to the school frontages but also along the broader road network) to accommodate bus services.
22	**Transport for NSW**	Sightline assessment to be provided for the proposed wombat crossings in proximity to intersections to ensure visibility at the proposed pedestrian crossings complies, in accordance with the Austroads Guide to Road Design: Part 4A: Unsignalised and Signalised Intersections (Section 3 – Sight Distance).	A sightline assessment has been undertaken at each proposed pedestrian crossing and is provided at Appendix F of this updated TAIA. This assesses the sightlines required for both 60km/h and 30km/h speeds (73m and 27m sight distance) to represent the travel speeds for vehicles approaching straight to the crossing and vehicles approaching around a bend, respectively. Considering this, suitable sightlines are achieved on approach to all proposed pedestrian crossings. Realistically, it is expected that vehicles will often approach crossings at speeds less than 30km/h, particularly when turning from a minor road (e.g. from Rakali St to Galah St) and due to the crossings being raised and approachable at low speeds only. Therefore, we are providing a more conservative assessment. Based on this and the explanation above, the sightlines to the proposed crossings are suitable.
23	**Transport for NSW**	Noting there are existing pedestrian splitter islands at the roundabout intersection of Kaluta Avenue and Elara boulevard, the demand for a proposed pedestrian crossing at these locations are to be investigated.	The demand volumes for pedestrian crossings have been outlined in this report at Section 4.4.3. The intersection of Kaluta Avenue and Elara Boulevard will be a high intensity location for both pedestrian and vehicle movements, including heavy vehicles (buses), and therefore pedestrian safety treatments are a high priority. The ability for children to safely access the site with pedestrian priority is critical to the success of the project. We also note comments from DPE, TfNSW, and BCC as part of the SSDA submissions relating to a complete pedestrian network, which these crossings will help facilitate.

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Item	Submission Author	Key Items	Comments and References
24	**Transport for NSW**	TfNSW notes, as per the Transport and Accessibility Impact Assessment (TAIA), the proposed school capacity comprises 3000 students and 219 staff members. This can potentially generate an additional 1000's private vehicles to the already congested road network in the area during the school drop off and pick up period, should no active and public travel provisions be provided from Day 1 of the school operation. The TAIA mentions that car mode and parking are the lowest priority in the transport strategy to discourage private cars and supplement alternative transport options, which is a positive strategy. However, this should be justified with more details on how this can be achieved. The school operation timing is unclear from the report	Justification and provisions for active and public transport options are outlined in detail throughout this report. Provisions include construction of new pedestrian zebra / wombat crossings, construction of bicycle storage and end-of-trip facilities, and construction of a new indented bus bay to accommodate higher volumes of bus services in future. All these active and public transport provisions will be provided from Day 1 of operation.
25	**Transport for NSW**	The SIDRA traffic model outcome does not represent the overall cumulative impact at the intersections along Elara Boulevard and Richmond Road. Currently, the intersection of Richmond Road and Elara Boulevard experiences long queues, resulting in poor speed ratio and journey time reliability along Richmond Road and Elara Boulevard. This is likely to worsen as further developments in the area are completed, noting people who live outside of the walking and cycling catchments from these schools are more likely to drive their children to school	Updated traffic modelling (in this revision of the report) now addresses cumulative impacts along Elara Boulevard and Richmond Road as requested. The project includes provision of an indented bus bay to accommodate a higher volume of bus services in future, to ensure that people who live outside the walking and cycling catchments are not forced to drive to school and are encouraged to take public transport. Bus services to the outer areas of the catchment were specifically discussed with TfNSW during the Transport Working Group consultation stream.
26	**Transport for NSW**	Adequate accessible parking should be provided within the on-site parking area.	Accessible parking is proposed to be provided in accordance with the rates outlined in the BCA.

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Item	Submission Author	Key Items	Comments and References
27	**Transport for NSW**	To attract sustainable travel mode to/from schools and manage the impacts of the future schools, TfNSW recommends the following: - Council and DET to collaborate with TfNSW to investigate on travel demand management measures, with a greater focus on improving facilities and safety for people walking, cycling and using public transport. - Provision of footpaths on both sides of the streets providing safety cyclists, with adequate infrastructure, to existing and new street networks within a 15-minutes walking catchment (1.2km) of the schools. - Ensure tree canopies are planted on at least one side of the street networks within the 15 minutes walking catchment of the schools. - Before the schools are built, the Council should consider providing a connected and safe footpath network and multiple generous pedestrian crossings across all surrounding Local and State roads on key desire lines to embed safe, convenient pedestrian movement from Day 1. - Monitor situations on a regular basis to understand future travel patterns and how pedestrians and cyclists move around in the area. Also ensuring that safe walking and cycling routes to key destinations, crossing opportunities at desired lines, direct/reliable local/school bus routes and adequate bus stop facilities are provided. Any proposed pedestrian crossing facilities, signage and line marking on the Local road network will require consideration of the Council's Local Traffic Committee.	- Council has advised the footpath network is funded and will be delivered for the entire precinct, with footpaths to be constructed once residential construction within any particular sub-area reaches approximately 80% completion. Council to advise on timing, we recommend that this infrastructure should be available from Day 1. - Tree canopies to the surrounding road network are the responsibility of Council. - This project will provide pedestrian crossings to ensure desire lines to the school (from Day 1) are facilitated. - The School Transport Plan will include provision for future monitoring and updates. - Requirements relating to Council / LTC approval are anticipated as a condition of development consent.
28	**Transport for NSW**	A significant number of vehicles and pedestrians will access the site at the start and end of the school day. School Zones must be installed along all roads with a direct access point (either pedestrian or vehicular) from the school. School Zones must not to be provided along roads adjacent to the school without a direct access point. Road Safety precautions and parking zones should be incorporated into the neighbouring local road network: - 40km/hr School Zones are to be installed in streets with direct access in accordance with the below/following conditions. - Council should ensure that any parking, drop-off / pick-up zones and bus zones incorporated are in accordance with TfNSW standards.	School Zone documentation requirements are anticipated as a condition of development consent.

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Item	Submission Author	Key Items	Comments and References
29	**Transport for NSW**	TfNSW is responsible for speed management through all public roads within the state of New South Wales, being the only authorised organisation that can approve speed zoning changes and authorise installation of speed zoning traffic control devices on the road network within New South Wales. Accordingly, the Developer must obtain written authorisation from TfNSW to install the School Zone signs and associated pavement markings and/or remove/relocate any existing Speed Limit signs. To obtain authorisation, the Developer must submit the following information for review and approval by TfNSW, at least eight (8) weeks prior to student occupation of the site: - A copy of Council's development Consent Conditions - The proposed school commencement/opening date. - Two sets of detailed design plans indicating the following: I. School Property boundaries II. All adjacent road carriageways to the school property III. All proposed school access points to the public road network and any conditions imposed/proposed on their use IV. All existing and proposed pedestrian crossing facilities on the adjacent road network V. All existing and proposed traffic control devices and pavement marking on the adjacent road network (including School Zone signs pavement markings). VI. All existing and proposed street furniture and street trees. School Zone signs and pavement marking patches must be installed in accordance with TfNSW approval/authorisation, guidelines and specifications. All School Zone signs and pavement markings must be installed prior to student occupation of the site. The Developer must maintain records of all dates in relation to installing, altering, removing traffic control devices related to speed. Following installation of all School Zone signs and pavement markings, the Developer must arrange an inspection with TfNSW for formal handover of the assets to TfNSW. The installation date information must also be provided to TfNSW at the same time. Please note, until the assets are formally handed-over and accepted by TfNSW, TfNSW takes no responsibility for the School Zones/assets.	School Zone documentation requirements are anticipated as a condition of development consent.

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Item	Submission Author	Key Items	Comments and References
30	**Transport for NSW**	TfNSW notes the proposed mode shares for public and active transport mode share within the Green Travel Plan (GTP), but TfNSW requires the applicant to significantly reduce the mode share for single occupancy car use for staff (which is currently at 80% including 15% for car-pooling) and further increase car-pooling for staff and use of buses for staff and increase cycling and walking mode shares for staff when cycling and walking paths have been safely managed. Please consult TfNSW website Travel Plan Toolkit and Travel Plan template for further information.	The project is current seeking to find a balance between inputs from Council and TfNSW. We propose for these mode share targets be retained, and acknowledge that these targets can and should change over time to reflect changing travel behaviour in response to future surveys and studies. The School Transport Plan will include provision for annual reviews and updates to adjust these mode splits as required.
31	**Transport for NSW**	TfNSW recommends that the GTP include an implementation plan. The Implementation Plan should include all of the initiatives and incentives within the GTP, timing and completion dates to ensure the overall effectiveness of the GTP as an implementation strategy. Each part of the Implementation Plan should be managed overall by a Travel Plan Coordinator/Steering Committee. The Implementation Plan should: - Identify the party or parties responsible for delivery and implementation of each element of the updated GTP throughout various stages of the development lifecycle, including for its ongoing implementation, monitoring and review, for a period of at least 5 years post OC; - Be updated both on an annual basis, and when future transport services are upgraded. - Include your current communication strategies and initiatives.	The School Transport Plan (equivalent to the GTP), which has been provided in preliminary format as required for the SSDA and will be issued as a final document prior to occupation, will include details relating to implementation. The School Transport Plan template has been developed in coordination with and endorsed by TfNSW and the Green Building Council of Australia (GBCA).
32	**Transport for NSW**	TfNSW recommends that the GTP includes student and staff surveys that are conducted each year for the lifecycle of the development. The surveys should include questions to obtain workforce data analysis (including staff and student residential postcodes), to identify the staff and student travel origin and destination patterns, to inform strategies that help to reduce car parking demand for staff and students to get to and from the site. The Travel Survey should also be promoting any initiatives or strategies that encourage sustainable transport routes. An example of a travel survey can be found here. A Travel Survey should be prepared for this GTP as a separate appendix.	The final School Transport Plan (prior to occupation) will include details relating to future/ongoing travel surveys.
33	**Transport for NSW**	TfNSW requests that a parking management strategy be incorporated into the GTP (into the Implementation Plan), that prioritises use by staff on a needs basis, e.g. preference for staff parking that are car-pooling or car sharing	The final School Transport Plan (prior to occupation) will include details relating to a parking management strategy.

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Item	Submission Author	Key Items	Comments and References
34	**Transport for NSW**	Please include a Transport Access Guide as a separate appendix in the GTP to inform staff, students and visitors to the school of the travel choices available to them. This should include information about public transport connectivity, end of trip (EoT) facilities, and local pedestrian and cycling connections.	The final School Transport Plan (prior to occupation) will include a Travel Access Guide.
35	**Transport for NSW**	TfNSW recommends reducing the amount of carparking proposed (142 car parking spaces across both schools) as this will further encourage car driving as a preference. More sustainable modes should be encouraged which is consistent with Future Transport 2056 in which Travel Demand Management (TDM) is one of TfNSW top priorities.	The project is current seeking to find a balance between inputs from Council and TfNSW. Council has requested an increased parking provision in contrast to TfNSW's request for a reduction. We propose that the quantity of car parking spaces be retained as per the current proposal.
36	**Transport for NSW**	A good supply of quality EoT and bicycle parking is requested to encourage walking and cycling mode shares (once these paths are safely managed). TfNSW asks for clarity on these bike spaces; currently there are 219 new staff, but only 40 bike spaces with EOT facilities for staff, and a further 144 bike spaces across both schools but it is not clear if these are for students or if the 144 bike spaces also include the 40 bike spaces for EoT for staff. TfNSW recommend that this bicycle parking and any EoT be monitored over time to ensure sufficient supply to encourage active transport both to/from the site, for staff. The bicycle parking should be located at the development site at convenient locations, be safe, secured and under cover. Some further guidance on bicycle parking and end of trip facilities can be found in the cycleway design toolkit.	Bicycle storage for students is proposed as per the Department of Education's Educational Facilities Standards & Guidelines (EFSG), comprising 84 spaces for the high school and 60 spaces for the primary school (total 144 spaces). These 144 spaces are for students. In addition, a capacity of 40 spaces for staff is proposed, collocated with the EOTF adjacent to the school hall (Block G). The student spaces are distributed as follows, as currently shown on the architectural plans, however the exact distribution may vary prior to occupation: - 10 rails (20 spaces) near Elara Boulevard entry - 14 rails (28 spaces) near Kaluta Avenue entry - 16 rails (32 spaces) near Kaluta Avenue & Swallowtail Street - 14 rails (28 spaces) near Swallowtail Street entry - 18 rails (36 spaces) near Galah Street entry
37	**Transport for NSW**	The Transport Access Guide should include (but not be limited to) the following: - Information about cycling, walking and public transport initiatives (once safe pathways are completed) to encourage the use of sustainable transport journeys by staff and students. - Promotion of end of trip (EoT) facilities, including any new cycling infrastructure available, and update number and location of bicycle parking and EoT facilities. - Information on car share, car-pooling and priority parking for people that carpool or carshare.	The final School Transport Plan (prior to occupation) will include a Travel Access Guide.

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Item	Submission Author	Key Items	Comments and References
38	**Transport for NSW**	The Public Transport Accessibility Impact Assessment states an action to seek an increase in the frequency of the 747 school buses in the area and potentially all services that pass these schools to service the potential 1000 extra students. These improvements may have an impact on the bus stop, layover and road capacity requirements in the vicinity and possibly within the development.	As documented in the meeting minutes for the Transport Working Group consultation stream (three meetings with Council + TfNSW on 12/05/22, 09/06/22, and 20/07/22), the project team has worked closely with TfNSW to develop the transport strategy for the site including the bus stop and bus servicing. TfNSW's bus servicing representatives stated that they had no complaints with the proposal, and that initial bus servicing in Year 2025 should be okay. TfNSW requested enrolments by suburb (specifically Colebee) and this will be provided by SINSW to TfNSW on an ongoing basis as part of continual service planning for the life of the development. TfNSW also advised that services on the 747 route which terminate at/near the site would continue on as another route. We expect services will continue to change over time and the operations of the school (including elements such as School Transport Plans and Travel Access Guides) will adapt to these changes.
39	**Transport for NSW**	The proposed design of the indented bus stops should be in accordance with Bus Capable Infrastructure guidelines. The capacity of these stops needs to be appropriate not just for services currently existing or agreed upon but any future increase in services (747, school and other as mentioned above).	As documented in Section 4.7 of this report, the proposed indented bus bay has a capacity for 5 buses based on the Bus Infrastructure Guide, or could potentially fit up to 6 buses with reduced (non-independent) spacing. TfNSW has not advised of any specific capacity that this bus stop should accommodate. Based on the Bus Infrastructure Guide, a bus stop with capacity for 5 buses would be suitable for 90 – 120 buses passing the bus stop in the busiest hour (subject to various factors including dwell time), which is considered substantially higher than the expected future increase in services at this location. This report notes that this proposed capacity would be sufficient to accommodate the full demand of the school within approximately 15-20 minutes of the bell time. All other services could be readily accommodated across a peak hour period.
40	**Transport for NSW**	A Construction Traffic and Pedestrian Management Plan (CTMP) must be prepared prior to the issue of the construction certificate with details of predicted construction traffic movements, routes and access arrangements, and outline how construction traffic impacts on existing traffic, pedestrian and cycle networks would be appropriately managed and mitigated.	Accepted as a condition of consent.
41	**Transport for NSW**	An Operational Traffic Management Plan (OTMP) to be prepared prior to occupancy and prepared by a suitably qualified person, in consultation with TfNSW.	As per recent SINSW projects approved through DPE, we anticipate that the content of an OTMP would be incorporated into the content of a School Transport Plan, which is an expected condition of consent. Refer to SSD-9579147 (Pendle Hill High School), Condition D21 for an example. Therefore, we recommend that an OTMP should not be required as a separate condition of consent.

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Item	Submission Author	Key Items	Comments and References
42	**Transport for NSW**	Sight distances from the proposed vehicular crossings are to be in accordance with the Austroads Guide to Road Design: Part 4A: Unsignalised and Signalised Intersections (Section 3 – Sight Distance) and AS 2890. Vegetation and proposed landscaping/fencing must not hinder sight lines to and from the vehicular crossings to motorists, pedestrians and cyclists.	A sightline assessment has been undertaken for the driveway of the car park and the loading area and is provided at Appendix F of this updated TAIA. For the car park driveway, it is expected that most movements will occur during school zone hours and so it is appropriate to consider the AS2890.1 sight distance required for this speed (55m), although we have increased this to consider the minimum sight distance for a 60km/h speed (65m) to account for any car park movements occurring during non-school zone hours. The AGRD Part 4A requires sight distances of 40m and 73m for 40km/h and 60km/h speed zones, respectively. However, it is more appropriate to consider and comply with the AS2890 requirements as this standard is specifically intended for use at access driveways and AGRD Part 4A would be overconservative. For the loading dock driveway, the AS2890.2 sightline requirement for 60km/h speed zones (83m) encroaches into the proposed fence line. This fence line will be reviewed during the detailed design phase to target shifting the fence about 2.6m back within the site. However, a 40km/h school zone will be in place during the majority of vehicle movements in the local area, which only requires a 55m sight distance and is clear of the fence. Therefore, if the fence cannot be readily adjusted, the current sightlines are still suitable. The AGRD Part 4A requires sight distances of 79m and 131m for 40km/h and 60km/h speed zones, respectively. However as outlined above, it is more appropriate to consider and comply with AS2890, although it is noted that the AGRD Part 4A requirement for 40km/h can be achieved if the fence is shifted. Vehicles exiting both the driveways are able to achieve suitable sight distances to Galah Street clear from fencing and significant landscaping or vegetation. Galah Street does contain a line of small trees located within the sightlines, however these obstructions are minor and are not expected to significantly impact drivers' sight. Rather than removing the trees, we recommend that Council monitor, maintain and trim the trees if required. In addition to the sightlines required to Galah Street, the minimum sightlines required to the footpath for pedestrian safety have also been assessed. Sight distance to the footpath is achieved for both driveways.

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2 Existing Transport Network

2.1 Site Overview

The site is located at 20 Kaluta Avenue and 10 Swallowtail Street, Melonba, which is within the Central River City Precinct and Blacktown Local Government Area (LGA). The site is irregular in shape and is sited between two tributaries of Little Creek. The site is generally level but has a gentle fall from the south-eastern corner (RL23) to the north western corner (RL19.5). The site contains no vegetation other than grass and is currently fenced to prevent unauthorised access.

To the north, east and south of the site is emerging and recently completed low density residential development comprising one and two storey dwellings. To the west of the site is an open space area (which serves a drainage function) and beyond this is Little Creek, a tributary to South Creek that flows north to the Hawkesbury River. Further to the south is an area zoned as B2 Local Centre, which has not yet been developed. The next phase of residential development in the area is located on the western side of Little Creek and is currently in the bulk earthworks phase to create the street network.

The site location and approximate extent is shown in Figure 2.1.



Figure 2.1: Site extent (red)

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2.2 Road Hierarchy

Elara Boulevard is a collector road in the east of intersection with Kaluta Avenue. In the west of the intersection at north of the site (north of proposed Marsden Park High School), Elara Boulevard is a local street. Along this street, there is a single travel lane plus parking lane in each direction without any sign of parking restriction.

Kaluta Avenue is a collector road running adjacent east of the site. There is a single travel lane plus parking lane in each direction without any sign of parking restriction.

Galah Street is a local street running adjacent west of the site. There is a single travel lane plus parking lane in each direction without any sign of parking restriction.

Swallowtail Street is a local street running adjacent south of the site.

Abell Road is a local street running south of the site. In the south, the site connects to western and eastern road network through Abell Road. Currently some part of this road is under construction.

Richmond Road is a major arterial road to the east of the site. There are typically two travel lanes in each direction which are separated by raised median island, with a general speed limit of 60 km/hr. On-street parking is not permitted by signage and line marking along this road. The site access to Richmond Road is provided at Elara Boulevard and Abell Road via signalised intersections.

The location of the site within the state road network is shown Figure 2.2.

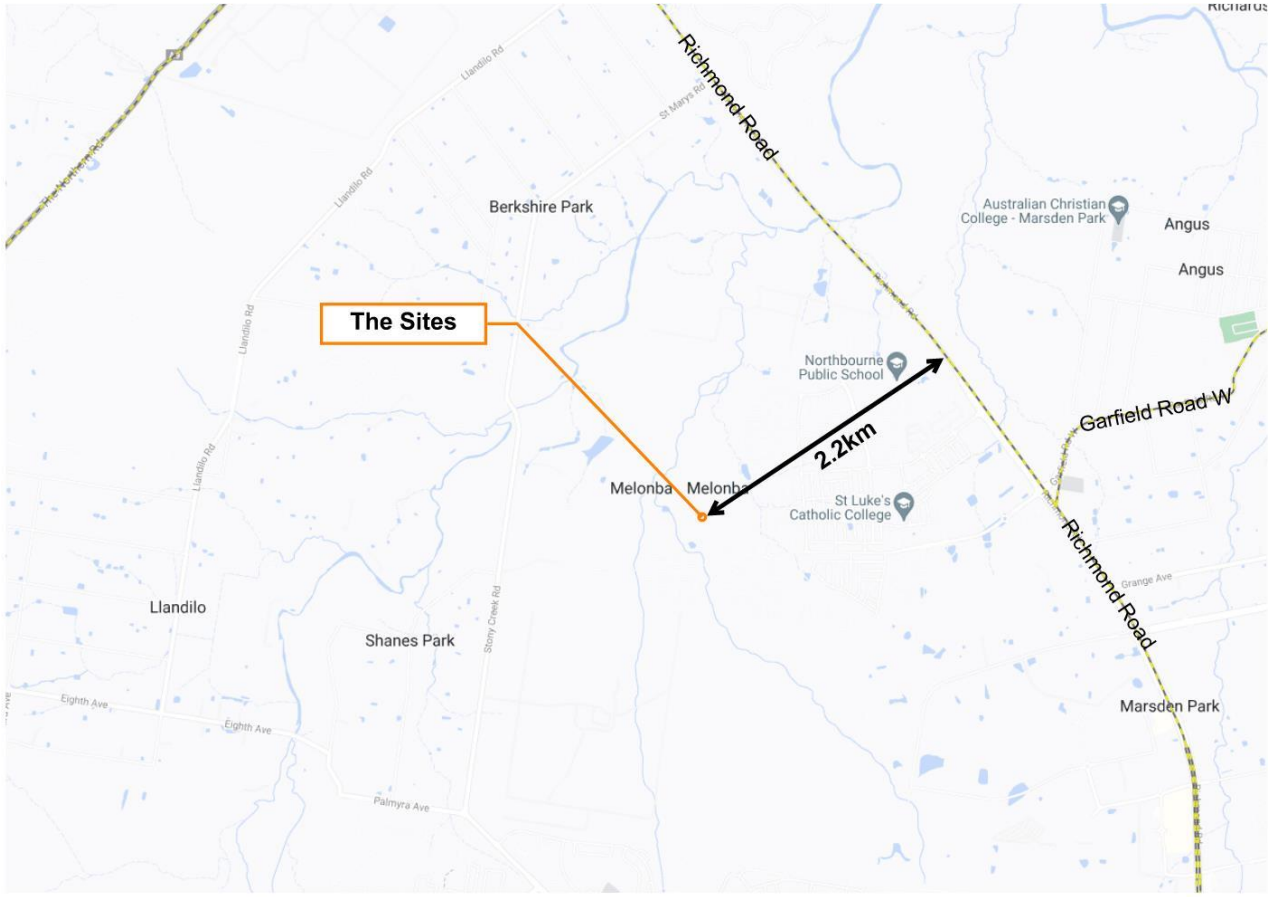


Figure 2.2: State Roads

Source: roads-waterways.transport.nsw.gov.au, June 2022

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Figure 2.3 indicates the road hierarchy surrounding the site within the Marsden Park Precinct.

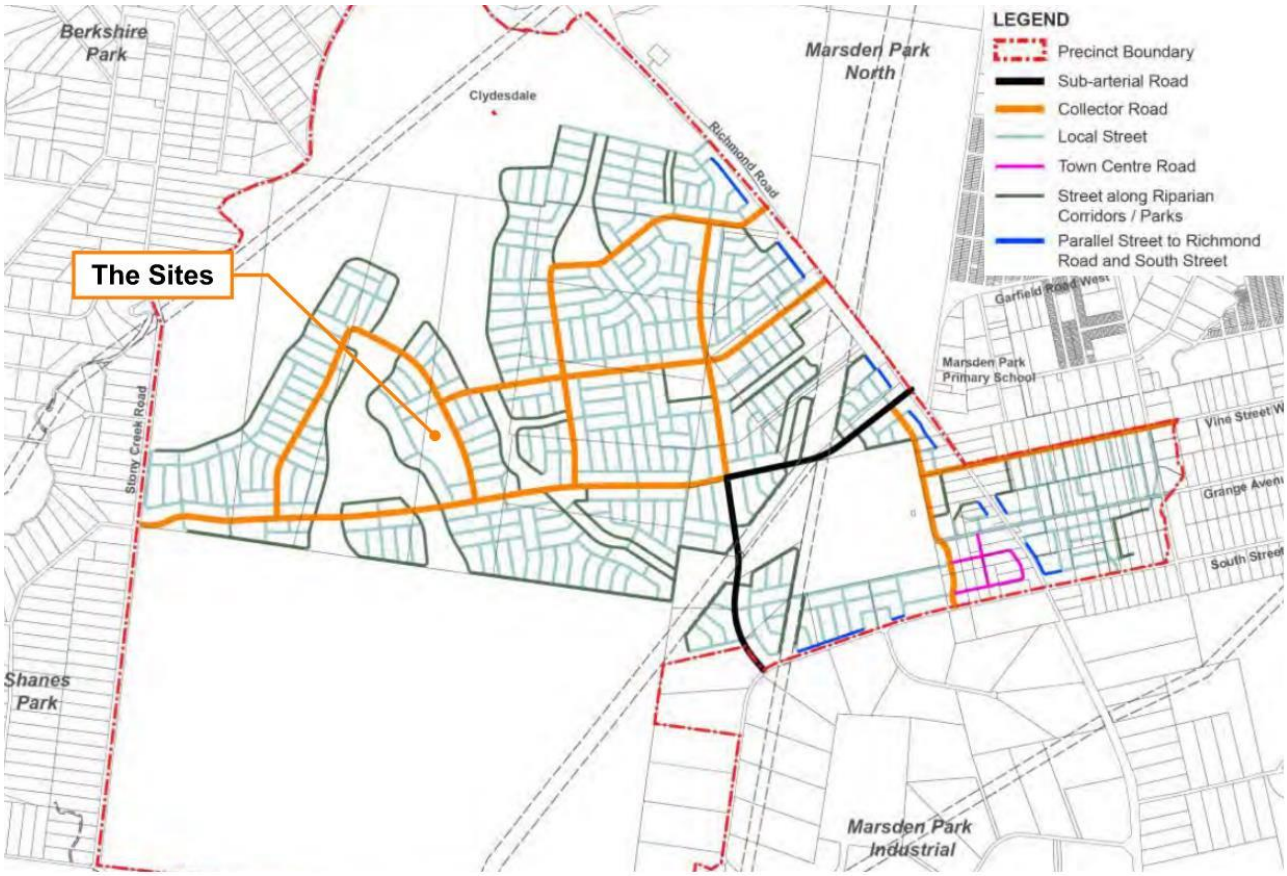


Figure 2.3: Road Hierarchy

Source: Figure 4-2 from Growth Centres DCP Schedule 6

Figure 2.4 and Figure 2.5 illustrate the cross sections for collector roads and local streets respectively, as documented in the Growth Centres DCP. These diagrams demonstrate that all roads within the local precinct (including minor local streets) will be provided with a minimum 1.5m footpath on both sides of the road. On collector roads, this is increased to a 1.5m footpath on one side and a 2.5m shared path on the other. The Growth Centres DCP does not define which side of the collector roads would be provided with the footpath or the shared path.

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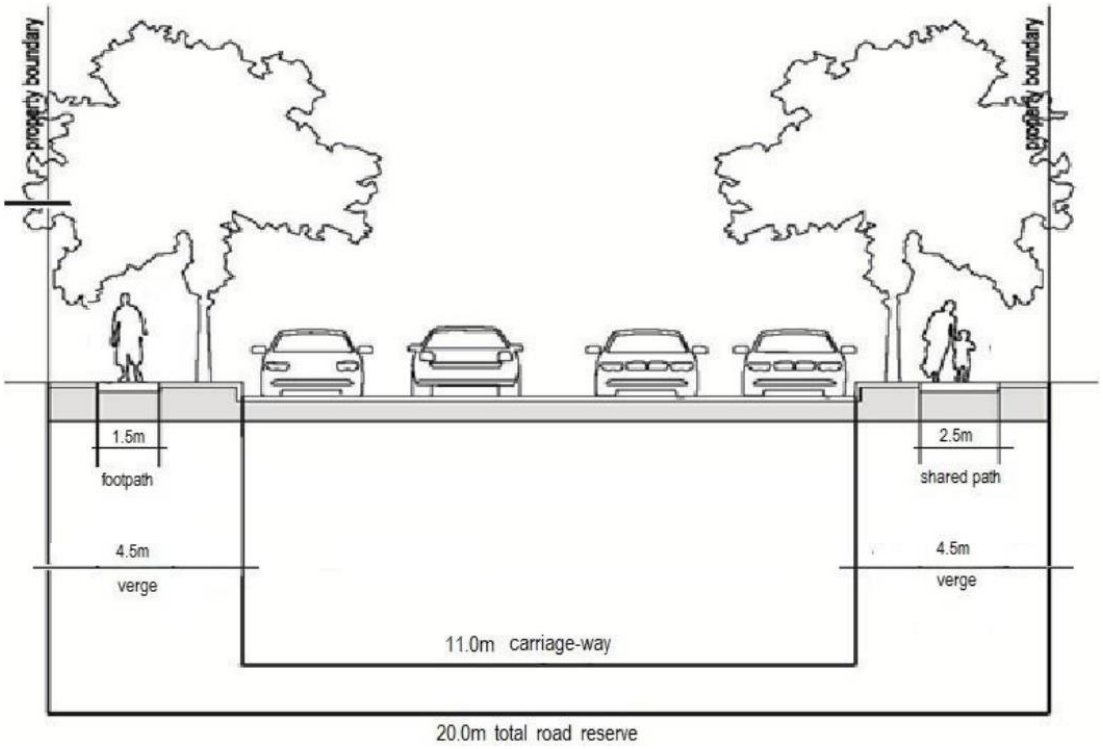


Figure 2.4: Typical collector road
Source: Figure 3-11 from Growth Centres DCP

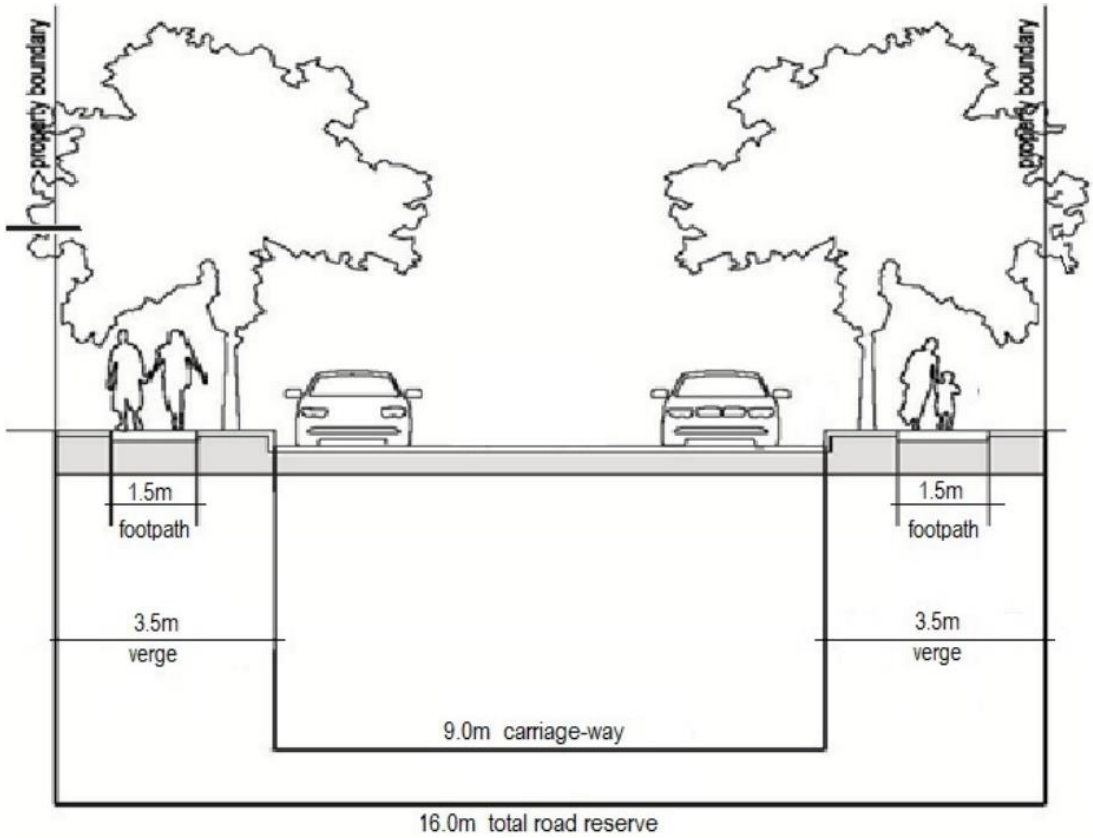


Figure 2.5: Typical local street
Source: Figure 3-12 from Growth Centres DCP

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The location of the site within the local road network and intersection controls are shown in Figure 2.6.



Figure 2.6: Intersection Controls and Local Road Network

2.3 Land Use

The sites' land is located within Blacktown City Council. Under State Environmental Planning Policy (Precincts - Central River City) 2021 - Appendix 11 Blacktown Growth Centres Precinct Plan, the sites are currently zoned R2 Low Density Residential as shown in Figure 2.7.

According to the Indicative Layout Plan developed by the Department of Planning and Infrastructure, the site has been planned as an indicative school site as shown in Figure 2.8.

Currently the sites are undeveloped and unoccupied.

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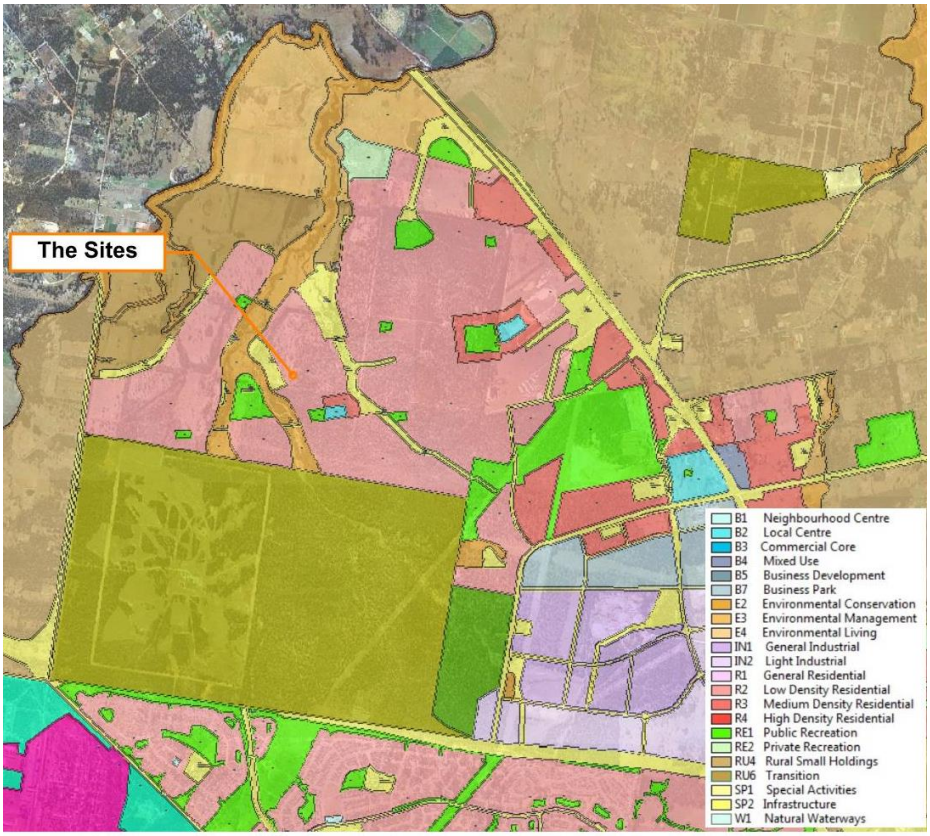


Figure 2.7: Land Zoning

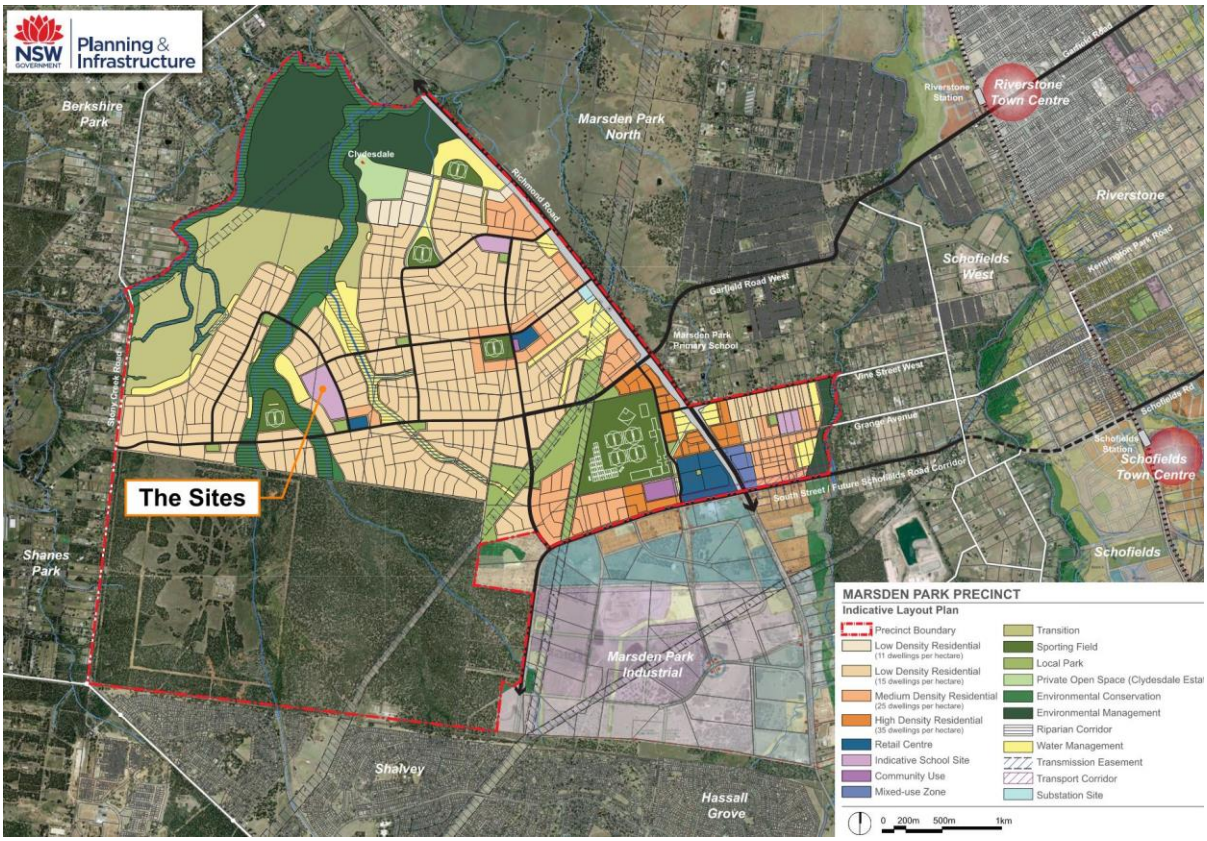


Figure 2.8: Marsden Park Precinct Indicative Layout Plan

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2.4 Site Access

As the sites are undeveloped and unoccupied by any land use, there are no existing formalised access points to the site.

2.5 School Catchment

2.5.1 Melonba (New Primary School)

Figure 2.9 shows the Melonba (new primary school) catchment and “crow-flies” catchment distances. The furthest catchment extent is approximately 1.7km to residential area (to the south-west) and 2.6km to the non-residential area (to the north).

Figure 2.10 shows the Melonba Primary school catchment and walking distance catchments for the 400m, 800m, 1200m, and 2400m walk. These are roughly equivalent to the 5-minute, 10-minute, 15-minute, and 30-minute walk respectively.

As shown in these figures, the entirety of the residential components (i.e. excluding parks and open space) of the MPS catchment is located within the School Student Transport Scheme (SSTS) exclusion zone. The vast majority is located within a 1200m or 15-minute walk to the site.



Figure 2.9: Melonba Primary School Catchment and Crow-Flies Catchments

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Figure 2.10: Melonba Primary School Catchment and Walking Distance Catchments

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2.5.2 Marsden Park High School

Figure 2.11 shows the Marsden Park High School catchment and “crow-flies” catchment distances. The furthest catchment extent is approximately 8km to the south-east.

Figure 2.12 shows the Marsden Park High school catchment and walking distance catchments for the 400m, 800m, 1200m, and 2400m walk. These are roughly equivalent to the 5-minute, 10-minute, 15-minute, and 30-minute walk respectively.

As shown in these figures, the suburb of Melonba is located fully within the School Student Transport Scheme (SSTS) exclusion zone. Further east, the suburb of Colebee and the industrial precinct of Marsden Park are located outside the SSTS exclusion zone.



Figure 2.11: Marsden Park High School Catchment and Crow-Flies Catchments

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Figure 2.12: Marsden Park High School Catchment and Walking Distance Catchments

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2.6 Public Transport

There are existing bus stops at both sides of Elara Boulevard (east of Roundabout with Kaluta Avenue), 3 minutes' walk to the site. The bus stops are serviced by 747, 748 and 751 lines, operated by Busways. The relevant services and destinations around the school are listed in Table 2.1, with all local routes shown in Figure 2.13.

Table 2.1: Bus Routes Surrounding the School

Bus Route Number	Bus Route
747	Rouse Hill Station to Mount Druitt via Riverstone & Marsden Park
748	Marsden Park to Rouse Hill Station via Schofields
751	Marsden Park to Blacktown via Colebee

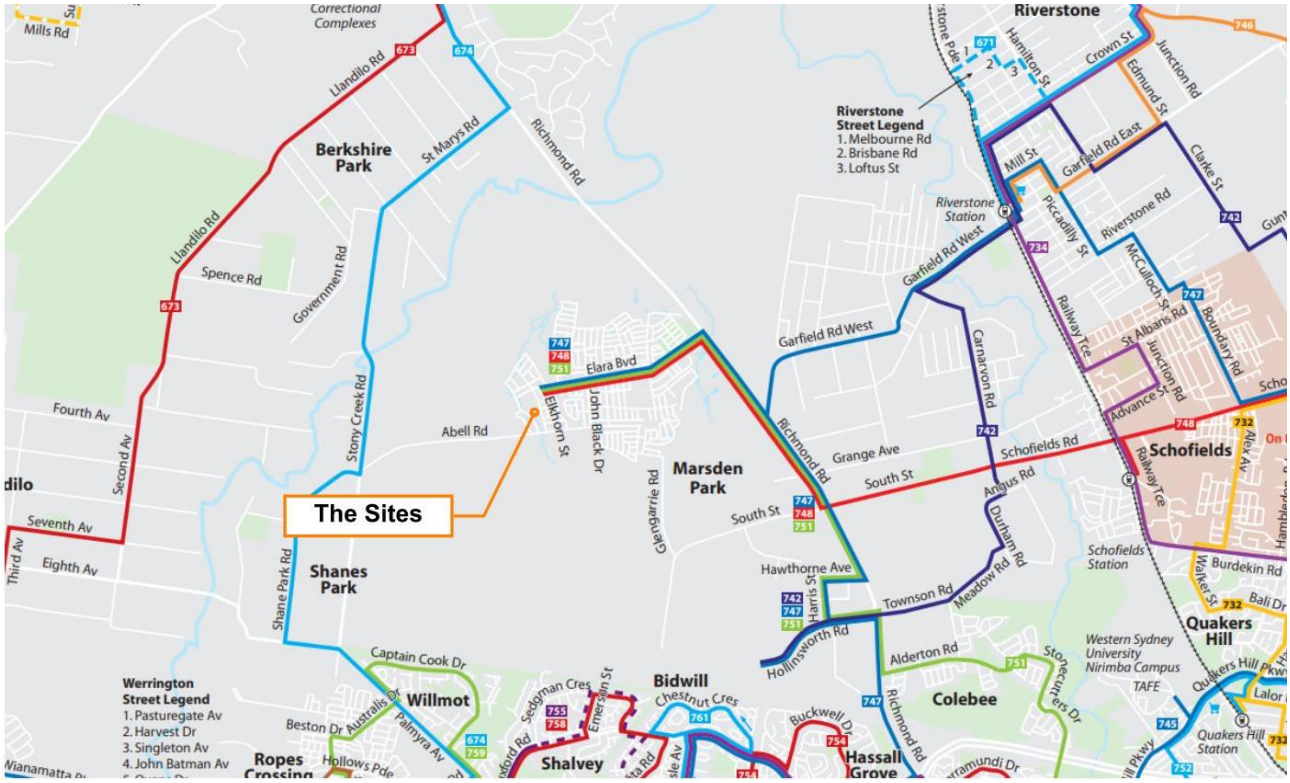


Figure 2.13: Marsden Park Bus Routes
Source: Transport for NSW

There are no train or metro stations near the site. However, the nearest stations at Riverstone and Schofields (train) and Tallawong (metro) are all accessible via direct bus connections from the bus stops near the site.

The existing bus services currently provide a good frequency of service. Table 2.2 describes the morning arrivals and afternoon departures per route, across the general peak period likely to be most relevant for a school site. A total over 17 buses arrive during the assessed morning period, and a total of 15 buses depart during the assessed afternoon period. Times are correct at time of writing but may be subject to change at any time.

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Table 2.2: Current bus servicing schedule
Source: Transport for NSW

Route	Arrivals	Departures
747	7:32am, 8:04am, 8:38am, 9:08am	2:42pm, 3:12pm, 3:37pm, 4:02pm
747	7:39am, 7:54am, 8:37am, 9:13am	2:37pm, 3:38pm, 4:27pm
748	7:48am, 8:04am, 8:34am, 9:04am, 9:34am	2:42pm, 3:12pm, 3:43pm, 4:02pm
751	7:59am, 8:29am, 9:00am, 9:29am	2:34pm, 3:04pm, 3:39pm, 4:09pm

2.7 Active Transport

2.7.1 Pedestrian Facilities

Council has advised[2] that footpaths will be constructed on both sides of the road in the precinct surrounding the development site (i.e. to the north of the black line shown in Figure 2.14), based on contribution requirements placed on those development approvals. Any future developments to the southern part of the precinct (i.e. to the south of the black line in Figure 2.14) would be required to fund footpaths.

It is assumed that these footpaths will be provided in accordance with the Growth Centres DCP, with minimum 1.5m footpaths to both sides of all streets, increased to 2.5m shared paths on one side of collector roads (to be confirmed by Council). Kaluta Avenue, to the eastern edge of the site, is a collector road as defined in the Marsden Park precinct road hierarchy. Cross sections for these road types are illustrated in Section 2.2. Currently there are no pedestrian crossings near the site.



Figure 2.14: Precinct Footpaths

[2] Email from Council dated 28 July 2022

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2.7.2 Cycling Facilities

Figure 2.15 shows the local cycling routes near the site according to the Cycleway Finder website. In addition to the Cycleway Finder network, there is a concrete shared bike path along west side of Galah Street which through the south connects to Rakali Parade and continues in the west to Abell Road, and through the north connects to Pepperberry Parade.



Figure 2.15: Cycling Map for Local Road Network
Image source: Cycleway Finder, June 2022

2.8 Car Parking

There are no parking restrictions in the nearby streets. On-street parking is generally unrestricted.

2.9 Network Performance

2.9.1 Traffic Data Collection Scope

To analyse the existing traffic conditions around the site, intersection movement counts were completed at various location in the vicinity of site. Traffic modelling has been undertaken for this data.

Intersection traffic counts were completed at the following intersections, during peak morning (7:45 – 8:45am) and afternoon (2:30 – 3:30pm) periods on Thursday 23 June 2022:

1. Elara Boulevard & Kaluta Avenue
2. Elara Boulevard & John Black Drive / Barrallier Drive
3. Elara Boulevard & Northbourne Drive

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4. Elara Boulevard & Richmond Road
5. Abell Road & Kaluta Avenue
6. Abell Road & Betula Parade
7. Abell Road & John Black Drive
8. Abell Road & Northbourne Drive
9. Abell Road/Garfield Road West & Richmond Road

The location of these intersection surveys is shown in Figure 2.16. The scope of intersection studies was reviewed and agreed with the Transport Working Group.

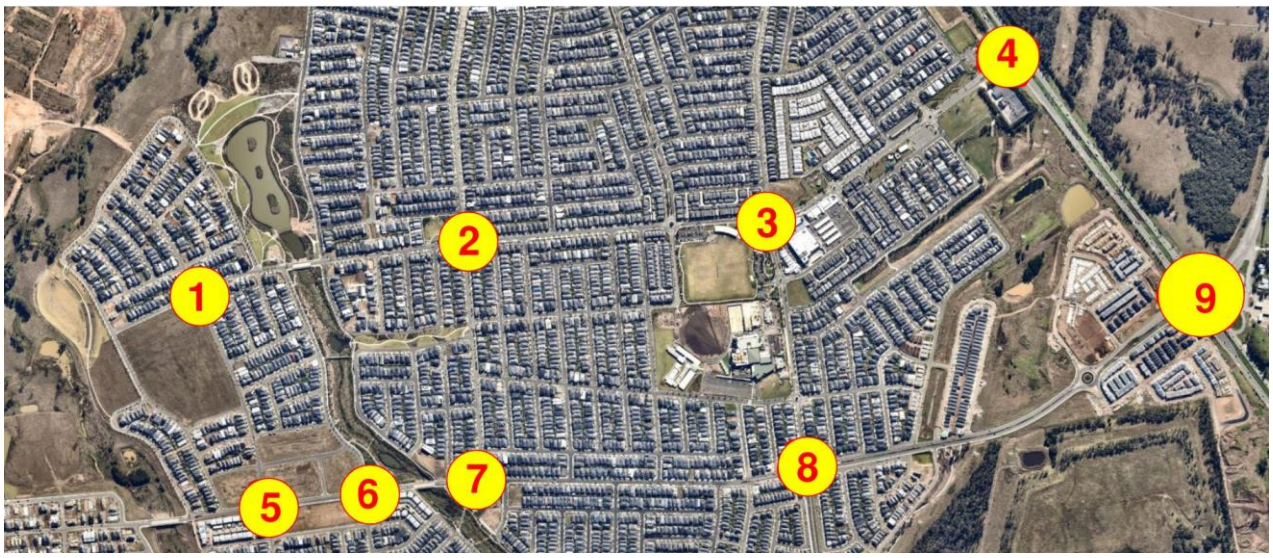


Figure 2.16: Location of Intersection Survey

2.9.2 Intersection Traffic Movements

Traffic movements in the surrounding road network were observed between 7:00am – 10:00am and 2:00pm – 5:00pm on Thursday, 23 June 2022. These times were selected as they relate to the anticipated peak traffic generating periods of the proposed development. Recorded data is attached in Appendix B of this report.

Based on the total network volumes surrounding the development, the morning peak hour occurred at 07:45 – 08:45 and the afternoon peak hour occurred at 14:30 –15:30.

Total intersection traffic volumes at the nominated study intersections are summarised in Table 2.3 and presented in Figure 2.17 to Figure 2.18, with full survey results included in Appendix B.

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Table 2.3: Traffic Volumes Summary

Intersection	Period		Total Volume (Mon.)
Elara Boulevard & Kaluta Avenue	AM	07:45-08:45	182
	PM	14:30- 15:30	129
Elara Boulevard & John Black Drive/Barrallier Drive	AM	07:45-08:45	1,016
	PM	14:30- 15:30	721
Elara Boulevard & Northbourne Drive	AM	07:45-08:45	1,559
	PM	14:30- 15:30	1,160
Elara Boulevard & Richmond Road	AM	07:45-08:45	3,280
	PM	14:30- 15:30	3,225
Abell Road & Kaluta Avenue	AM	07:45-08:45	285
	PM	14:30- 15:30	228
Abell Road & Betula Parade	AM	07:45-08:45	508
	PM	14:30- 15:30	402
Abell Road & John Black Drive	AM	07:45-08:45	932
	PM	14:30- 15:30	659
Abell Road & Northbourne Drive	AM	07:45-08:45	1,662
	PM	14:30- 15:30	1,254
Abell Road/Garfield Road West & Richmond Road	AM	07:45-08:45	5,068
	PM	14:30- 15:30	4,567

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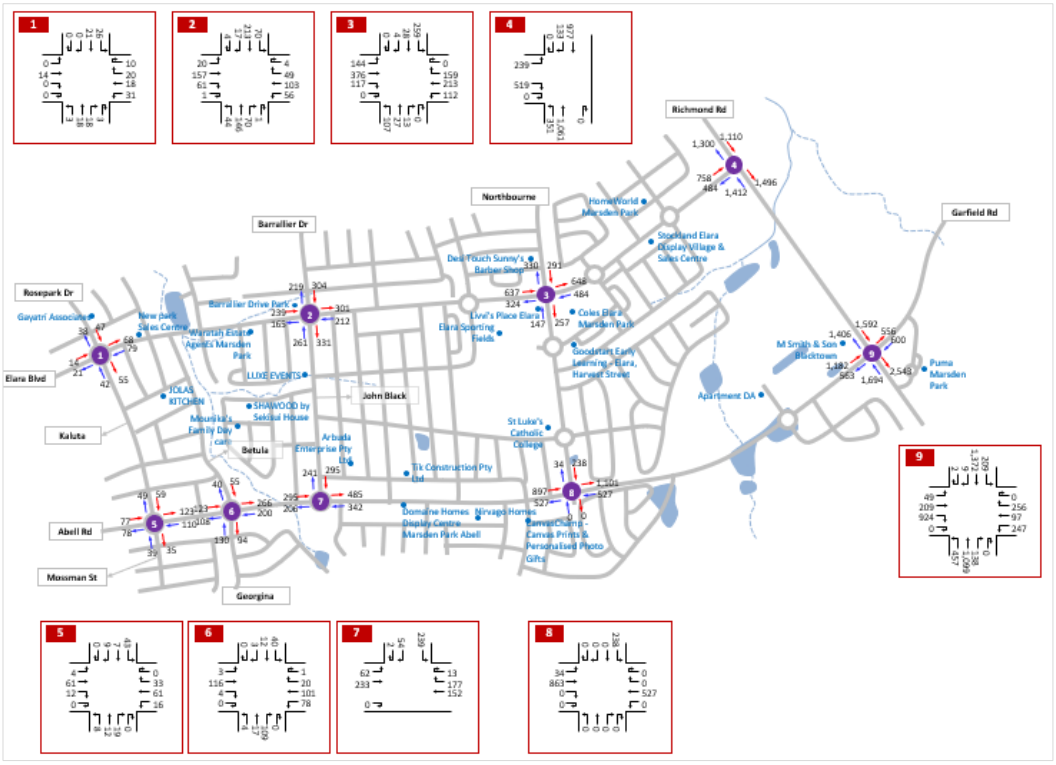


Figure 2.17: Trip Volume Summaries – AM Peak – Thursday 23 June 2022

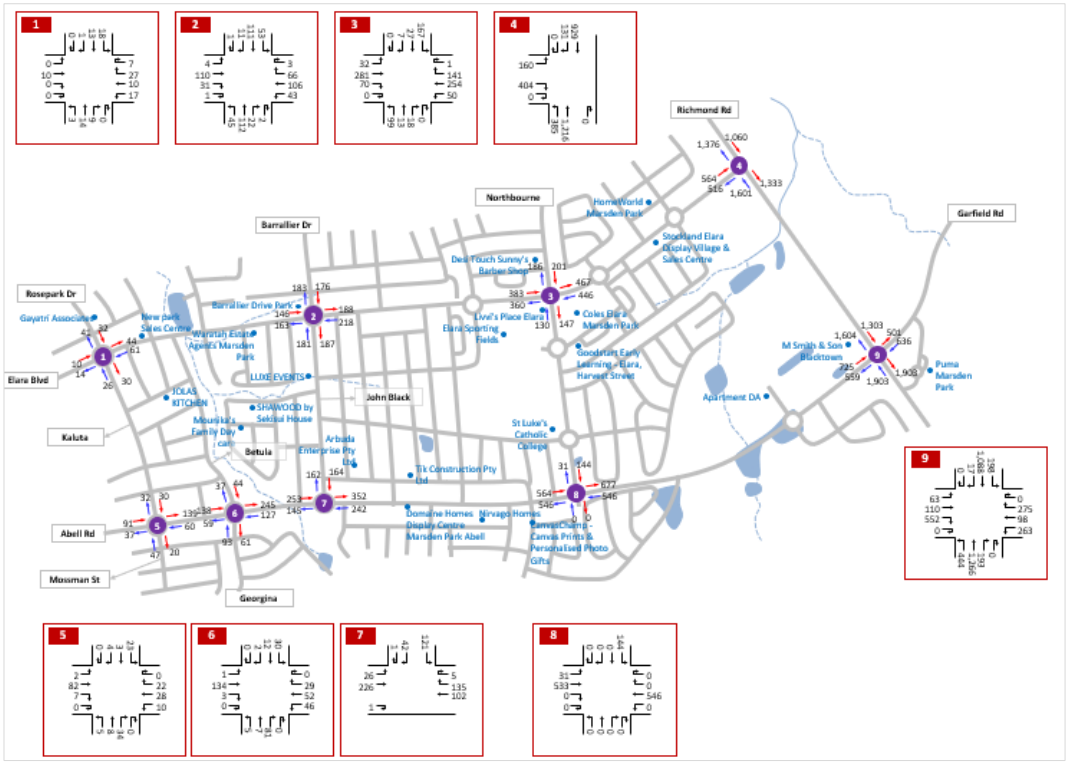


Figure 2.18: Trip Volume Summaries – PM Peak – Thursday 23 June 2022

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2.10 Intersection Analysis

2.10.1 Modelling Calibration

TCS plans for both of the signalised intersections on Richmond Road have been used to calibrate and determine the phasing information for use in the SIDRA model.

Historical SCATS phasing and timing data has been used to calibrate the SIDRA model and calculate the cycle times for both the signalised intersections on Richmond Road. The average phase times shown in Table 2.4 have been calculated as the average phase times across each 15-minute interval for both the morning and afternoon peak periods.

Table 2.4: Summary of Cycle Times

Intersection	Peak Period	Phase	Average Phase Time
Elara Boulevard & Richmond Road	**AM**	**A**	91
		B	18
		C	32
		Cycle time (sec)	**141**
	PM	**A**	92
		B	18
		C	25
		Cycle time (sec)	**140**
Abell Road & Richmond Road & Garfield Road	**AM**	**A**	64
		D	42
		E	16
		G	18
		Cycle time (sec)	**140**
	PM	**A**	66
		C	18
		D	31
		E	17
		G	23
		Cycle time (sec)	**155**

2.10.2 Intersection Modelling

SIDRA intersection modelling has been completed for the selected intersections at the identified morning and afternoon peak periods. Table 2.5 summarises the operation and performance of the intersections with existing traffic volumes, with full results presented in Appendix C**.**

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Table 2.5: Summary of Existing Conditions Intersection Modelling

Data for unsignalised intersections is the manoeuvre with the worst delay

Intersection	Peak Period	Avg Delay (sec)	DoS	LOS	Avg. queue Length (m)
Elara Boulevard & Kaluta Avenue	**AM**	10.1	0.063	A	0.8
	PM	10.0	0.045	A	0.5
Elara Boulevard & John Black Drive / Barrallier Drive	**AM**	11.7	0.357	A	7.7
	PM	10.3	0.161	A	3.1
Abell Road & Kaluta Avenue	**AM**	9.7	0.036	A	0.6
	PM	9.6	0.027	A	0.3
Abell Road & Betula Parade	**AM**	10.3	0.054	A	0.8
	PM	10.3	0.043	A	0.6
Abell Road & John Black Drive	**AM**	11.5	0.318	A	6.8
	PM	11.1	0.176	A	3.3
Elara Boulevard & Richmond Road	**AM**	28.5	0.678	C	139.0
	PM	20.5	0.691	B	118.1
Abell Road & Richmond Road & Garfield Road	**AM**	48.7	0.931	D	241.1
	PM	36.3	0.790	C	144.2

2.10.3 Intersection Performance

Based on the results outlined in Table 2.5, the nominated study intersections operate at a satisfactory Level of Service (LOS) during both the AM and PM peak conditions. A LOS of A is achieved across all local intersections in all scenarios. For the main road intersections along Richmond Road, performance ranges from LOS B to LOS D.

All intersections show a Degree of Saturation (DoS) well below the typical accepted limit of 0.850, with the exception of Abell Road & Richmond Road which operates at DoS 0.931 in the AM peak. Despite the high DoS in this scenario, the intersection operates at LOS D.

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3 Proposed Development

3.1 Overall Works

The proposal is for the construction of two new schools, a new high school in Marsden Park and a new primary school in Melonba, located at 20 Kaluta Avenue and 10 Swallowtail Street, Melonba.

Marsden Park new high school is a new secondary school comprising:

- 97 general learning spaces (GLS) and specialist teaching spaces;
- Three supported education learning unit (SELU) rooms;
- School hall, and lecture and movement studio;
- Administration spaces;
- Staff and student facilities;
- Library
- Canteen;
- Sports courts;
- Playing field;
- Landscaping and outdoor learning areas;
- Covered outdoor learning area (COLA); and
- Car parking (shared with Melonba new primary school).

Melonba new primary school will comprise:

- 44 GLS;
- Three SELU rooms;
- Administration and staff facilities;
- Canteen;
- Multi-purpose hall;
- Library;
- Out of School Hours Care (OSHC);
- COLA;
- Outdoor play areas including sports courts; and
- Landscaped outdoor learning areas.

A summary table of the student capacity and estimated staffing is shown in Table 3.1.

Table 3.1: Proposed Capacities

User Group	Marsden Park High School	Melonba Public School	Total
Students	2,000	1,000	3,000
Staff	151	68	219

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The proposed site plan is illustrated in Figure 3.1 below and all elements are further detailed in later sections of this report.

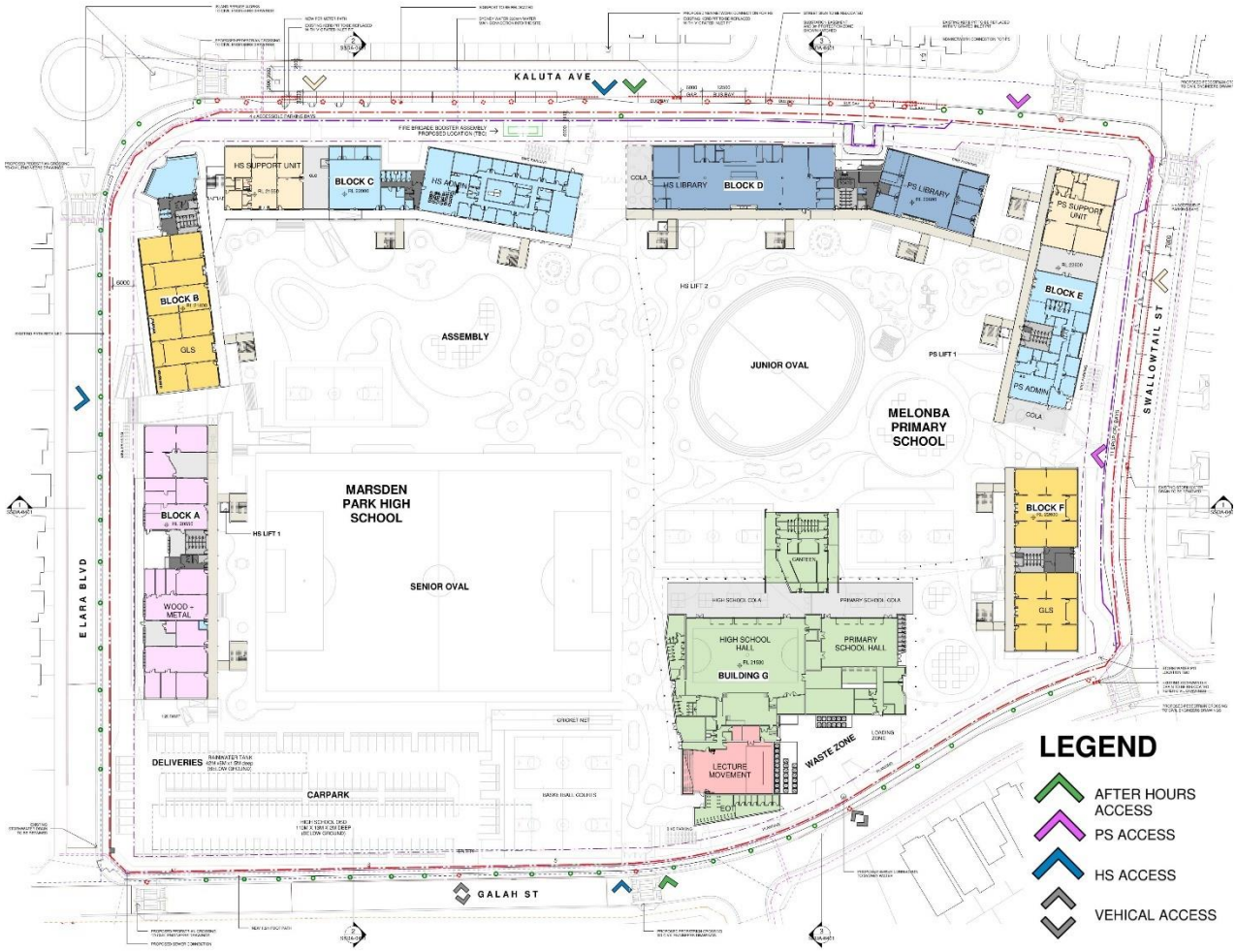


Figure 3.1: Proposed Site Plan
Source: NBRS Architecture, dated 11/08/22

3.2 Site Access

Access to Melonba Primary School and Marsden Park High School will be available via multiple access points, shown in Figure 3.1 and detailed below:

- High school access from Elara Boulevard, Kaluta Avenue and Galah Street
- Primary school access from Kaluta Avenue and Swallowtail Street
- After-hours access from Galah Street and Kaluta Avenue
- Car park access from Galah Street
- Waste vehicle access from Galah Street

3.2.1 Primary School Entry

Pedestrian access to the primary school is provided through two different locations at Kaluta Avenue and Swallowtail Street.

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3.2.2 High School Entry

Pedestrian access to the high school is provided through three different locations at Kaluta Avenue, Elara Boulevard and Galah Street. The access points on Kaluta Avenue and Galah Street are also to be used for after-hours access.

3.2.3 Bike Access

There are multiple proposed bike parking pods at the development, distributed across each of the four site frontages. The final locations and configuration (including the number of parking spaces in each location and the selection of storage products such as bike rails) will be finalised prior to construction and will be in accordance with Australian Standard AS2890.3.

3.2.4 Car Park Access

The proposed car park access point is located on Galah Street to the south of the site. This access point is a combined entry/exit with approximate width 7.5m. This car park is allocated to staff only.

3.3 Pedestrian Facilities

General pedestrian strategy:

- Connect to existing and future key routes and creek crossings
- Provide zebra crossings at corners of site

As Figure 3.2 illustrates, there are seven pedestrian crossings proposed as detailed below:

- Raised pedestrian zebra crossing south of the intersection of Elara Boulevard and Galah Street
- Raised pedestrian zebra crossing north of the intersection of Rakali Parade and Galah Street
- Raised pedestrian zebra crossing north of the intersection of Swallowtail Street and Galah Street
- Raised pedestrian zebra crossing west of the intersection of Swallowtail Street and Kaluta Avenue
- Raised pedestrian zebra crossing south of the intersection of Kaluta Avenue and Periwinkle Street
- Raised pedestrian zebra crossing west of the intersection of Elara Boulevard and Kaluta Avenue
- Raised pedestrian zebra crossing south of the intersection of Elara Boulevard and Kaluta Avenue

The two raised crossings proposed on Elara Boulevard, which is a bus route, would be designed in accordance with the State Transit Bus Infrastructure Guide. The remaining crossings on local roads would be designed to Blacktown City Council standards.

Further information on the anticipated pedestrian demand for the proposed crossing locations is outlined in Section 4.4.3 of this report.

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Figure 3.2: Proposed Pedestrian Crossings

3.4 Cyclist Facilities

The general cycling and rideables strategies are to:

- Provide access to pedestrian network and Shared Path network
- Provide on-site storage for students to EFSG rates or higher
- Provide end-of-trip facilities (EOTF) for staff

The proposed cycling facilities are as below:

- Multiple bike stores distributed across each frontage of the site for use by students
- Combined end-of-trip facility for MPHS and MPS staff including 40 bicycle parking spaces, 6 showers with change areas, plus lockers in accordance with *NSW Planning Guidelines for Walking and Cycling*.
- 84 bicycle parking spaces for MPHS students plus 60 bicycle parking spaces for MPS students

The layout of the staff end-of-trip facilities and staff bicycle storage is shown in Figure 3.3. The student bicycle parking is distributed around the site near each of the entry points as illustrated on current architectural documentation, however locations are conceptual and may be adjusted prior to or during construction.

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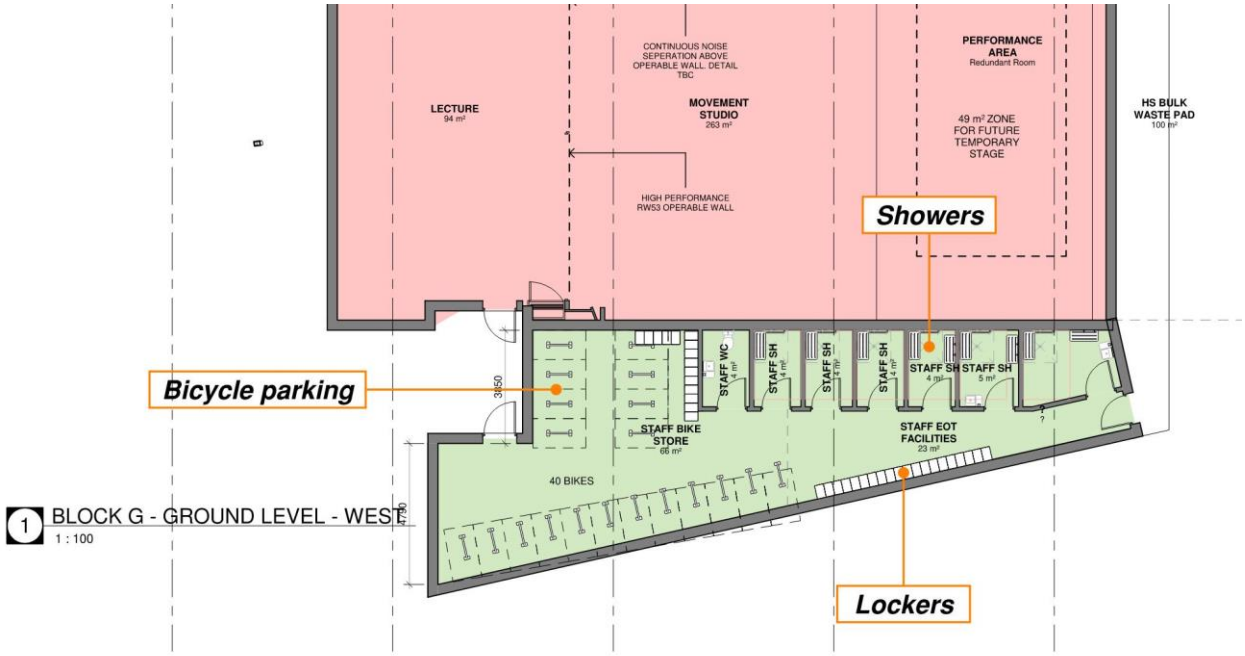


Figure 3.3: Proposed End-of-Trip Facilities
Source: NBRS Architecture, dated 11/08/22

3.5 Public Transport Access

The general public transport strategy is to:

- Provide an indented bus bay to Kaluta Avenue frontage (northbound), as shown in Figure 3.4
- Seek improved afternoon servicing for route 747 (only selected services continue past site)
- Seek increased frequency of all services and/or dedicated school specials – approximately 1,000 student potential demand
- Provide connectivity to existing bus stop for any relevant services (e.g. southbound)

3.6 Service Vehicle Access

A shared service vehicle area including waste and delivery services is located to the south-west of the site with an entry/exit access point at Galah Street, as shown in Figure 3.1.

An additional delivery area is located at north-east of the car park.

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3.7 Pick-up and Drop-off (Kiss & Ride)

The proposed works relating to kiss & ride in this project include:

- Road widening to accommodate a kiss & ride bay on Swallowtail Street (approximately 16 vehicles)
- Road widening to accommodate a kiss & ride bay on Kaluta Avenue (approximately 16 vehicles)
- All relevant signage and line marking (anticipated to be 'No Parking' zones during peak periods)
- Inclusion of on-street accessible bays within the indented kiss & ride bays to serve the SELU

The Figure 3.4 illustrates the proposed parking restrictions and traffic conditions around the site, including the kiss & ride zones.

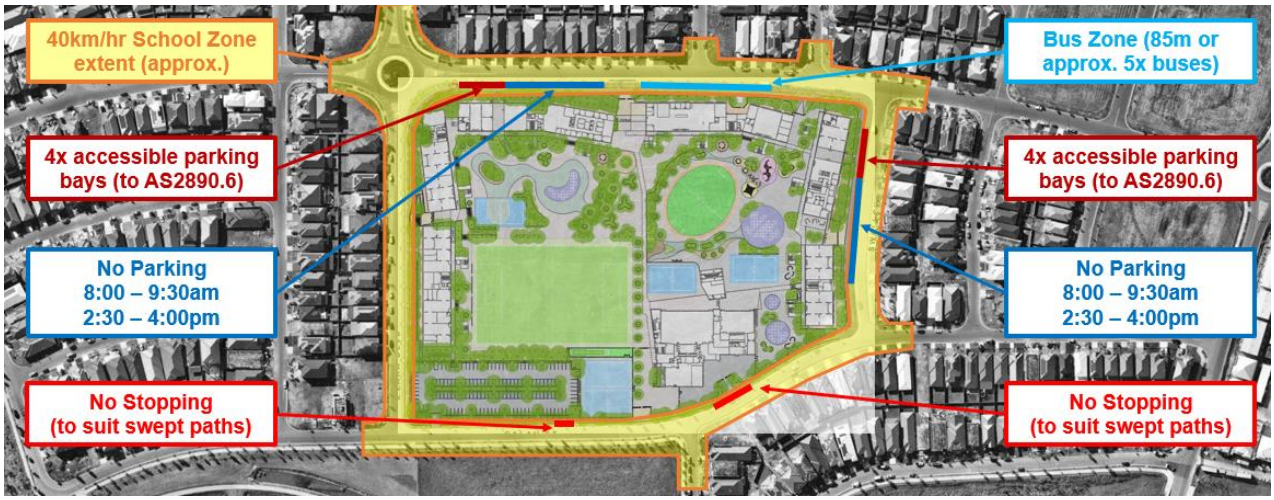


Figure 3.4: Proposed Parking Restrictions and Traffic Conditions

We note that Council has raised concerns regarding the on-street accessible drop-off bays, in relation to the unsafe or improper operation of these bays. The current scheme includes the provision of 4 on-street accessible bays for each of the primary school (at Swallowtail Street) and high school (at Kaluta Avenue). We propose that these bays provide a sufficient and high level of safe operation because:

- The design is developed in accordance with Australian Standards (specifically AS2890.6) which is specifically developed to ensure safe operation.
- The accessible bays are proposed in order to cater for a relatively small portion of users; when the additional width is not being used, the proposed works would deliver additional excess road width which will provide safety improvements particularly to Swallowtail Street which is narrow.
- Mobility parking permit holders may only utilise unlimited parking exemptions[3] where a signposted time limited is more than 30 minutes. Where a signposted time limit is less than 30 minutes, permit holders may only park for a maximum of 30 minutes. In areas signposted as 'No Parking', permit holders can stop for up to 5 minutes to drop-off or pick-up passengers or goods (compared to 2 minutes for general drivers).

[3] 'Where you can use a mobility parking permit' - https://www.nsw.gov.au/driving-boating-and-transport/driver-and-rider-licences/health-conditions-and-disability/disability-parking-permits/using-your-permit

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3.8 Car Parking

The car parking provision includes 142 spaces based on a 65% staff parking rate. An overview of the proposed parking layout is illustrated in Figure 3.1.

Further discussion and analysis relating to the adequacy of this car parking provision is provided in Section 4.9.

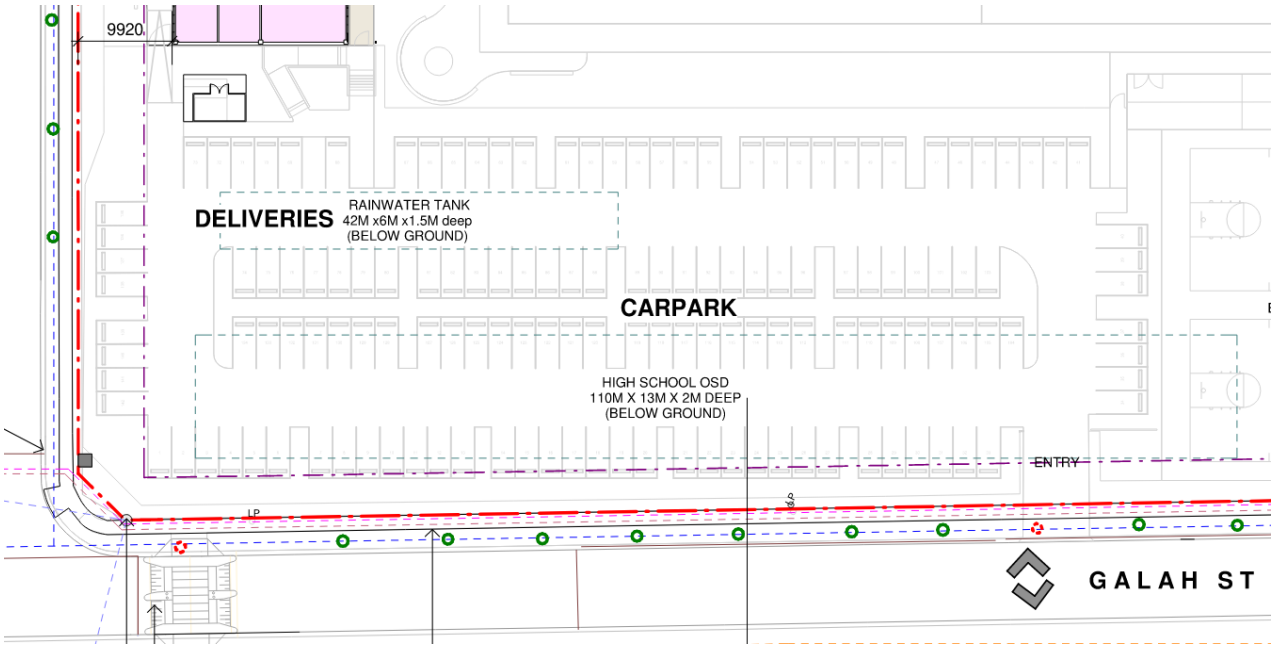


Figure 3.5: Proposed On-site Parking
Source: NBRS Architecture, dated 01/09/22

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4 Operational Impacts

4.1 Transport Hierarchy

The transport strategy for the project is designed as a sustainable transport strategy, prioritising non-vehicle modes such as active transport (i.e. walking, cycling) and public transport and discouraging private vehicle travel (including kiss & ride and car parking). This hierarchy is indicatively illustrated in Figure 4.1.

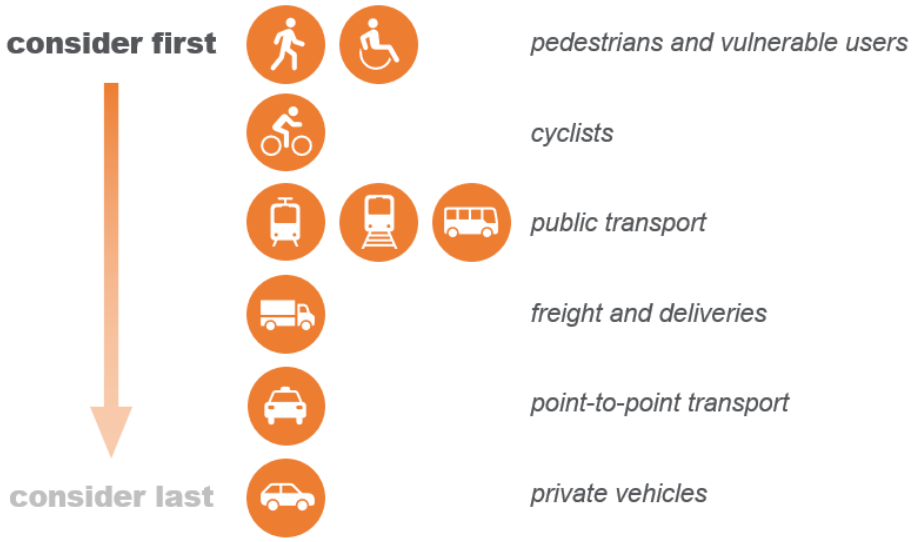


Figure 4.1: Sustainable Transport Hierarchy

This strategy is consistent with NSW state government policy, specifically the Road User Space Allocation Policy. This strategy is applied across all current SINSW projects and has been presented to Council and TfNSW through the Transport Working Group consultation stream.

4.2 Travel Demands

To calculate total travel demands, forecast travel mode splits have been developed based on a combination of existing travel habits at comparable sites, plus anticipated travel habits based on the school catchments and the project's transport provisions.

A sample of existing travel habits at comparable sites include:

- Existing 47% walking split at Carlingford West Public School, and 25% at Pendle Hill High School
- Existing high bicycle usage at John Palmer Public School (exceeding 90 spaces for ~900 students)
- Existing 52% (AM) and 65% (PM) bus usage at Cumberland High School
- Existing 28% (AM) and 14% (PM) kiss & ride activity at Cumberland High School
- Existing <0.5% bus usage at John Palmer Public School or 0.5% usage at Carlingford West Public School

Site-specific considerations for the school catchment intake areas include:

- A highly walkable catchment for the proposed Melonba Primary School
- The high number of existing (and additional forecast) bus services within the local area and to stations
- TfNSW's recently released *Future Transport Strategy* indicates future provision of rail and rapid bus services to the Marsden Park area

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Other relevant policies and considerations include:

- The schools will facilitate new students on new sites and allow new travel habits to be created
- Department of Education (DoE) policy in relation to car parking provision for students (i.e. nil)
- Local staff recruitment considerations are currently under review by DoE

Importantly, the project is seeking to use the opportunities presented by a new site to establish a new baseline which differs from other existing schools. In transport planning terminology, this is the change from a 'predict and provide' methodology based on existing behaviours to a 'decide and provide' methodology to achieve a preferred future and vision. In order to avoid generating high levels of additional vehicular traffic through induced demand, transport provisions and capacity are specifically targeted and are supported with infrastructure and services across the full spectrum of transport options.

This strategic vision is also consistent with the recently released Future Transport Strategy, which in relation to schools states as a specific priority action (which are "actions to be implemented as a priority, with the view to delivery outcomes in 1-5 years"):

> *"Partner with the Department of Education and key stakeholders to improve safe walking, cycling and public transport access to schools."*[4]

This priority action indicates that higher levels of walking, cycling, and public transport, and conversely lower levels of private vehicle travel, are of high importance to the success of local neighbourhoods, and that existing travel behaviours are expected to change as new facilities or services are implemented.

On these grounds, the travel mode splits outlined above and used in the assessment of this development are considered realistic and feasible. Post-development, a School Transport Plan will be implemented to ensure the ongoing management and encouragement of more sustainable travel modes.

As detailed in Section 3.1, the proposed development capacity is for 3,000 students (2,000 high school plus 1,000 primary school) and 219 staff (151 high school plus 68 primary school). The forecast travel demands for these populations are estimated as shown in Table 4.1, Table 4.2 and Table 4.3.

It should also be noted that a growth in student and staff population (and therefore travel demands) is expected over time, rather than an immediate introduction of full demands of the site.

Table 4.1: Forecast Travel Mode Splits and Volumes – Primary School
Values may not add exactly, due to rounding

	Students		Staff	
Travel mode	**Mode split**	**Volume**	**Mode split**	**Volume**
Walk	50%	500	5%	3
Bicycle / scooter	10%	100	5%	3
Bus	<1%	0	10%	7
Car (passenger)	40%	400	15%	10
Car (driver)	0%	0	65%	44
Total	**100%**	**1,000**	**100%**	**68**

[4] Action P2.1g

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Table 4.2: Forecast Travel Mode Splits and Volumes – High School
Values may not add exactly, due to rounding

	Students		Staff	
Travel mode	**Mode split**	**Volume**	**Mode split**	**Volume**
Walk	25%	500	5%	8
Bicycle / scooter	5%	100	5%	8
Bus	50%	1,000	10%	15
Car (passenger)	20%	400	15%	23
Car (driver)	0%	0	65%	98
Total	**100%**	**2,000**	**100%**	**151**

Table 4.3: Forecast Travel Mode Splits and Volumes – Total
Values may not add exactly, due to rounding

Travel mode	Students	Staff
Walk	1,000	11
Bicycle / scooter	200	11
Bus	1,000	22
Car (passenger)	800	33
Car (driver)	0	142
Total	**3,000**	**219**

4.3 Traffic Generation

4.3.1 Students Volumes

The forecast volumes for students travelling via private vehicle to the site is 400 for the primary school and 400 for the high school, as outlined in Table 4.1 and Table 4.2, respectively. An occupancy rate of 1.2 students per vehicle is applied, generating a forecast of approximately 333 vehicles for the primary school and 333 vehicles for the high school across each peak period.

As detailed in the tables above, the transport strategy and travel mode split for this project is to achieve zero usage of travel by car as driver for students (i.e. senior students driving themselves to site). This can be achieved by providing the supplementary infrastructure and services for pedestrian, cyclist, and public transport activity, which are included as key components of this proposal. This will result in a change relative to travel habits at other comparable schools[5] and therefore a direct forecast based on comparable schools has not been made in this case.

[5] Cumberland High School = 3% total or 5% Year 11 & 12. Northmead CAPA High School = 1% total or 4% Year 11 & 12. Pendle Hill High School = 8% total however these responses were from Year 7 – 9 students, suggesting this was mistaken for drop-off rather than driving. Glenwood High School = 8% total however the school's estimates were not divided by year group. Equivalent usage at an average total rate of 2% (based on Cumberland and Northmead where specific year-group data is available) would be 40 students for MPHS.

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Additionally, it is anticipated that the new high school will initially open with students in junior year groups who would be too young to drive to school. By the time those students have reached driving age in the senior year groups, their travel habits will be already established on other transport modes. This provides this site with the opportunity to embed sustainable travel habits and behaviour from the opening day onwards.

4.3.2 Staff Volumes

The total number of staff travelling via private vehicle to the site is 175, comprising 142 staff as driver plus 33 staff as passenger, as outlined in Table 4.3. Only 142 vehicle trips would be generated.

4.3.3 RMS Rates

For the purposes of comparison only, standard rates have been compared against the site-specific rates detailed above.

The TfNSW (previously RMS) *Guide to Traffic Generating Developments* does not provide a trip generation rate specifically for school premises. However, reference can be made to TfNSW's Trip Generation Surveys, Schools Analysis Report prepared on the 25th of August 2014 which gives the school trip generation rates as shown in Table 4.4 and Table 4.5.

Peak Vehicle Trip Generation based on TfNSW Rates are shown in Table 4.6 and Table 4.7.

Table 4.4: Primary School Trip Generation Rates
Source: TfNSW Trip Generating Surveys – Schools – Analysis Report (GTA, 2014)

Period	Average	Minimum	Maximum	Range
	Peak Person Trip Rates per Students			
AM	**1.6**	1.3	1.96	0.66
PM	**1.7**	1.46	1.99	0.53
	Peak Vehicle Trip Generation per Student Summary			
AM	**0.67**	0.43	0.92	0.49
PM	**0.53**	0.14	0.98	0.84

Table 4.5: Secondary School Trip Generation Rates
Source: TfNSW Trip Generating Surveys – Schools – Analysis Report (GTA, 2014)

Period	Average	Minimum	Maximum	Range
	Peak Person Trip Rates per Students			
AM	**1.14**	0.91	1.45	0.54
PM	**1.05**	0.78	1.66	0.88
	Peak Vehicle Trip Generation per Student Summary			
AM	**0.51**	0.16	0.83	0.67
PM	**0.28**	0.15	0.51	0.36

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Table 4.6: Primary School Peak Vehicle Trip Generation per Student based on TfNSW Rates

Period	Average	Minimum	Maximum	Range
AM	670	430	920	490
PM	530	140	980	840

Table 4.7: High School Peak Vehicle Trip Generation per Student based on TfNSW Rates

Period	Average	Minimum	Maximum	Range
AM	1020	320	1660	1340
PM	560	300	1020	720

4.4 Trip Distribution

4.4.1 Student Trip Distribution

The vehicle volumes generated by students are distributed across the road network as indicated in Figure 4.2 and Figure 4.3 for the primary school, and Figure 4.4 and Figure 4.5 for the high school.

Traffic distribution has been developed based on the following assumptions:

- Vehicles related to the primary school travel to and from the pick-up and drop-off zone on Swallowtail Street, and the vehicles relating to the high school travel to and from the pick-up and drop-off zone on Kaluta Avenue.
- The future road network was applied including a connection between Ribbonwood Crescent to the north as shown in Figure 2.3.
- The origin destination matrix was developed according to future land use as illustrated in Figure 2.7, using the total land area of each land zoning block and applying the relevant density ratios to these zones, and using this distribution to convert an anticipated population density into trip distribution percentages.
- The inbound traffic and outbound traffic have both been applied for morning peak and afternoon peak to consider movements both to and from the pick-up and drop-off areas.

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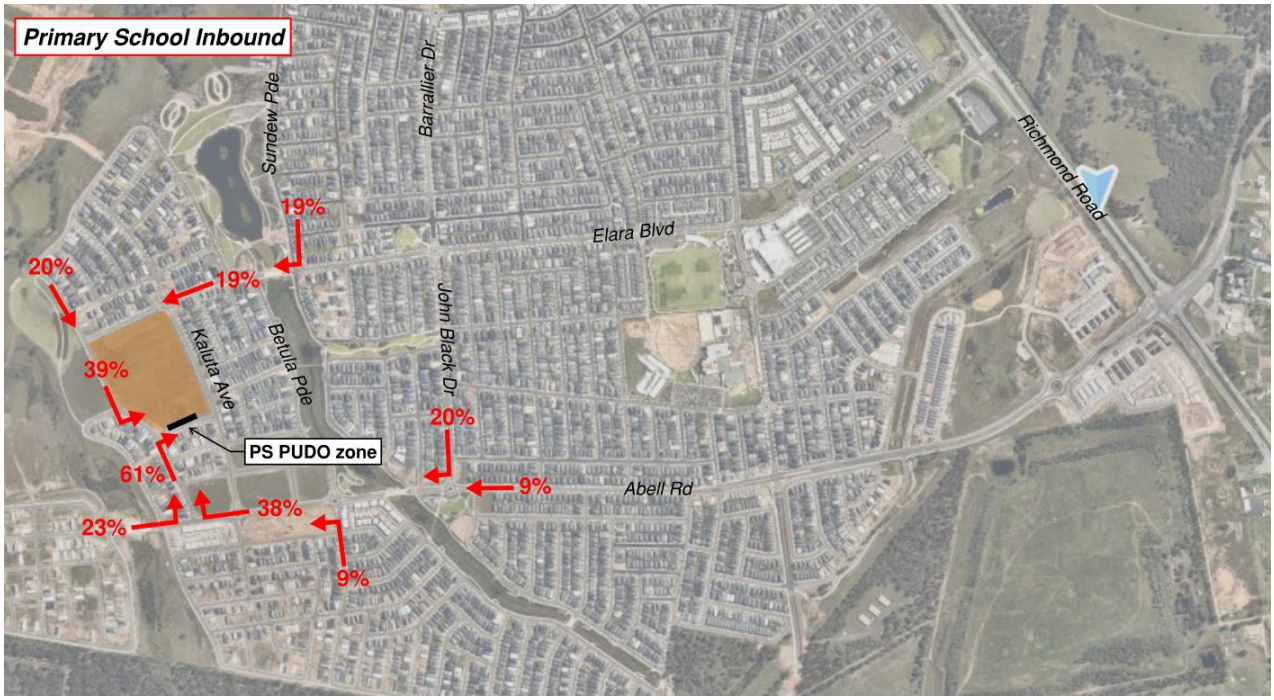


Figure 4.2: Trip distribution for primary school arrivals

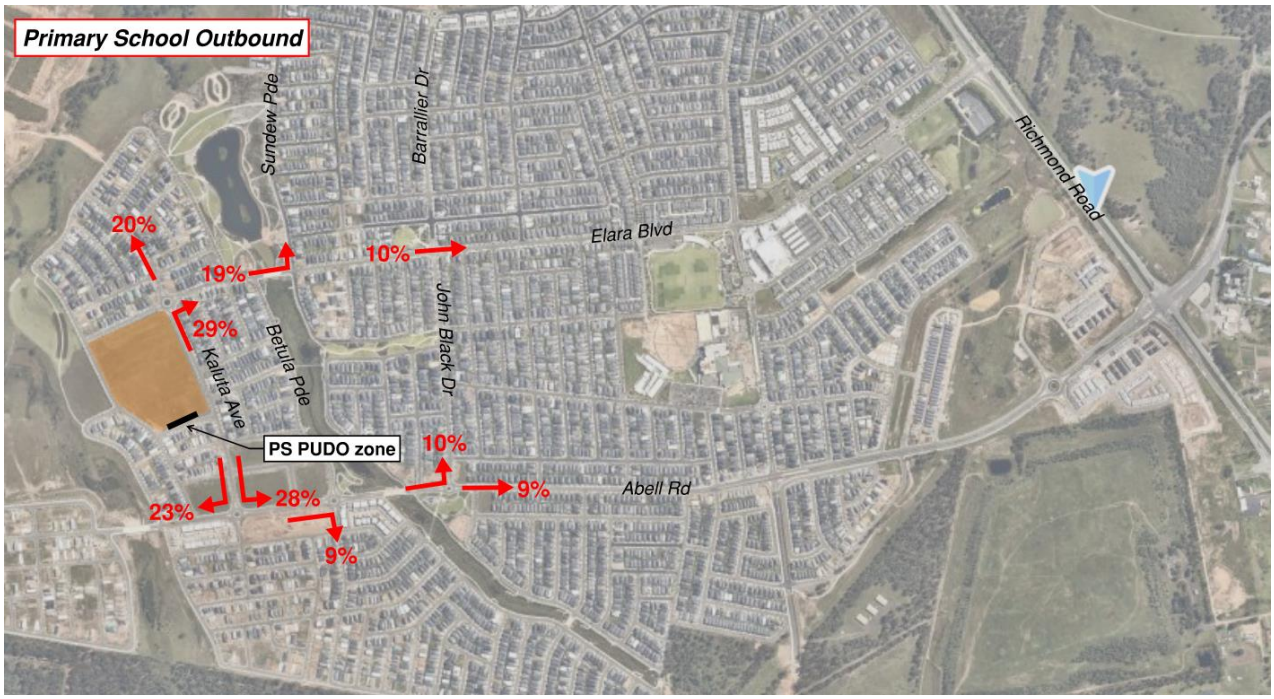


Figure 4.3: Trip distribution for primary school departures

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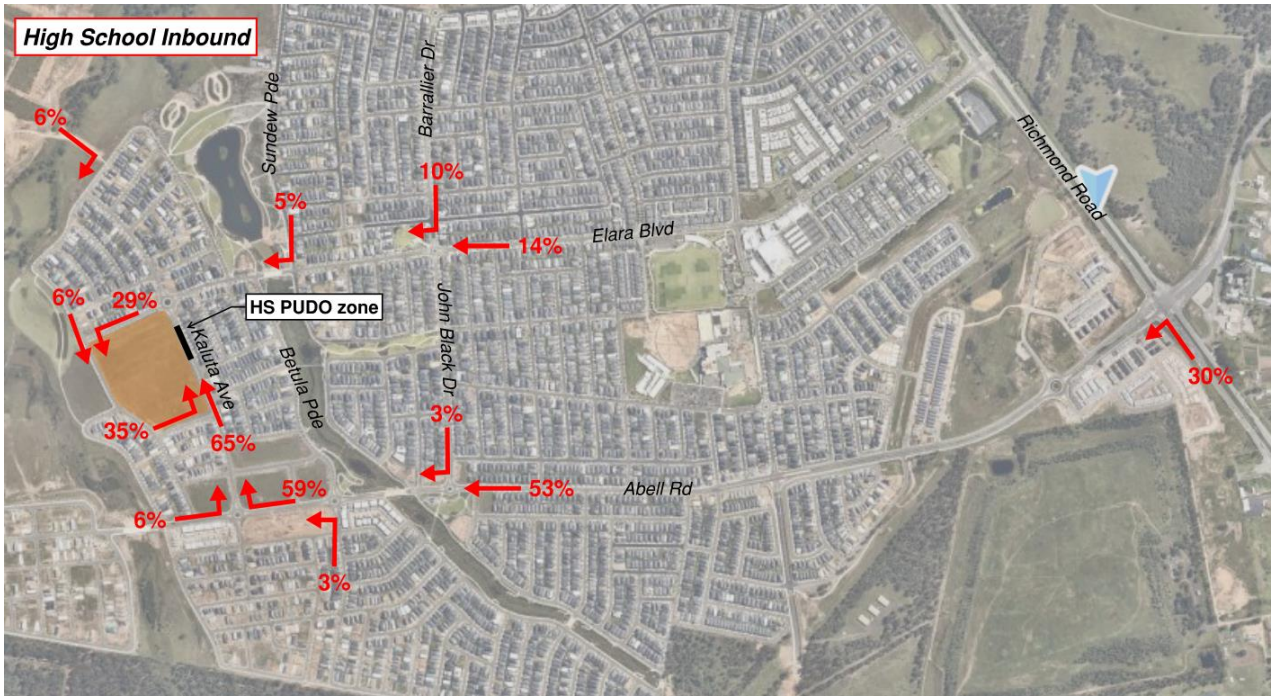


Figure 4.4: Trip distribution for high school arrivals

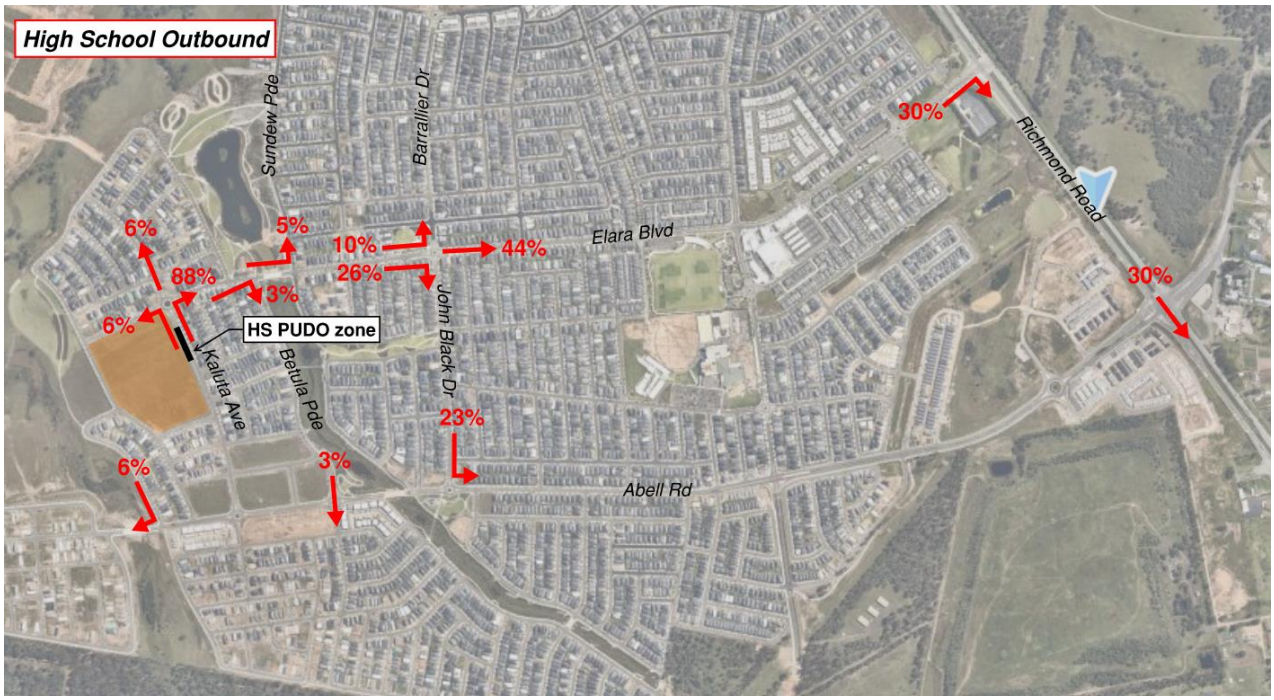


Figure 4.5: Trip distribution for high school departures

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4.4.2 Staff Trip Distribution

The generated vehicle volumes by staff are distributed across the road network as illustrated in Figure 4.6 and Figure 4.7. Staff traffic distribution has been based on:

- It is estimated that many staff would travel from out of area, particularly those travelling by car.
- A north-south split of approximately 20% and 80% respectively has been applied.
- Staff vehicular movements comprise only arrivals in the AM peak, and only departures in the PM peak.

It is acknowledged that these are broad estimates that may vary significantly during the operation of the school and based on the location of staff during any given year. There is currently no more accurate way of forecasting staff trip distribution given that there are no existing staff to analyse. However, given the scale of staff trip generation in comparison to the student trip generation (and the overall levels of background traffic), these uncertainties relating to staff trip distribution are not considered to have any impact on overall results and assessment.



Figure 4.6: Trip distribution for staff arrivals



Figure 4.7: Trip distribution for staff departures

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4.4.3

4.4.3 Pedestrian Trip Distribution

Based on the forecast travel mode splits and volumes detailed in Table 4.3, it is estimated that approximately 1,000 pedestrians will travel to and from the site (in addition to accompanying parents, people walking to public transport, and cyclists). The assumed trip distribution for pedestrians is shown in Figure 4.8.



Figure 4.8: Pedestrian trip Distribution

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4.5 Future Traffic Condition

An assessment of the impacts that the anticipated development traffic would have on the surrounding road network can be made by comparing intersections prior to and following the development of the site in a 10-year time period.

In the Traffic and Transport Assessment for Marsden Park Precinct conducted by AECOM in April 2013 for the surrounding area, the 10-years population growth for 2021-2031 is 1.35. In this report, the 10-year population growth for 2022-2032 is also assumed to be 1.35. Therefore, an increase in background traffic of 135% is applied across the precinct area to the west of Richmond Road. The increase in peak flows from 2021 – 2031 along Richmond Road have been extracted from the AECOM report, and the averages are presented in Table 4.8. Based on these values, an increase in background traffic of 20% has been applied along the Richmond Road corridor.

Table 4.8: Average growth rate along Richmond Road corridor

Direction	AM Peak	PM Peak
Northbound	28%	11%
Southbound	-3%	30%

Appendix E details the increase in peak flows from 2021 – 2031 for all the modelled intersections. The results indicated an average growth rate of 139% for the intersections to the west of Richmond Road. This is considerably similar to the growth rate of 135% as outlined above, and so the rate of 135% has been applied to the intersections to the west of Richmond Road.

To achieve better understanding from development impact on current and future condition, three scenarios are proposed as follow:

- Existing Conditions with Development
- 10-year time period Conditions without Development
- 10-year time period with Development

The performance of nearby intersections in each scenario has been assessed using SIDRA. The results are shown in Table 4.9 to Table 4.15 with full results presented in Appendix C.

Table 4.9: Summary of intersection modelling for Elara Boulevard & Kaluta Avenue
Data for unsignalised intersections is the manoeuvre with the worst delay

		Existing	Existing Plus Development	2032	2032 Plus Development
Average delay (sec)	**AM**	10.1	12.2	10.3	10.4
	PM	10.0	12.1	10.1	10.4
Degree of saturation	**AM**	0.063	0.023	0.146	0.052
	PM	0.045	0.034	0.106	0.056
Level of Service	**AM**	A	A	A	A
	PM	A	A	A	A
Avg back of Queue (m)	**AM**	0.8	0.4	2.1	0.9
	PM	0.5	0.5	1.4	0.9

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Table 4.10: Summary of intersection modelling for Elara Boulevard & John Black Drive
Data for unsignalised intersections is the manoeuvre with the worst delay

		Existing	Existing Plus Development	2032	2032 Plus Development
Average delay (sec)	**AM**	11.7	17.8	373.4	579.7
	PM	10.3	10.5	16.8	66.8
Degree of saturation	**AM**	0.357	0.556	1.380	1.617
	PM	0.161	0.191	0.618	0.958
Level of Service	**AM**	A	B	F	F
	PM	A	A	B	E
Avg back of Queue (m)	**AM**	7.7	15.5	426.3	686.2
	PM	3.1	3.8	19.4	72.0

Table 4.11: Summary of intersection modelling for Abell Road & Kaluta Avenue
Data for unsignalised intersections is the manoeuvre with the worst delay

		Existing	Existing Plus Development	2032	2032 Plus Development
Average delay (sec)	**AM**	9.7	12.8	10.6	12.0
	PM	9.6	11.8	10.4	10.5
Degree of saturation	**AM**	0.036	0.058	0.096	0.150
	PM	0.027	0.065	0.072	0.162
Level of Service	**AM**	A	A	A	A
	PM	A	A	A	A
Avg back of Queue (m)	**AM**	0.6	1.0	1.6	2.8
	PM	0.3	1.1	1.0	3.1

Table 4.12: Summary of intersection modelling for Abell Road & Betula Parade
Data for unsignalised intersections is the manoeuvre with the worst delay

		Existing	Existing Plus Development	2032	2032 Plus Development
Average delay (sec)	**AM**	10.3	11.8	12.6	14.0
	PM	10.3	11.2	12.4	14.0
Degree of saturation	**AM**	0.054	0.197	0.164	0.455
	PM	0.043	0.060	0.134	0.175
Level of Service	**AM**	A	A	A	A
	PM	A	A	A	A
Avg back of Queue (m)	**AM**	0.8	3.2	2.8	9.8
	PM	0.6	0.9	2.3	3.2

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Table 4.13: Summary of intersection modelling for Abell Road & John Black Drive

Data for unsignalised intersections is the manoeuvre with the worst delay

		Existing	Existing Plus Development	2032	2032 Plus Development
Average delay (sec)	**AM**	11.5	12.2	66.5	164.0
	PM	11.1	12.6	20.6	121.5
Degree of saturation	**AM**	0.318	0.494	0.975	1.130
	PM	0.176	0.380	0.633	1.065
Level of Service	**AM**	A	A	E	F
	PM	A	A	B	F
Avg back of Queue (m)	**AM**	6.8	12.1	91.2	201.3
	PM	3.3	8.2	20.6	139.2

Table 4.14: Summary of intersection modelling for Elara Boulevard & Richmond Road

		Existing	Existing Plus Development	2032	2032 Plus Development
Average delay (sec)	**AM**	28.5	31.3	291.4	310.4
	PM	20.5	27.8	121.6	155.5
Degree of saturation	**AM**	0.678	0.723	1.367	1.404
	PM	0.691	0.733	1.173	1.232
Level of Service	**AM**	C	C	F	F
	PM	B	B	F	F
Avg back of Queue (m)	**AM**	139.0	148.5	643.9	703.7
	PM	118.1	159.5	426.4	479.1

Table 4.15: Summary of intersection modelling for Abell Road & Richmond Road & Garfield Road

		Existing	Existing Plus Development	2032	2032 Plus Development
Average delay (sec)	**AM**	48.7	52.7	387.3	385.8
	PM	36.3	39.3	210.3	239.7
Degree of saturation	**AM**	0.931	0.970	1.626	1.647
	PM	0.790	0.843	1.266	1.354
Level of Service	**AM**	D	D	F	F
	PM	C	C	F	F
Avg back of Queue (m)	**AM**	241.1	293.8	1229.5	1258.0
	PM	144.2	180.2	664.2	753.5

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The majority of the local roundabout intersections perform favourably for both AM and PM future scenarios. The performance remains unchanged from the pre-development condition at a LOS of A and DoS below the typical accepted limit of 0.85.

The Elara Boulevard & John Black Drive and the Abell Road & John Black Drive intersections demonstrate a worsening performance for the 2032 and 2032 plus development scenarios. It should be noted that the background growth rate of 135% is based on the population growth within the precinct, and therefore likely already accounts for future school trips. However, the analysis in this report separately calculates the trips associated with the proposed school and adds these volumes on top of the background growth. Therefore, the analysis likely overestimates the overall 2032 plus development traffic volumes and produces conservative modelling results.

The signalised intersections at Richmond Road are considerably impacted by the 2032 background traffic growth, regardless of any additional development-related traffic. As seen in both Table 4.14 and Table 4.15, when comparing the results of the existing volumes to the results of the existing plus development volumes, there is no change to LOS and only a minor worsening of the DoS. Similarly, there is no change to LOS and only a minor worsening of DoS when comparing the results for 2032 and the 2032 plus development volumes. Therefore, the increased vehicle volumes resulting from the proposed school development will have minimal impact on the performance of the signalised intersections at Richmond Road and the poor performance of these intersections is primarily attributed to external traffic.

Overall, the background traffic is expected to increase gradually over the 10 year period, as is the population of the proposed school and its associated trips. Therefore, drivers are likely to adjust their travel behaviours in response to any increasing traffic, including switching travel modes or driving via alternate routes. Furthermore, it is acknowledged that any impact to the surrounding intersections resulting from development volumes will only occur for a short period of time during pick up and drop off activity.

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4.6 Pedestrian Impacts

Pedestrian trip generation and distribution have been calculated in Section 4.3 and Section 4.4. The predicted pedestrian volumes have been applied in Sidra modelling. The Sidra modelling results indicate that the future pedestrian volume have minor impact on surrounding networks.

In relation to pedestrian volume demands at the proposed zebra crossings, the *Pedestrian Crossing Guideline* issued by Transport for NSW (13 September 2022) notes:

> *Local governments may choose to use TfNSW's warrants outlined in the Supplement to Australian Standard AS 1742.10-2009. However, the threshold of combined pedestrian and vehicle volumes required by the TfNSW warrants may be difficult to achieve on local or subarterial roads.*
>
> *As an alternate to the TfNSW warrants, councils may use the following pedestrian demand calculation:*
>
> - *In each of two separate one-hour periods in a typical day, the pedestrian flow per hour (P) crossing the road is, or is expected to be, equal to or greater than 20.*
> - *Children and elderly or mobility impaired pedestrians count as two pedestrians.*

As detailed in Figure 4.8, the expected pedestrian trip generation at each of the proposed pedestrian crossings would substantially exceed (by an order of magnitude) the 20 pedestrians per hour threshold, particularly once applying the doubled volumes for children. The proposed crossing locations and quantities are therefore deemed suitable. The crossings will be designed in accordance with relevant Council standards, or TfNSW standards for the crossings on Kaluta Avenue which are located along bus routes.

The anticipated pedestrian volumes have also been assessed against the TfNSW warrants for completeness. The anticipated pedestrian demands at zebra crossings as shown in Figure 4.8 are at least 125 pedestrians per peak hour (not including accompanying parents, people walking to public transport, and cyclists). This would also substantially exceed the TfNSW warrant requirements of 30 pedestrians per hour. Vehicular flow may be below the warrants (500 vehicles per hour) in some locations on the surrounding local roads but would be exceeded on Kaluta Avenue.

It should be noted that, historically, numerical warrants for pedestrian zebra crossings have been defined in the Transport for NSW Supplement to Australian Standard AS1742.10-2009, Manual of Uniform Traffic Control Devices – Part 10: Pedestrian control and protection. The most recent version of this document (Version 3.1, dated 16 March 2021) supersedes the previous version (3.0), and in particular this latest version clarifies that TfNSW's numerical warrants only apply to arterial roads. Local roads are therefore not considered in this document and should be assessed by local councils on their own basis.

4.7 Public Transport

The proposed bus bay has a kerbside length of approximately 85 metres, which is a capacity for 5 buses based on typical Bus Infrastructure Guide spacing, or up to 6 buses at a reduced spacing

As detailed in Section 3.5, the anticipated demand for bus services is approximately 1,000 high school students. At 50 students per full bus, this would be equivalent to filling 20 buses in each of the morning and afternoon travel periods.

No primary school students are expected to travel by bus. Existing comparable schools show negligible usage[6], and additionally as described in Section 2.5.1 the full residential component of the primary school catchment is located within the SSTS exclusion zone, and are therefore not eligible for free transport services.

[6] John Palmer Public School – <0.5%. Carlingford West Public School – 0.5%. Equivalent usage at these rates for MPS would be 5 students or fewer, which is considered negligible.

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It is anticipated that students travelling to the site by bus would do so on a mixture of general public route services and dedicated school special services, subject to future operations to be determined by TfNSW. Buses may be shared by members of the public and/or other schools. Therefore, the demand for 20 full buses would likely be spread across more buses, say 25.

As it is not yet possible to determine the exact distribution and alignment of future bus routes, it would be reasonable to assume that many bus routes providing dedicated service for the school could be aligned to operate northbound along Kaluta Avenue and utilise the bus bay. Some services (or general public services) may be required to operate southbound along Kaluta Avenue and use the existing bus stop at Elara Boulevard. Service demand at the bus bay could therefore be on the order of 15 buses.

The proposed bus bay capacity of 5 buses could readily accommodate the forecast demands, in approximately 3 cycles of the bus bay. Assuming a timetabled separation of services by 5-10 minutes, this could be cleared within approximately 15-20 minutes of afternoon bell times (when bus service demand is often highest) and would likely be more spread during the morning.

4.8 Pick-up and Drop-off

The kerbside capacity at the kiss & ride zones, and the respective processing capabilities, are outlined in Table 4.16. Figures listed may vary during operation, based on the actual turnover time of individual vehicles, and the initiatives in the operational School Transport Plan will be implemented to ensure reasonable operation of the kiss & ride facilities. In particular, staffing of the kiss & ride zones is recommended to ensure quick turnover of vehicles in the kiss & ride zones.

Table 4.16: Forecast Travel Mode Splits and Volumes – Total

Values may not add exactly, due to rounding

	Primary school	High school
Forecast demand	400 students	400 students
Assumed occupancy	1.2 students per vehicle	1.2 students per vehicle
Forecast vehicles	333 vehicles	333 vehicles
Kerbside capacity	16 bays (approx.)	16 bays (approx.)
Turnover required	20.8 cycles per bay	20.8 cycles per bay
Assumed turnover rate	60 seconds per cycle	60 seconds per cycle
Total processing time	**21 minutes**	**21 minutes**

This analysis demonstrates that the forecast demands for each of the primary school and high school can be accommodated or processed in approximately 20 minutes. It is recommended that the primary school and high school bell times be staggered, such that the traffic movements of each school on the surrounding road network can be separated.

Both kiss & ride zones have been designed to accommodate four accessible parking bays in each zone to provide transport functionality for the primary and high school SELU rooms. These bays have been designed in accordance with Australian Standards AS2890.5 and AS2890.6 at a width of 3.2m, higher than the standard minimum width of 2.0m for kerbside parking (as per AS2890.5). AS2890.5 is a specific design document for on-street parking facilities and includes this guidance for accessible parking design, which is a typical type of on-street parking configuration.

Figure 4.9 and Figure 4.10 provide the design guidance given in the Australian Standards for these facilities. Final arrangements for signage and line marking of these bays will be subject to future coordination with, and approval by, Council's Local Traffic Committee.

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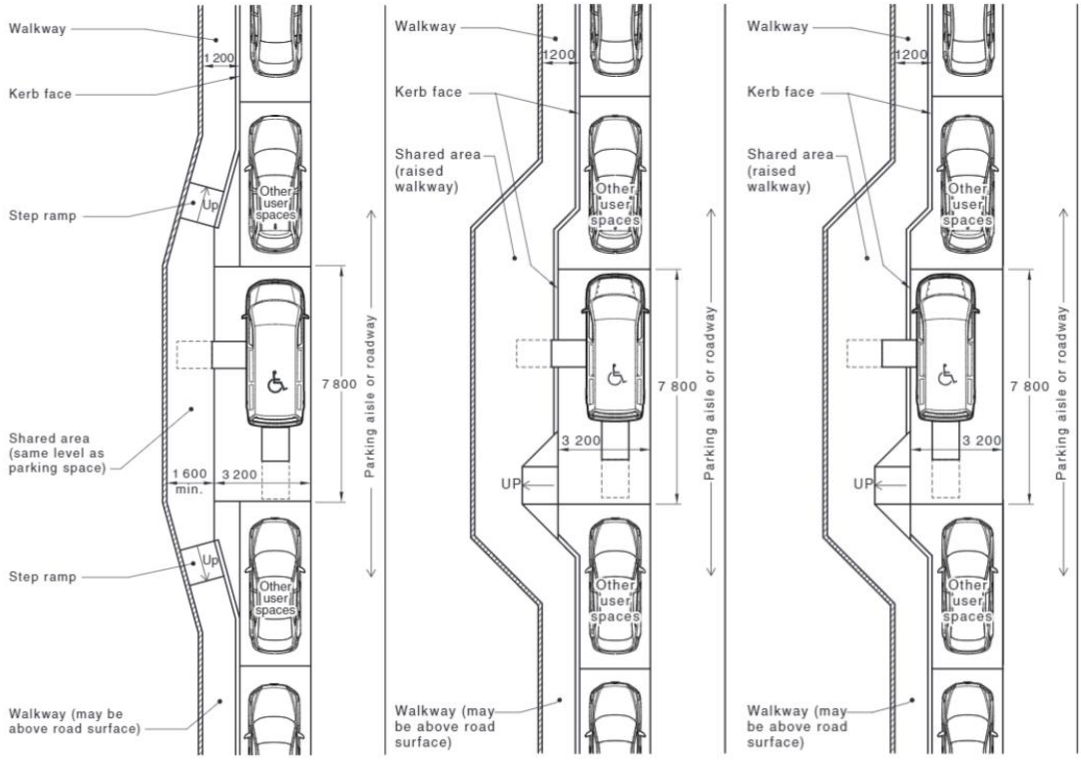


Figure 4.9: Compliant design options for accessible parallel parking bays (off-street)
Source: Australian Standard AS2890.6 (Figures 2.11 and 2.12)

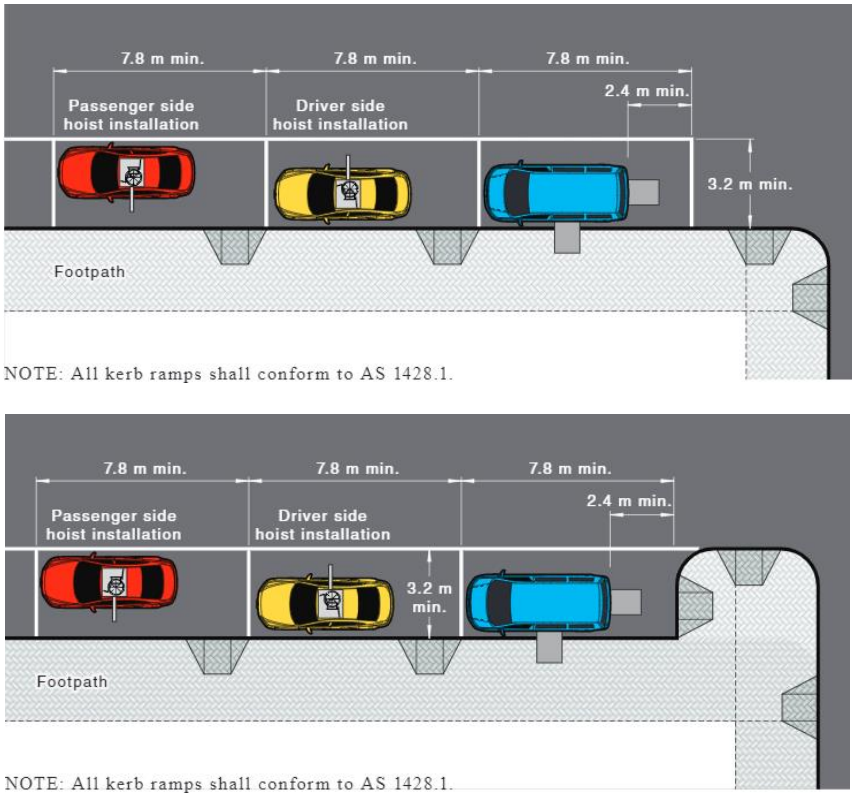


Figure 4.10: Compliant design options for accessible parallel parking bays (on-street)
Source: Australian Standard AS2890.5 (Figures 4.2 and 4.3)

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4.9 Car Parking

4.9.1 Transport Strategy and Forecast Demands

As defined in Section 4.2, the anticipated car parking demand for the project (once the schools reach full staff and student capacity) is 142 parking spaces, or 65% of staff driving a car to site. An additional 15% are estimated to travel by carpooling, for a total of 80% or 175 staff travelling by private vehicle. The proposed on-site car parking capacity of 142 spaces meets this anticipated demand.

To support the sustainable transport strategy for the project and meet this car parking (and carpooling) rate, the overall transport strategy includes the following:

- The proposed indented bus bay on Kaluta Avenue facilitates additional bus services to the site, which will assist TfNSW in operating additional routes and services in the future. Even under existing conditions, there are approximately 15 bus services past or near the site in each of the morning and afternoon peak travel periods, and this is expected to grow in the future, providing better public transport accessibility for staff and students.
- The proposed end-of-trip facilities (shared between MPHS and MPS) provide storage capacity for approximately 40 bicycles, or approximately 18% of staff. This is higher than the current forecast demand for staff travel by bicycle, which will ensure this is a good and accessible option for staff and assist in reducing travel by car. The bicycle storage area is fully enclosed, and is adjacent to staff locker and shower facilities, providing an excellent level of amenity.
- As detailed in Section 4.2 and Section 5.2, the Department of Education is currently reviewing and considering options for local staff recruitment, i.e. encouraging employment of staff who live in close proximity to the site. All recruitment will continue to be decided on a merit basis, with proximity to site being just one element in the recruitment process. Higher numbers of staff living closer to site, compared to other typical schools, will allow the walking and cycling mode shares of 5% each to be reasonably achieved.

On the basis of these provisions in the overall transport strategy, the forecast travel mode of 65% car driver (and therefore a 65% or 142-space parking provision) is considered achievable and reasonable.

For students, no car parking provision is proposed, and similarly to the assessment for staff there are substantial active and public transport options and improvements being provided by this project to ensure this is realistic. The absence of travel by car for students is considered achievable. Car travel at other existing high schools is very low (e.g. Cumberland High School approx. 3%, Glenwood High School approx. 8%, Northmead CAPA High School approx. 1%) which will be readily reduced or eliminated by the superior transport provisions of this project. Even at the highest of those rates (i.e. 8%) car parking usage for 300 Year 12 students (approximately one-sixth of the high school population) would be 24 vehicles which would be negligible in terms of impact to on-street parking. Section 4.9.3 provides further assessment of on-street parking capacity for the purposes of comparison.

4.9.2 Growth Centres DCP Rates

The project is progressing under an SSDA rather than a local council approval. However, the project does need to review relevant local council controls and provide a thorough assessment of parking demands. Additionally, in their minutes of a Pre-Application Meeting (dated 25 July 2022, PAM number C22/25784), Council noted that they “will be objecting to the EIS where the provision of parking on site does not at least comply with the [DCP] requirements for staff and for the component of the students in Year 12.” The current relevant Development Control Plan for this site is the Blacktown City Council Growth Centre Precincts Development Control Plan 2010 (Growth Centres DCP).

The parking rates for educational establishments from the Growth Centres DCP are shown in Table 4.17.

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Table 4.17: Parking Requirements in Surrounding Areas

	Staff	Students	Visitors
Growth Centres DCP Rate	1 space per staff member	1 space per 5 students in Year 12	1 space per 100 students
Relevant Proposed Quantity	219 staff	300 Year 12 students[7]	3,000 students
Car Parking Requirement	219 spaces	60 spaces	30 spaces

The Growth Centres DCP rate in its entirety would require a provision of 309 spaces. Excluding parking for visitors (i.e. assessing the components requested by Council as described above), the DCP rates for staff and students would require a provision of 279 spaces. Excluding parking for students and visitors (as these are not consistent with DoE policy), the residual DCP rate for staff would require a provision of 219 spaces.

Application of the parking rates in the Growth Centres DCP would be a significant departure from the sustainable transport strategy for the development and would also compromise the design in other areas. It should be noted that:

- The provision of a car park more than twice the size of that proposed (142 spaces proposed vs up to 309 spaces at DCP rates) would encroach significantly into the available open space / play space and reduce the amenity of the site for students.
- The provision of 1 space per employee would conflict directly with the sustainable transport strategy for the development which seeks to reduce levels of private vehicle usage and encourage active and public transport modes (noting also that this project will provide new infrastructure for those modes, particularly for pedestrians, cyclists, and buses).
- The introduction of additional traffic around the site would further congest the road network and would increase the potential level of vehicle/pedestrian crossover at local intersections and driveways.
- During consultation with the Transport Working Group, TfNSW has advised that they consider the proposed car parking provision (at the rate of 65% driving) to be higher than desired (i.e. TfNSW suggests that the parking provision should be further reduced).
- The car park can cater for staff as both driver and as passenger; the transport strategy considers 15% of staff potentially carpooling (in addition to the capacity for 65% as drivers) resulting in 80% potentially travelling by car, which is closer to the relevant DCP rate.

Finally, it is important to note, as described in the RTA (now TfNSW) Guide to Traffic Generating Developments, that:

> *"The importance of parking must be kept in perspective in the overall planning assessment. There may be situations where it may not be physically possible to provide parking, but the potential planning benefits of the proposal are significant. For example, the adaptive re-use of an historic building may not include on-site parking as it could have an adverse impact on the structure of the building or on its curtilage. Another example is the case of a change of use of a small shop that is part of a traditional strip shopping centre and cannot provide extra parking space. Alternatives, such as contributions for off-site parking provision must be explored. It is stressed that a shortage of parking (both on-site and off-site) is not necessarily detrimental to the success of a proposed development. It is but one of many issues that need to be considered in determining development proposals."*

[7] Estimated, based on slightly less than one-sixth of the total high school population (2,000 students)

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This project team considers that the planning assessment process in relation to traffic, transport, and car parking has been thorough. This has included a series of three Transport Working Group meetings to review and discuss the proposal with Council and TfNSW and outline the additional sustainable transport provisions of this project. The current car parking capacity of 142 spaces results in a residual on-site open play space of 30,000m^2 or exactly 10 square metres per student (which is the minimum EFSG requirement as defined by Design Guide DG10 'Area' for a greenfield site), therefore it would not be physically possible to provide additional car parking without impinging on this defined play space ratio. Active and public transport provisions including a brand-new bus bay, bicycle storage, end-of-trip facilities, and major improvements to pedestrian infrastructure are proposed to be provided as part of this project. This project has taken a holistic view of transport, including car parking, and has put forward appropriate transport provisions.

On this basis, and on the basis of the additional transport provisions as described in Section 4.9.1 and elsewhere in this report, the proposal for this project is not utilising DCP rates to calculate car parking provisions and is instead using a first-principles assessment focused on the sustainable transport strategy.

4.9.3 On-Street Parking Analysis

Based on the transport strategy for this site, and the accompanying on-site car parking provisions, there is expected to be zero demand for on-street parking. The overall transport strategy for the project provides sufficient alternatives to ensure that users would not need to travel by car and therefore achieve a zero usage of on-street parking.

For the purposes of comparison only, the staff and Year 12 components of the DCP parking rates have been considered regarding potential theoretical shortfall into on-street parking in the local network. These components have been reviewed as these user groups were mentioned by Council in their Pre-DA advice in relation to parking. However, as described above and throughout this report, the overall transport strategy for the project provides alternative means of travel such that the DCP parking rates are not directly applicable, and this study of on-street parking capacity has been reviewed for completeness and comparison only.

This assessment has only focused on non-residential frontages, i.e. does not consider or count any frontages of residential properties, and only considers frontages to parklands etc. or the school site itself, as illustrated in Figure 4.11.



Figure 4.11: On-street Car Parking Capacity

This assessment has found that:

- The total capacity of all non-residential frontages in the assessed local area is at least 290 parking spaces (assuming a conservative 7m length per space; parking closer to 6m per space would be achievable).
- The relevant DCP component rates (i.e. staff and students) would require 279 parking spaces to be

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provided, which would represent a theoretical shortfall of 137 spaces relative to the development provisions (of 142 spaces).

- The theoretical shortfall at the relevant DCP rates would occupy only 47% of the non-residential street parking capacity (at 7m per space; or 41% at 6m per space).

Consideration of the DCP parking rates would indicate a parking shortfall relative to the proposed on-site capacity. However, the DCP rates do not align with the transport strategy for the project, and alternative means of transport are facilitated by these works, therefore the DCP rates are not directly applicable and a more relevant site-specific parking rate has been derived from the forecast travel mode splits.

As shown in Table 4.1 and Table 4.2, 65% of staff (or, 142 staff members) are estimated to require parking, and so with the proposed 142 on-site parking spaces, the demand will be fully accommodated within the site. There would be no usage of on-street parking, by either staff or students.

4.9.4 Design Compliance

Car parking is to be provided in accordance with AS2890.1. Key design parameters for 90-degree angled parking include:

- Classification: Class 1 (all-day employee parking) or higher
    - *Note: Higher classes are typically only required for higher turnover usage and would not be required for this use class, however does have a narrower aisle width (with wider space) which can be a useful design option to consider.*
- Parking space width: 2.4m or higher
- Aisle width: 6.2m (or as required by class)
- Parking space length: 5.4m
- Gradient: 1:20 (5%) maximum

In accordance with AS2890.1, the car park is to have a Category 2 access driveway, in which a combined entry and exit (as per the proposed design) is suitable.

Sight line analysis for the car park driveway is attached at Appendix F.

4.9.5 Accessible Parking

The Building Code of Australia (BCA) defines accessible parking requirements as a portion of total capacity depending on the land use. To cater for the school development, accessible parking is to be provided at a rate of 1 space for every 100 car parking spaces or part thereof (1%). The development is required to provide a minimum of 2 accessible parking spaces.

The proposed design provides 2 accessible spaces, complying with the BCA.

There is also proposed provision of accessible kiss & ride bays, as detailed in Section 4.8, which will be designed in accordance with AS2890.5 and AS2890.6.

4.10 Service and Loading

There is a waste and delivery area which is shared between both schools with the entry/exit access point at Galah Street. Also, there is an additional delivery area located at north-east of the car park with access through Galah Street. This access point will be managed by a weighted cantilever sliding gate.

We have been advised by the waste consultant that the site's waste collection area and access should be designed for a 12.5m Heavy Rigid Vehicle (HRV) in accordance with AS2890.2. Waste collection vehicles are likely to be rear-lift. Design development for the site will proceed on this basis.

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All service vehicle areas are to be designed in accordance with AS2890.2. Key design parameters include:

- Design vehicle: Heavy Rigid Vehicle (waste) or Medium Rigid Vehicle (deliveries)
- Loading bay width: 3.5m
- Loading bay gradient: 1:25 (4%) maximum
- Loading bay clear height: 4.5m minimum

The swept path analysis for the waste collection vehicle are provided in Appendix A.

Sight line analysis for the loading dock driveway is attached at Appendix F.

4.11 Cumulative Impacts

We have not been advised of any specific development plans which would depart from the Indicative Layout Plan and other master planning documents. Generally, the site will be surrounded by low density residential developments, resulting in a low level of traffic generation.

As development is consistent with existing master plans, future land uses including MPHS and MPS have been considered in the design of the road network and the background traffic growth forecasts, which have therefore already been considered in the traffic modelling provided in this report. No further consideration of cumulative impacts is required.

4.12 Road Safety

This proposal has been developed with consideration of road safety elements and impacts on the site and around the local precinct. The key road safety considerations in the current design are:

- The scope of public domain works includes the provision of new zebra crossings to manage conflict points between pedestrians and vehicles and to provide safe crossing points for high volumes of pedestrians.
- The proposed pedestrian footpaths within the surrounding precinct to improve pedestrian safety
- The proposed indented bus bay along Kaluta Avenue to reduce congestion between buses and passing traffic

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5 Mitigation Measures

5.1 Infrastructure Upgrades

Table 5.1 provides a summary of the new or upgraded infrastructure necessary for this project to achieve acceptable performance and safety.

These mitigation measures have been incorporated into the assessment of development impacts in Section 4 where necessary and require no additional or separate assessment.

Table 5.1: Mitigation Measures

Item	Timing	Responsibility	Notes
Raised zebra crossings to corners of site (7 total)	Prior to occupation	School Infrastructure NSW	To be designed for bus movements where required on Kaluta Avenue.
Pedestrian footpaths to western boundary of site	Prior to occupation	School Infrastructure NSW	To be delivered as a 1.5m footpath to Blacktown Council standards.
Bicycle storage and end-of-trip facilities	Prior to occupation	School Infrastructure NSW	To minimum EFSG requirements and 10% staff, plus NSW EOTF guidelines.
Indented bus bay to Kaluta Avenue and associated footpaths	Prior to occupation	School Infrastructure NSW	Designed in accordance with State Transit Bus Infrastructure Guide.
Indented kiss & ride bays including accessible bays and associated footpaths	Prior to occupation	School Infrastructure NSW	Accessible bays to be designed in compliance with AS2890.5 and AS2890.6.
Pedestrian footpaths within surrounding residential precinct	To be confirmed	Private developers or Blacktown City Council	Subject to confirmation of developer agreements and subdivision consent.

5.2 Operations and Management

Table 5.2 provides a summary of the operational or management measures necessary for this project to achieve acceptable performance and safety.

These mitigation measures have been incorporated into the assessment of development impacts in Section 4 where necessary and require no additional or separate assessment.

Table 5.2: Mitigation Measures

Item	Timing	Responsibility	Notes
Additional bus services through local precinct	2022 and ongoing	Transport for NSW	As advised by TfNSW
Carpooling initiatives for staff	During operation	School Infrastructure NSW	Nominal 15% target rate; may be higher or lower
Staggered bell times between HS and PS	During operation	School Infrastructure NSW	Estimated 20-minute separation, to be confirmed
Local staff recruitment considerations	Prior to operation and during operation	Department of Education	All recruitment will continue to be decided on a merit basis

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6 Construction Traffic and Pedestrian Management Plan

6.1 Construction Operation

6.1.1 Access Arrangements

Based on the proposed site plan as illustrated in Figure 3.1, the buildings will be located along Elara Boulevard, Kaluta Avenue, and Swallowtail Street. Therefore, the frontage to Galah Street may provide good opportunities for construction access as this would be more flexible throughout the duration of construction.

Kaluta Avenue as collector road with approximately 11m width will provide more amenity for large vehicles in comparison with Galah Street as a local road with approximately 9m width. Depending on the timing of construction stages, the proposed indented bus bay at Kaluta Avenue would also increase utility of potential access from this road and may be able to function as a Works Zone or similar (subject to separate approvals).

A detailed CTMP would be prepared by the contractor prior to construction and will outline a proposed construction access methodology.

6.1.2 Hours of Operation

The hours of operation for construction activities are to be determined by the planning authority and will likely contain similar work hours to the following:

- Monday to Friday 7am to 6pm
- Saturday 8am to 1pm
- Sunday and public holidays None

6.1.3 Construction Vehicle Volumes

It is assumed that the average volume of construction vehicle traffic to and from the site would be consistent with other similar SINSW projects. Sample data from other projects is provided in Table 6.1 below. This information is provided for reference only, and more accurate data would be provided by an appointed contractor in a detailed Construction Traffic Management Plan (CTMP) prior to commencement of construction.

Table 6.1: Construction Vehicle Volumes at Similar Construction Sites

Project	Peak vehicles per day	Typical vehicles per day	Maximum vehicle length
Pendle Hill High School	20	6 – 8	9 metres
John Palmer Public School	6	6	20 metres
Smalls Road Public School	30	2 – 8	20 metres

The maximum size of vehicle is anticipated to be a 20m semi-trailer (articulated vehicle). Larger vehicles may be subject to special approvals.

6.1.4 Worker Parking

It is estimated that there will be a maximum workforce of 550 staff, with an average of 300 – 400 staff. Once a contractor is appointed, a strategy shall be developed to accommodate worker parking on-site where possible.

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Depending on the staging of the works, the staff car park (with a capacity of 142 spaces) may become available to construction works at some point during the works. Other parts of the site such as future sports fields or play space areas may also be available, subject to a contractor methodology being developed. As outlined in Figure 4.11, the surrounding roads have good on-street parking capacity which can also be used by construction workers.

However, travel by private vehicle is discouraged, and workers will be advised of alternative transport options and will be encouraged to utilise public transport to and from the site. Workers choosing to travel by car shall be responsible for finding their own parking and are to park in accordance with all signposted parking restrictions.

6.1.5 Construction Program

The program has not yet been determined and a detailed CTMP would be prepared by the appointed contractor prior to construction.

6.2 Construction Traffic Management

The delivery of material to and from the site will result in some generated traffic activity associated with the works. It is expected that the heavy vehicles would generally arrive outside of AM and PM peaks, therefore there is no impact on the peak period traffic volume associated with the heavy construction vehicles. The estimated construction traffic volumes for the standard operation for the worst-case is 30 trucks per day. This is equivalent to approximately 3 trucks per hour, as a result, increased traffic associated with construction activities will have only minor impacts on the existing road network.

Light vehicle traffic generation would be generally associated with construction staff movements to and from the site. Staff would be comprised of project managers, various trades and general construction employees. Over the full period, the peak workforce represents the worst-case scenario for vehicle movements during the morning and the evening road network peak hour. The workforce arrival and departure periods (6:30 - 7:00AM and 6:00 - 6:30PM) represent the peak construction traffic periods. Workers should be encouraged to use active and public transport options.

6.2.1 Vehicle Management

During days of high estimated vehicle movements, communication between the site and incoming vehicles will be maintained to stagger the arrival of vehicles, in order for them to be accommodated within the worksite and to minimise traffic disruptions.

Loading and unloading activities will occur within the site, at the nominated vehicle zones. All deliveries are to be made outside of any posted School Zone times. All deliveries are to be made within the approved work hours. Truck movements to and from the site will be scheduled outside peak hours where possible to reduce impacts to the local and state road network.

Non-tonal reversing beepers (or an equivalent mechanism) shall be fitted and used on all construction vehicles and mobile plants regularly used on-site (i.e., greater than one day) and for any out of hours work.

6.2.2 Construction Vehicle Routes

Construction vehicles shall be directed to travel on the main road network except where required to reach the construction site.

- **Approach from North-East:**
  - Approach via Macquarie Street
  - Turn left into Richmond Road
  - Turn right into Elara Boulevard

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- **Approach from South:**
  - Approach via M7 then turn right/left into Richmond Road
  - Turn left into Elara Boulevard
- **Departure to south:**
  - Turn right into Elara Boulevard
  - Turn right into Richmond Road
  - Turn right/left into M7
- **Departure to south:**
  - Turn right into Elara Boulevard
  - Turn left into Richmond Road
  - Turn right into Macquarie Street

The construction vehicle routes are illustrated in Figure 6.1.

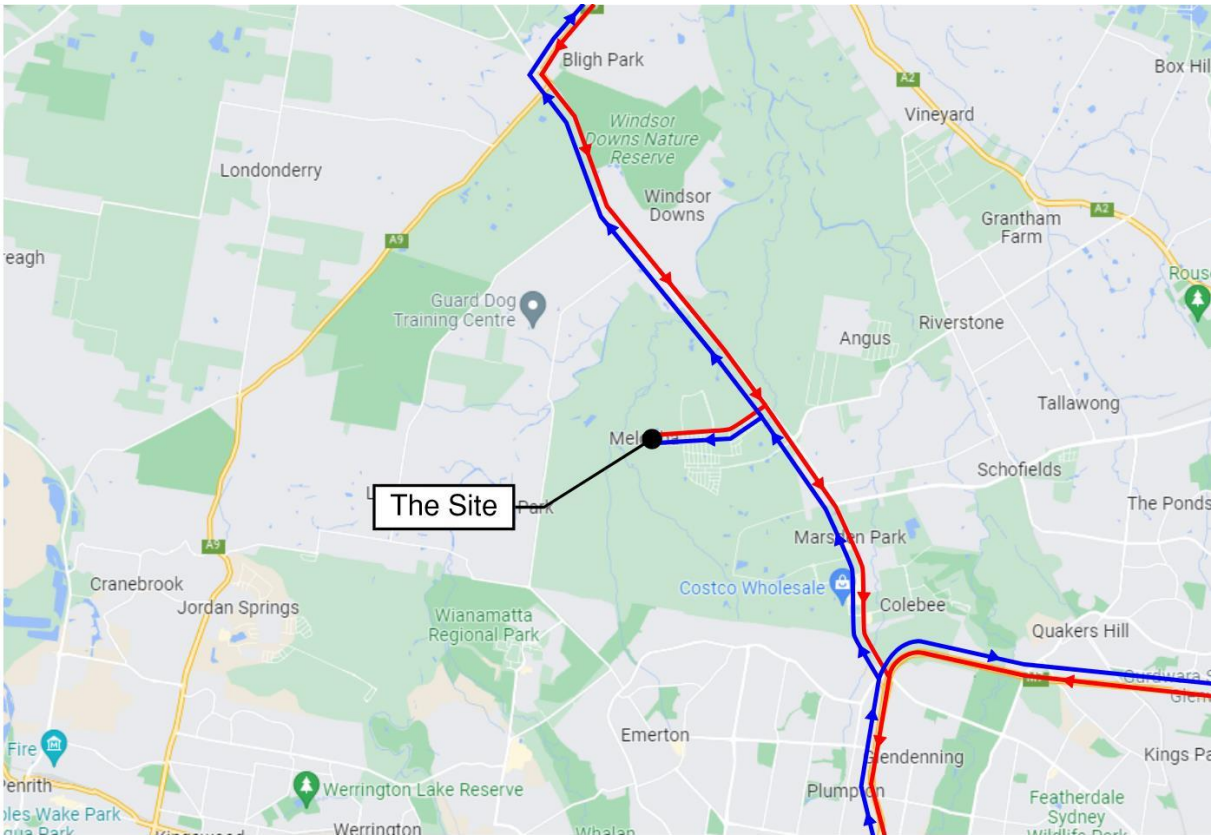


Figure 6.1: Local Construction Vehicle Routes

6.2.3 Public Transport Impacts

There shall be no changes to local public transport routes and services because of construction.

6.2.4 Cumulative Impacts

Community notification shall be undertaken as per any School or SINSW requirements and should include:

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- Temporary notification signage installed around the site and affected areas highlighting the upcoming changes/impact
- Door knocking to the immediately surrounding stakeholders advising them of the upcoming works
- Mailbox drops within a set radius around the project, distributing the monthly project updates
- Project updates on School websites containing project updates, notifications, and contact numbers
- Project specific distribution lists that can be signed up to by members of the public who wish to receive notifications electronically

6.3 Cumulative Local Impacts

The site manager shall be responsible for liaising with the site manager of any surrounding construction projects once identified. In particular, communication across sites should ensure:

- Overall project programs are to be identified and shared
- High-volume days or periods (such as concrete pours) are to be communicated, and where possible are to be coordinated to avoid excessive impact to the road network
- Oversize / overmass delivery days are to be communicated, and where possible are to be coordinated to avoid excessive impact to the road network
- Traffic control measures (including Traffic Control Plans / Traffic Guidance Schemes) are to be shared if these may be relevant to construction vehicle routes for surrounding projects

As Marsden Park is a developing area, there is a high volume of residential construction activity ongoing in the surrounding area. However, these sites are minor projects in nature and are unlikely to result in any noticeable cumulative impacts. Additionally, the low occupancy levels in the precinct during the ongoing construction will result in a reduced number of impacted residents.

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7 Conclusion

The overall transport strategy for the proposed development is as follows:

- Pedestrians
  - Improve connections to existing and future key routes and creek crossings
  - Provide raised zebra crossings (wombat crossings) at each corner of the site
- Cyclists
  - Provide bicycle storage and end-of-trip facilities on-site to increase cyclist mode share
  - Pedestrian improvements will also be able to be used by cycling students (aged under 16)
- Public transport
  - Provide a new indented bus bay to the Kaluta Avenue frontage
  - Improve connectivity to existing bus stops
- Service vehicles
  - Provide a shared waste collection and delivery point with access from Galah Street, and an additional delivery area to the northeast of the car park also accessed from Galah Street
- Pick-up and drop-off
  - Provide two indented kiss & ride bays, one for MPS on Swallowtail Street and one for MPHS on Kaluta Avenue
- Car parking
  - Provide 142 on-site car parking spaces to allow up to 80% of staff to travel via car (65% as driver and 15% as passenger)

This overall strategy has been proposed to, and discussed with, both Council and TfNSW during ongoing liaison through a Transport Working Group (TWG) for the project. The TWG has met several times since May 2022, and the project has refined the transport strategy during that period in response to feedback received. The current revision of this document also includes updates in response to submissions from Council, Transport for NSW, and the Department of Planning during the EIS exhibition phase.

A preliminary School Transport Plan has been prepared which addresses the sustainable management of operational transport demands and discusses different management options to ensure the success of the future operation of the site. A preliminary Construction Traffic Management Plan has also been developed to assess any traffic impacts expected to occur during construction works.

7.1 Findings

This TAIA has analysed the proposed development and its transport strategy and found the following:

- The proposed internal and external provisions for pedestrian, cyclist, and public transport modes will assist in reducing reliance on private vehicles and reducing the potential volumes of cars travelling to the staff car park or kiss & ride zones.
- Based on intersection traffic modelling undertaken for this proposal during both morning and afternoon peak periods, the impacts of the proposed school have been assessed as acceptable. While the traffic modelling does show some worsening of traffic conditions across the precinct (both locally and at the arterial road network along Richmond Road), the primary factor is clearly shown to be general background growth (calculated based on the traffic modelling provided for the original master plan) and not as a result of this school development. This distinction has been made through a comparison of development and non-development scenarios to determine the associated impacts.
- The anticipated car parking demand is 142 parking spaces, or 65% of staff driving a car to site. An

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additional 15% are estimated to travel by carpooling, for a total of 80% or 175 staff travelling by private vehicle. Based on the sustainable transport strategy which will be implemented through the School Transport Plan, the parking demand of 142 spaces will be fully accommodated on-site with no usage of on-street parking.

Prepared by

TTW (NSW) PTY LTD



MICHAEL BABBAGE

Associate (Traffic)

Approved by



PAUL YANNOULATOS

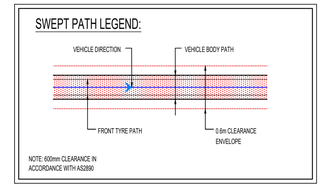
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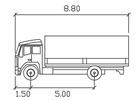
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Appendix A Swept Path Analysis

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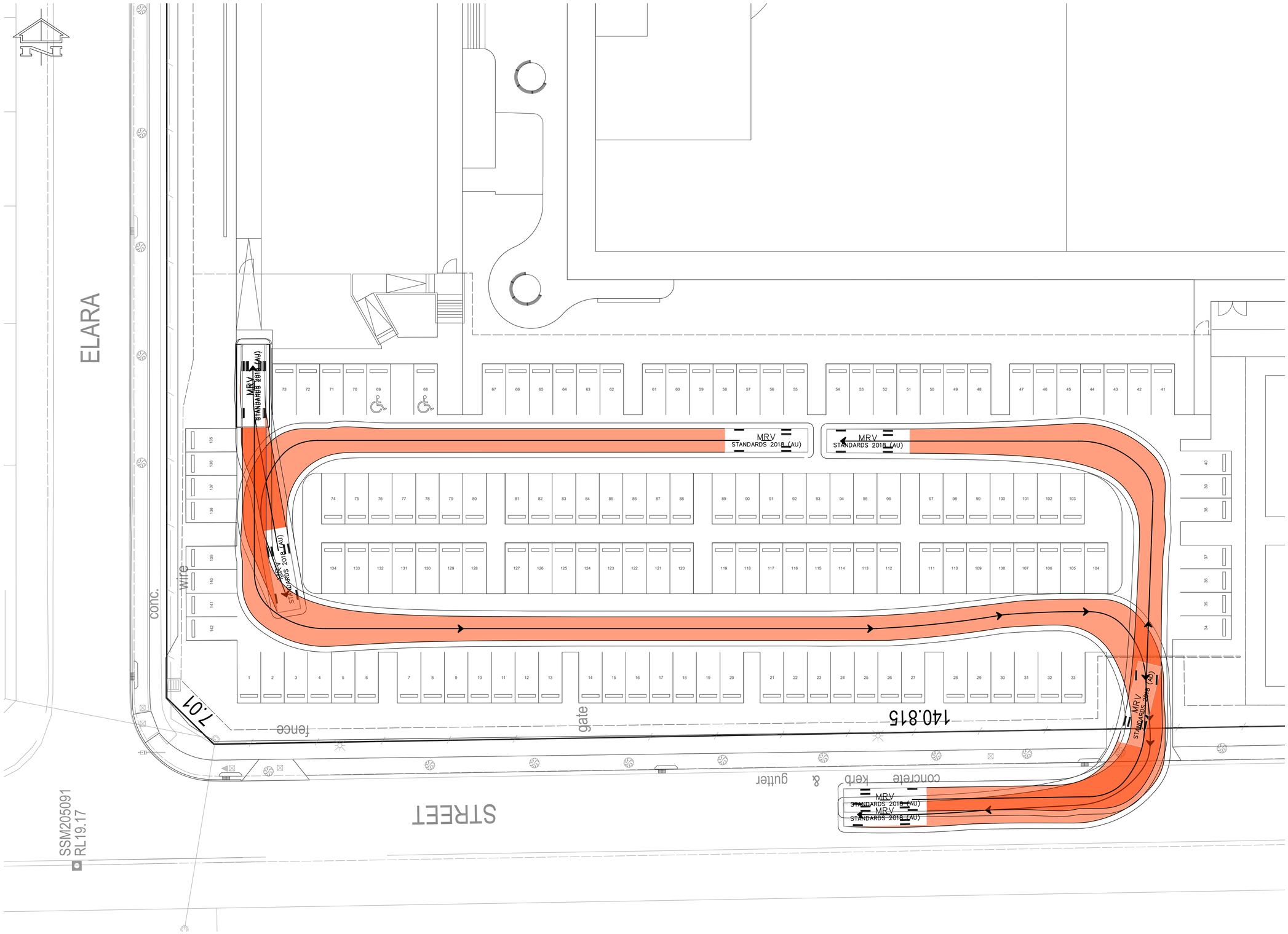
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4 GLEN STREET
MILSONS POINT
NSW 2061

Engineer
TTW Structural Civil Traffic Façade
612 9439 7288 | Level 6, 73 Miller Street, North Sydney, NSW 2060

Project
MARSDEN PARK HIGH SCHOOL & MELONBA PUBLIC SCHOOL

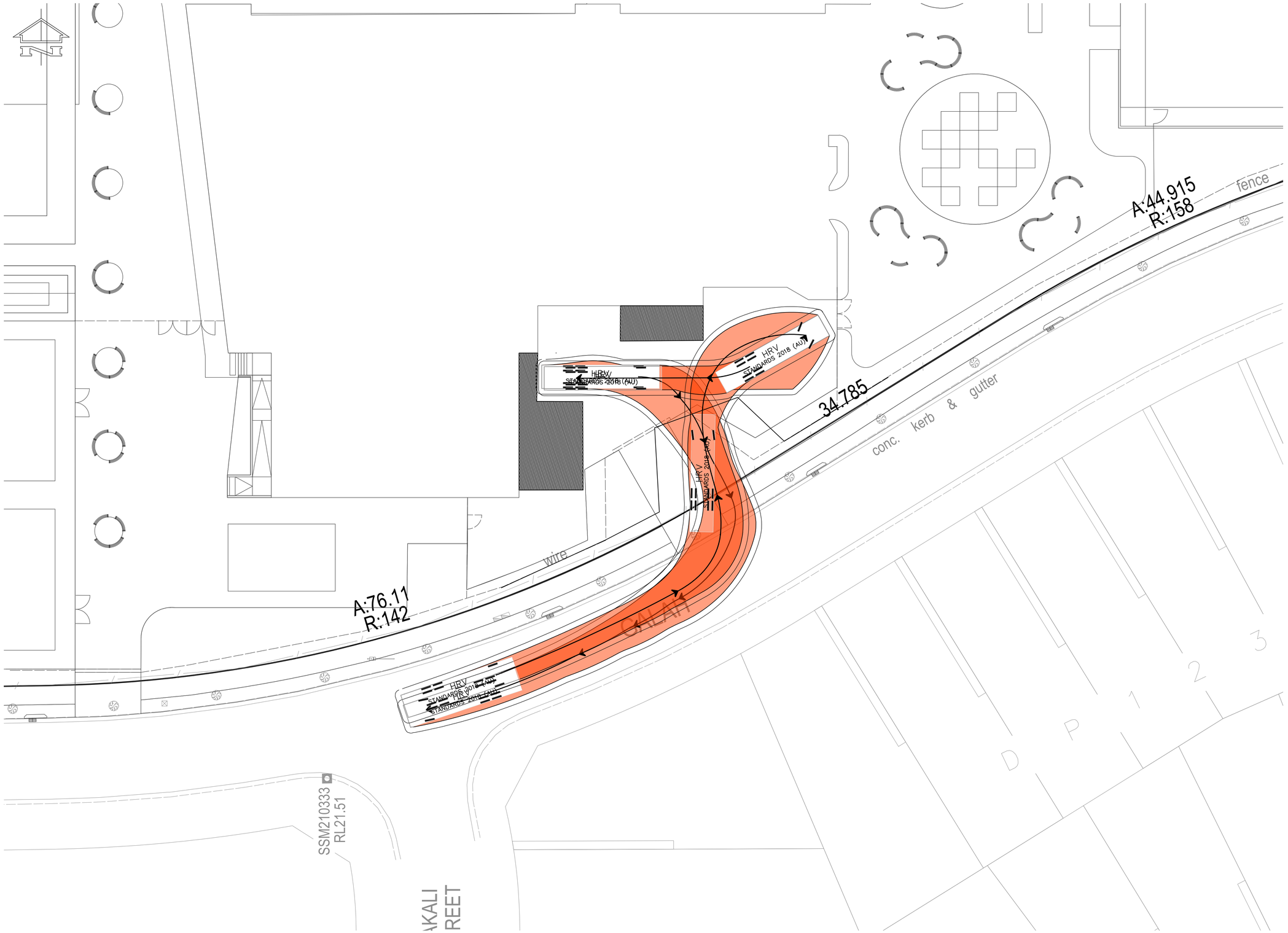
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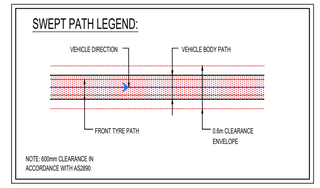
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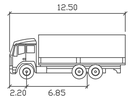
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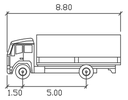






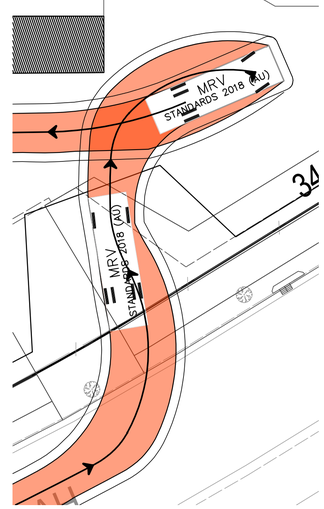
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Rev	Description	Eng	Draft	Date
1	PRELIMINARY	MB	MB	19/07/22

Architect
NBRS ARCHITECTURE
4 GLEN STREET
MILSONS POINT
NSW 2061

Engineer
TTW Structural Civil Traffic Façade
612 9439 7288 | Level 6, 73 Miller Street, North Sydney, NSW 2060

Project
MARSDEN PARK HIGH SCHOOL
& MELONBA PUBLIC SCHOOL

Sheet Subject
SWEPT PATH SKETCH
WASTE - HRV & MRV

Scale : A1	Drawn	Authorised
1:1	MB	-

Job No	Drawing No	Revision
221022	SK07	P1

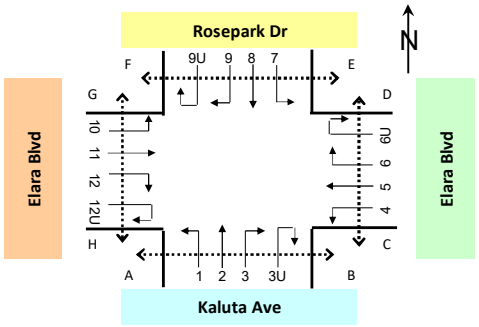
Plot File Created: Jul 19, 2022 - 10:29pm

Appendix B Traffic and Transport Data

© 2023 Taylor Thomson Whitting

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 1. Elara Blvd / Kaluta Ave / Rosepark Dr

Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



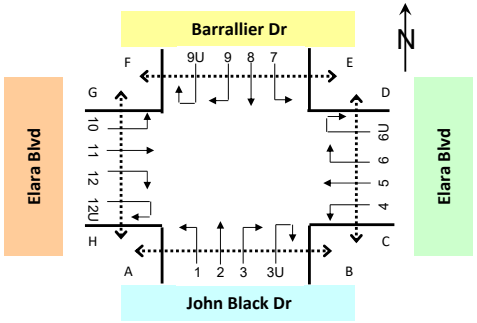
MATRIX Traffic and Transport Data

	Approach	Kaluta Ave					Elara Blvd					Rosepark Dr					Elara Blvd					Grand Total
	Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
AM	8:00 to 9:00	39	2	0	0	**41**	68	4	10	0	**82**	45	3	0	0	**48**	13	0	1	0	**14**	**185**
PM	14:00 to 15:00	17	3	0	0	**20**	47	1	10	1	**59**	39	5	0	0	**44**	11	0	0	0	**11**	**134**

Approach	Kaluta Ave					Elara Blvd					Rosepark Dr					Elara Blvd					Grand Total
Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
7:00 to 8:00	30	2	0	0	**32**	25	3	11	0	**39**	35	3	0	0	**38**	6	0	0	0	**6**	**115**
7:15 to 8:15	38	2	0	0	**40**	29	6	12	0	**47**	43	3	0	0	**46**	9	0	0	0	**9**	**142**
7:30 to 8:30	44	2	0	0	**46**	46	4	10	0	**60**	51	5	0	0	**56**	13	0	0	0	**13**	**175**
7:45 to 8:45	40	2	0	0	**42**	64	4	11	0	**79**	44	3	0	0	**47**	13	0	1	0	**14**	**182**
8:00 to 9:00	39	2	0	0	**41**	68	4	10	0	**82**	45	3	0	0	**48**	13	0	1	0	**14**	**185**
8:15 to 9:15	35	2	0	0	**37**	69	2	7	0	**78**	42	3	0	0	**45**	11	0	1	0	**12**	**172**
8:30 to 9:30	34	2	0	0	**36**	51	2	9	0	**62**	30	1	0	0	**31**	5	0	1	0	**6**	**135**
8:45 to 9:45	33	1	0	0	**34**	38	3	8	0	**49**	27	2	0	0	**29**	5	0	0	0	**5**	**117**
9:00 to 10:00	29	4	0	0	**33**	32	5	9	0	**46**	29	1	0	0	**30**	7	0	1	0	**8**	**117**
AM Totals	**98**	**8**	**0**	**0**	**106**	**125**	**12**	**30**	**0**	**167**	**109**	**7**	**0**	**0**	**116**	**26**	**0**	**2**	**0**	**28**	**417**
14:00 to 15:00	17	3	0	0	**20**	47	1	10	1	**59**	39	5	0	0	**44**	11	0	0	0	**11**	**134**
14:15 to 15:15	18	2	0	0	**20**	49	0	9	1	**59**	36	5	0	0	**41**	9	0	1	0	**10**	**130**
14:30 to 15:30	24	1	0	1	**26**	53	0	7	1	**61**	29	3	0	0	**32**	9	0	1	0	**10**	**129**
14:45 to 15:45	27	3	1	1	**32**	41	0	9	1	**51**	25	1	0	0	**26**	6	0	1	0	**7**	**116**
15:00 to 16:00	28	2	1	1	**32**	38	0	9	0	**47**	26	2	0	0	**28**	6	0	1	1	**8**	**115**
15:15 to 16:15	28	4	1	1	**34**	37	0	9	0	**46**	26	4	0	0	**30**	8	0	0	1	**9**	**119**
15:30 to 16:30	19	4	1	0	**24**	34	0	11	0	**45**	23	5	0	0	**28**	8	0	0	1	**9**	**106**
15:45 to 16:45	23	2	0	0	**25**	30	0	10	0	**40**	28	5	0	0	**33**	10	0	0	1	**11**	**109**
16:00 to 17:00	27	2	0	0	**29**	28	0	9	0	**37**	29	3	0	0	**32**	11	1	0	0	**12**	**110**
PM Totals	**72**	**7**	**1**	**1**	**81**	**113**	**1**	**28**	**1**	**143**	**94**	**10**	**0**	**0**	**104**	**28**	**1**	**1**	**1**	**31**	**359**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 2. Elara Blvd / John Black Dr / Barrallier Dr

Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



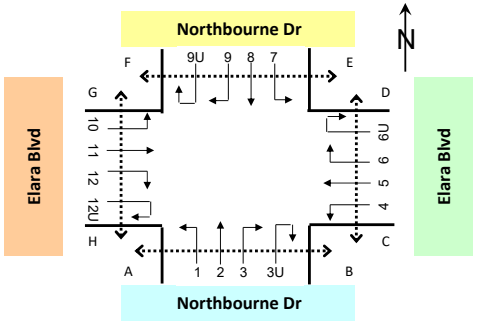
MATRIX Traffic and Transport Data

	Approach	John Black Dr					Elara Blvd					Barrallier Dr					Elara Blvd					Grand Total
	Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
AM	7:45 to 8:45	252	9	0	0	**261**	191	10	11	0	**212**	300	3	1	0	**304**	226	3	10	0	**239**	**1,016**
PM	14:00 to 15:00	190	6	0	0	**196**	180	10	11	0	**201**	165	6	0	0	**171**	150	6	10	0	**166**	**734**

Approach	John Black Dr					Elara Blvd					Barrallier Dr					Elara Blvd					Grand Total
Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
7:00 to 8:00	97	7	0	0	**104**	91	6	12	0	**109**	211	5	0	0	**216**	148	6	12	0	**166**	**595**
7:15 to 8:15	158	5	0	0	**163**	109	7	14	0	**130**	240	6	0	0	**246**	190	4	13	0	**207**	**746**
7:30 to 8:30	229	6	0	0	**235**	155	7	13	0	**175**	293	4	0	0	**297**	226	3	10	0	**239**	**946**
7:45 to 8:45	252	9	0	0	**261**	191	10	11	0	**212**	300	3	1	0	**304**	226	3	10	0	**239**	**1,016**
8:00 to 9:00	237	7	0	0	**244**	221	10	10	0	**241**	266	4	1	0	**271**	214	4	9	0	**227**	**983**
8:15 to 9:15	183	9	0	0	**192**	205	8	7	0	**220**	213	4	1	0	**218**	175	7	7	0	**189**	**819**
8:30 to 9:30	112	7	0	0	**119**	182	10	7	0	**199**	148	4	1	0	**153**	109	7	8	0	**124**	**595**
8:45 to 9:45	81	6	0	0	**87**	151	7	8	0	**166**	101	5	0	0	**106**	100	9	8	0	**117**	**476**
9:00 to 10:00	83	6	0	0	**89**	129	9	8	0	**146**	88	5	0	0	**93**	90	8	7	0	**105**	**433**
AM Totals	**417**	**20**	**0**	**0**	**437**	**441**	**25**	**30**	**0**	**496**	**565**	**14**	**1**	**0**	**580**	**452**	**18**	**28**	**0**	**498**	**2,011**
14:00 to 15:00	190	6	0	0	**196**	180	10	11	0	**201**	165	6	0	0	**171**	150	6	10	0	**166**	**734**
14:15 to 15:15	182	5	0	0	**187**	189	9	10	0	**208**	166	7	0	0	**173**	147	6	9	0	**162**	**730**
14:30 to 15:30	177	4	0	0	**181**	203	6	9	0	**218**	168	8	0	0	**176**	131	7	8	0	**146**	**721**
14:45 to 15:45	168	6	0	0	**174**	171	6	11	0	**188**	116	9	0	0	**125**	139	7	10	0	**156**	**643**
15:00 to 16:00	152	6	0	0	**158**	164	3	10	0	**177**	116	9	0	0	**125**	131	5	9	0	**145**	**605**
15:15 to 16:15	164	7	0	0	**171**	167	3	11	0	**181**	131	7	0	0	**138**	130	8	10	0	**148**	**638**
15:30 to 16:30	158	9	0	0	**167**	181	5	13	0	**199**	136	4	0	0	**140**	132	8	12	0	**152**	**658**
15:45 to 16:45	172	7	0	0	**179**	190	5	10	0	**205**	143	5	0	0	**148**	122	7	10	0	**139**	**671**
16:00 to 17:00	184	6	0	0	**190**	181	3	10	0	**194**	132	4	0	0	**136**	126	6	11	0	**143**	**663**
PM Totals	**526**	**18**	**0**	**0**	**544**	**525**	**16**	**31**	**0**	**572**	**413**	**19**	**0**	**0**	**432**	**407**	**17**	**30**	**0**	**454**	**2,002**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 3. Elara Blvd / Northbourne Dr

Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



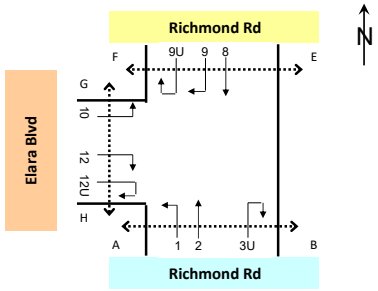
MATRIX Traffic and Transport Data

	Approach	Northbourne Dr					Elara Blvd					Northbourne Dr					Elara Blvd					Grand Total
	Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
AM	7:45 to 8:45	141	2	4	0	**147**	454	20	10	0	**484**	285	5	0	1	**291**	616	10	11	0	**637**	**1,559**
PM	14:15 to 15:15	124	4	6	0	**134**	460	16	11	0	**487**	173	6	1	0	**180**	378	21	8	0	**407**	**1,208**

Approach	Northbourne Dr					Elara Blvd					Northbourne Dr					Elara Blvd					Grand Total
Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
7:00 to 8:00	28	2	0	0	**30**	321	16	14	0	**351**	175	6	0	0	**181**	373	8	12	0	**393**	**955**
7:15 to 8:15	60	2	2	0	**64**	364	17	12	0	**393**	210	7	0	0	**217**	453	9	13	0	**475**	**1,149**
7:30 to 8:30	116	2	4	0	**122**	446	17	11	0	**474**	259	4	0	1	**264**	572	8	10	0	**590**	**1,450**
7:45 to 8:45	141	2	4	0	**147**	454	20	10	0	**484**	285	5	0	1	**291**	616	10	11	0	**637**	**1,559**
8:00 to 9:00	155	2	4	0	**161**	469	21	7	0	**497**	268	3	0	1	**272**	584	11	10	0	**605**	**1,535**
8:15 to 9:15	126	2	2	0	**130**	407	20	6	0	**433**	221	2	0	1	**224**	511	11	8	0	**530**	**1,317**
8:30 to 9:30	83	2	0	0	**85**	333	22	7	0	**362**	153	5	0	0	**158**	365	12	9	0	**386**	**991**
8:45 to 9:45	68	2	0	0	**70**	294	20	8	0	**322**	91	7	0	0	**98**	285	14	7	0	**306**	**796**
9:00 to 10:00	50	1	0	0	**51**	281	17	8	0	**306**	78	10	0	0	**88**	268	14	7	0	**289**	**734**
AM Totals	**233**	**5**	**4**	**0**	**242**	**1,071**	**54**	**29**	**0**	**1,154**	**521**	**19**	**0**	**1**	**541**	**1,225**	**33**	**29**	**0**	**1,287**	**3,224**
14:00 to 15:00	123	4	4	0	**131**	438	18	14	0	**470**	167	3	1	0	**171**	392	18	10	0	**420**	**1,192**
14:15 to 15:15	124	4	6	0	**134**	460	16	11	0	**487**	173	6	1	0	**180**	378	21	8	0	**407**	**1,208**
14:30 to 15:30	120	4	6	0	**130**	417	18	11	0	**446**	195	5	1	0	**201**	353	22	8	0	**383**	**1,160**
14:45 to 15:45	109	2	6	0	**117**	436	18	11	0	**465**	150	5	1	0	**156**	316	18	9	0	**343**	**1,081**
15:00 to 16:00	76	0	2	0	**78**	452	15	11	0	**478**	151	6	0	0	**157**	313	19	9	0	**341**	**1,054**
15:15 to 16:15	76	0	1	0	**77**	470	14	13	0	**497**	166	4	0	0	**170**	311	17	12	0	**340**	**1,084**
15:30 to 16:30	89	0	1	0	**90**	495	11	13	0	**519**	167	5	0	0	**172**	323	14	12	0	**349**	**1,130**
15:45 to 16:45	92	0	1	0	**93**	504	7	11	0	**522**	167	5	0	0	**172**	329	14	11	0	**354**	**1,141**
16:00 to 17:00	94	0	1	0	**95**	511	6	12	0	**529**	175	5	0	0	**180**	320	10	12	0	**342**	**1,146**
PM Totals	**293**	**4**	**7**	**0**	**304**	**1,401**	**39**	**37**	**0**	**1,477**	**493**	**14**	**1**	**0**	**508**	**1,025**	**47**	**31**	**0**	**1,103**	**3,392**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 4. Elara Blvd / Richmond Rd

Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



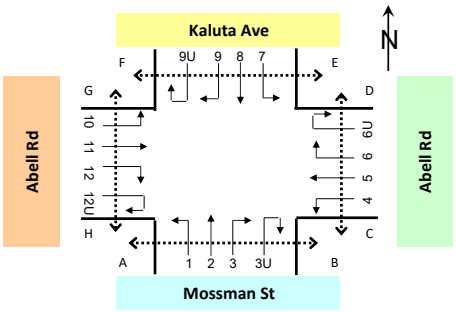
MATRIX Traffic and Transport Data

	Approach	Richmond Rd						Richmond Rd					Elara Blvd					Grand Total
	Time Period	Lights	Heavies	Buses	Cyclists	Total		Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
AM	7:15 to 8:15	1,154	150	16	3	**1,323**		1,211	104	2	1	**1,318**	620	19	13	0	**652**	**3,293**
PM	14:45 to 15:45	1,492	173	12	0	**1,677**		988	114	3	0	**1,105**	543	23	12	0	**578**	**3,360**

Approach	Richmond Rd						Richmond Rd					Elara Blvd					Grand Total
Time Period	Lights	Heavies	Buses	Cyclists	Total		Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
7:00 to 8:00	1,110	137	14	3	**1,264**		1,237	115	2	1	**1,355**	564	15	10	0	**589**	**3,208**
7:15 to 8:15	1,154	150	16	3	**1,323**		1,211	104	2	1	**1,318**	620	19	13	0	**652**	**3,293**
7:30 to 8:30	1,198	141	15	1	**1,355**		1,093	103	2	0	**1,198**	693	18	12	0	**723**	**3,276**
7:45 to 8:45	1,262	135	15	0	**1,412**		985	124	1	0	**1,110**	731	17	10	0	**758**	**3,280**
8:00 to 9:00	1,258	130	12	0	**1,400**		897	121	1	0	**1,019**	692	15	13	0	**720**	**3,139**
8:15 to 9:15	1,197	126	9	0	**1,332**		823	137	3	0	**963**	624	13	8	0	**645**	**2,940**
8:30 to 9:30	1,131	122	9	0	**1,262**		814	146	3	0	**963**	496	16	9	0	**521**	**2,746**
8:45 to 9:45	1,029	133	11	0	**1,173**		812	135	4	0	**951**	384	22	8	0	**414**	**2,538**
9:00 to 10:00	941	148	11	0	**1,100**		818	138	4	1	**961**	364	26	7	0	**397**	**2,458**
AM Totals	**3,309**	**415**	**37**	**3**	**3,764**		**2,952**	**374**	**7**	**2**	**3,335**	**1,620**	**56**	**30**	**0**	**1,706**	**8,805**
14:00 to 15:00	1,340	186	14	0	**1,540**		837	136	2	1	**976**	477	21	10	0	**508**	**3,024**
14:15 to 15:15	1,371	193	12	0	**1,576**		896	123	1	1	**1,021**	513	25	7	0	**545**	**3,142**
14:30 to 15:30	1,408	180	13	0	**1,601**		935	123	2	0	**1,060**	531	25	8	0	**564**	**3,225**
14:45 to 15:45	1,492	173	12	0	**1,677**		988	114	3	0	**1,105**	543	23	12	0	**578**	**3,360**
15:00 to 16:00	1,500	163	14	0	**1,677**		1,035	95	7	0	**1,137**	501	25	9	0	**535**	**3,349**
15:15 to 16:15	1,486	146	16	0	**1,648**		1,054	85	7	0	**1,146**	498	20	15	0	**533**	**3,327**
15:30 to 16:30	1,492	147	15	0	**1,654**		1,078	70	6	0	**1,154**	469	18	14	0	**501**	**3,309**
15:45 to 16:45	1,438	125	12	0	**1,575**		1,114	60	6	0	**1,180**	483	18	12	0	**513**	**3,268**
16:00 to 17:00	1,498	112	14	0	**1,624**		1,104	54	4	0	**1,162**	481	13	14	0	**508**	**3,294**
PM Totals	**4,338**	**461**	**42**	**0**	**4,841**		**2,976**	**285**	**13**	**1**	**3,275**	**1,459**	**59**	**33**	**0**	**1,551**	**9,667**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 5. Abell Rd / Kaluta Ave / Mossman St

Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



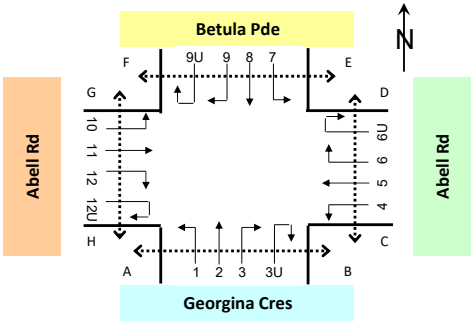
MATRIX Traffic and Transport Data

	Approach	Mossman St					Abell Rd					Kaluta Ave					Abell Rd					Grand Total
	Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
AM	7:45 to 8:45	35	4	0	0	**39**	90	20	0	0	**110**	57	1	1	0	**59**	58	19	0	0	**77**	**285**
PM	15:15 to 16:15	31	4	0	1	**36**	71	8	1	1	**81**	25	3	0	1	**29**	83	8	0	2	**93**	**239**

Approach	Mossman St					Abell Rd					Kaluta Ave					Abell Rd					Grand Total
Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
7:00 to 8:00	20	6	0	0	**26**	110	26	0	0	**136**	44	3	0	0	**47**	44	7	0	0	**51**	**260**
7:15 to 8:15	30	5	0	0	**35**	109	20	0	0	**129**	54	3	1	0	**58**	51	9	0	0	**60**	**282**
7:30 to 8:30	35	4	0	0	**39**	89	18	0	0	**107**	59	2	1	0	**62**	60	8	0	0	**68**	**276**
7:45 to 8:45	35	4	0	0	**39**	90	20	0	0	**110**	57	1	1	0	**59**	58	19	0	0	**77**	**285**
8:00 to 9:00	27	6	0	0	**33**	90	19	0	0	**109**	55	2	1	0	**58**	52	17	0	0	**69**	**269**
8:15 to 9:15	20	7	0	0	**27**	89	21	0	0	**110**	51	1	0	0	**52**	50	18	0	0	**68**	**257**
8:30 to 9:30	18	8	0	0	**26**	107	19	0	0	**126**	36	1	0	0	**37**	41	19	0	0	**60**	**249**
8:45 to 9:45	17	8	0	0	**25**	102	16	0	0	**118**	33	2	0	0	**35**	42	13	0	0	**55**	**233**
9:00 to 10:00	24	10	0	0	**34**	103	16	0	0	**119**	34	2	0	0	**36**	48	15	0	0	**63**	**252**
AM Totals	**71**	**22**	**0**	**0**	**93**	**303**	**61**	**0**	**0**	**364**	**133**	**7**	**1**	**0**	**141**	**144**	**39**	**0**	**0**	**183**	**781**
14:00 to 15:00	25	12	0	0	**37**	58	13	0	1	**72**	32	4	0	0	**36**	69	19	0	0	**88**	**233**
14:15 to 15:15	30	13	0	0	**43**	52	11	0	1	**64**	30	3	0	0	**33**	63	17	0	0	**80**	**220**
14:30 to 15:30	38	9	0	0	**47**	50	10	0	0	**60**	28	2	0	0	**30**	73	17	0	1	**91**	**228**
14:45 to 15:45	42	8	0	0	**50**	59	8	1	0	**68**	23	0	0	0	**23**	75	13	0	1	**89**	**230**
15:00 to 16:00	40	6	0	1	**47**	66	8	1	0	**75**	22	0	0	1	**23**	79	9	0	1	**89**	**234**
15:15 to 16:15	31	4	0	1	**36**	71	8	1	1	**81**	25	3	0	1	**29**	83	8	0	2	**93**	**239**
15:30 to 16:30	28	3	0	1	**32**	66	6	1	2	**75**	25	3	0	1	**29**	79	6	0	1	**86**	**222**
15:45 to 16:45	25	1	0	1	**27**	69	5	0	2	**76**	27	3	0	1	**31**	77	3	0	1	**81**	**215**
16:00 to 17:00	31	1	0	0	**32**	62	5	0	2	**69**	29	3	0	0	**32**	68	5	0	1	**74**	**207**
PM Totals	**96**	**19**	**0**	**1**	**116**	**186**	**26**	**1**	**3**	**216**	**83**	**7**	**0**	**1**	**91**	**216**	**33**	**0**	**2**	**251**	**674**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 6. Abell Rd / Betula Pde / Georgina Cres

Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



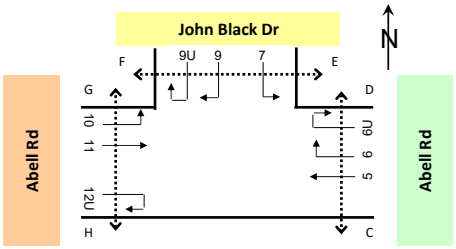
MATRIX Traffic and Transport Data

	Approach	Georgina Cres					Abell Rd					Betula Pde					Abell Rd					Grand Total
	Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
AM	7:15 to 8:15	108	6	0	0	**114**	189	31	0	0	**220**	62	1	0	0	**63**	107	11	1	0	**119**	**516**
PM	14:00 to 15:00	81	16	0	1	**98**	121	20	0	0	**141**	35	0	1	0	**36**	101	30	0	0	**131**	**406**

Approach	Georgina Cres					Abell Rd					Betula Pde					Abell Rd					Grand Total
Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
7:00 to 8:00	79	4	0	0	**83**	203	37	0	0	**240**	50	1	0	0	**51**	81	10	0	0	**91**	**465**
7:15 to 8:15	108	6	0	0	**114**	189	31	0	0	**220**	62	1	0	0	**63**	107	11	1	0	**119**	**516**
7:30 to 8:30	118	8	0	0	**126**	169	26	0	0	**195**	57	1	1	0	**59**	118	9	1	0	**128**	**508**
7:45 to 8:45	121	9	0	0	**130**	175	25	0	0	**200**	53	1	1	0	**55**	106	16	1	0	**123**	**508**
8:00 to 9:00	112	10	0	0	**122**	172	22	0	0	**194**	53	1	1	0	**55**	92	15	1	0	**108**	**479**
8:15 to 9:15	83	8	0	0	**91**	170	24	0	0	**194**	38	1	1	0	**40**	76	16	0	0	**92**	**417**
8:30 to 9:30	58	5	0	0	**63**	186	27	0	0	**213**	31	1	0	0	**32**	60	19	0	0	**79**	**387**
8:45 to 9:45	50	5	0	0	**55**	178	25	0	0	**203**	29	1	0	0	**30**	65	16	0	0	**81**	**369**
9:00 to 10:00	54	8	0	0	**62**	170	24	0	0	**194**	28	1	0	0	**29**	80	18	0	0	**98**	**383**
AM Totals	**245**	**22**	**0**	**0**	**267**	**545**	**83**	**0**	**0**	**628**	**131**	**3**	**1**	**0**	**135**	**253**	**43**	**1**	**0**	**297**	**1,327**
14:00 to 15:00	81	16	0	1	**98**	121	20	0	0	**141**	35	0	1	0	**36**	101	30	0	0	**131**	**406**
14:15 to 15:15	79	15	0	1	**95**	109	12	0	0	**121**	36	0	2	0	**38**	101	30	0	0	**131**	**385**
14:30 to 15:30	81	12	0	0	**93**	117	10	0	0	**127**	42	0	2	0	**44**	114	24	0	0	**138**	**402**
14:45 to 15:45	61	8	0	0	**69**	129	11	1	0	**141**	43	0	2	0	**45**	114	19	0	0	**133**	**388**
15:00 to 16:00	57	7	0	0	**64**	128	11	1	0	**140**	38	0	1	0	**39**	114	14	0	0	**128**	**371**
15:15 to 16:15	58	5	0	0	**63**	131	13	1	0	**145**	31	0	0	1	**32**	108	12	0	1	**121**	**361**
15:30 to 16:30	56	3	0	0	**59**	124	10	1	0	**135**	27	0	0	2	**29**	105	10	0	1	**116**	**339**
15:45 to 16:45	64	5	0	0	**69**	127	8	0	0	**135**	25	0	0	3	**28**	103	5	0	1	**109**	**341**
16:00 to 17:00	64	6	0	0	**70**	126	7	0	0	**133**	27	1	0	3	**31**	103	7	0	1	**111**	**345**
PM Totals	**202**	**29**	**0**	**1**	**232**	**375**	**38**	**1**	**0**	**414**	**100**	**1**	**2**	**3**	**106**	**318**	**51**	**0**	**1**	**370**	**1,122**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 7. Abell Rd / John Black Dr

Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



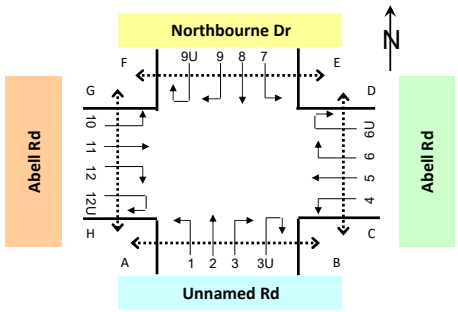
MATRIX Traffic and Transport Data

	Approach		Abell Rd					John Black Dr					Abell Rd					Grand Total
	Time Period		Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
AM	7:30	to 8:30	316	27	0	0	**343**	296	5	0	0	**301**	287	16	2	0	**305**	**949**
PM	14:30	to 15:30	226	16	0	0	**242**	162	2	0	0	**164**	215	36	2	0	**253**	**659**

Approach		Abell Rd					John Black Dr					Abell Rd					Grand Total
Time Period		Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
7:00	to 8:00	269	40	0	0	**309**	250	3	0	0	**253**	212	14	0	0	**226**	**788**
7:15	to 8:15	309	32	0	0	**341**	270	5	0	0	**275**	273	17	1	0	**291**	**907**
7:30	to 8:30	316	27	0	0	**343**	296	5	0	0	**301**	287	16	2	0	**305**	**949**
7:45	to 8:45	316	26	0	0	**342**	290	5	0	0	**295**	269	24	2	0	**295**	**932**
8:00	to 9:00	306	26	0	0	**332**	267	7	0	0	**274**	235	23	2	0	**260**	**866**
8:15	to 9:15	260	30	0	0	**290**	217	7	0	0	**224**	179	21	1	0	**201**	**715**
8:30	to 9:30	244	33	0	0	**277**	168	8	0	0	**176**	136	22	0	0	**158**	**611**
8:45	to 9:45	231	30	0	0	**261**	126	6	0	0	**132**	121	17	0	0	**138**	**531**
9:00	to 10:00	222	28	0	0	**250**	106	4	0	0	**110**	143	18	0	0	**161**	**521**
AM Totals		**797**	**94**	**0**	**0**	**891**	**623**	**14**	**0**	**0**	**637**	**590**	**55**	**2**	**0**	**647**	**2,175**
14:00	to 15:00	200	23	0	0	**223**	160	4	0	1	**165**	193	44	1	0	**238**	**626**
14:15	to 15:15	198	16	0	0	**214**	161	4	0	1	**166**	197	44	1	0	**242**	**622**
14:30	to 15:30	226	16	0	0	**242**	162	2	0	0	**164**	215	36	2	0	**253**	**659**
14:45	to 15:45	247	17	1	0	**265**	138	2	0	0	**140**	203	28	2	0	**233**	**638**
15:00	to 16:00	266	14	1	0	**281**	121	3	0	0	**124**	192	23	1	0	**216**	**621**
15:15	to 16:15	281	16	1	0	**298**	126	3	0	0	**129**	186	19	1	1	**207**	**634**
15:30	to 16:30	266	11	1	0	**278**	141	4	0	0	**145**	178	14	0	1	**193**	**616**
15:45	to 16:45	289	10	0	0	**299**	140	4	0	0	**144**	178	11	0	1	**190**	**633**
16:00	to 17:00	303	10	0	0	**313**	135	4	0	0	**139**	183	12	0	1	**196**	**648**
PM Totals		**769**	**47**	**1**	**0**	**817**	**416**	**11**	**0**	**1**	**428**	**568**	**79**	**2**	**1**	**650**	**1,895**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 8. Abell Rd / Northbourne Dr

Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



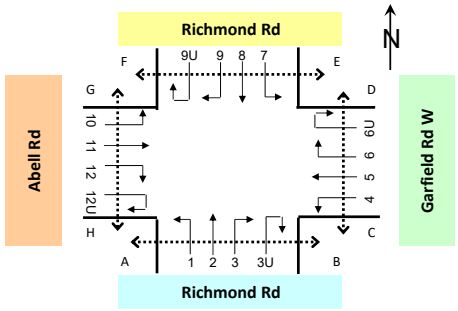
MATRIX Traffic and Transport Data

	Approach	Unnamed Rd					Abell Rd					Northbourne Dr					Abell Rd					Grand Total
	Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
AM	7:30 to 8:30	0	0	0	0	**0**	490	38	0	0	**528**	224	1	0	0	**225**	943	29	2	0	**974**	**1,727**
PM	14:45 to 15:45	0	0	0	0	**0**	574	19	2	0	**595**	131	0	1	0	**132**	516	40	2	0	**558**	**1,285**

Approach	Unnamed Rd					Abell Rd					Northbourne Dr					Abell Rd					Grand Total
Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
7:00 to 8:00	0	0	0	0	**0**	419	55	0	0	**474**	145	2	0	0	**147**	860	25	0	0	**885**	**1,506**
7:15 to 8:15	0	0	0	0	**0**	467	45	0	0	**512**	194	1	0	0	**195**	930	31	1	0	**962**	**1,669**
7:30 to 8:30	0	0	0	0	**0**	490	38	0	0	**528**	224	1	0	0	**225**	943	29	2	0	**974**	**1,727**
7:45 to 8:45	0	0	0	0	**0**	493	34	0	0	**527**	238	0	0	0	**238**	864	31	2	0	**897**	**1,662**
8:00 to 9:00	0	0	0	0	**0**	482	36	0	0	**518**	239	0	0	0	**239**	752	31	2	0	**785**	**1,542**
8:15 to 9:15	0	0	0	0	**0**	448	39	0	0	**487**	185	0	0	0	**185**	614	27	1	0	**642**	**1,314**
8:30 to 9:30	0	0	0	0	**0**	406	40	0	0	**446**	129	0	0	0	**129**	496	29	0	0	**525**	**1,100**
8:45 to 9:45	0	0	0	0	**0**	373	37	0	0	**410**	83	0	0	0	**83**	424	24	0	0	**448**	**941**
9:00 to 10:00	0	0	0	0	**0**	339	33	0	0	**372**	56	1	0	0	**57**	408	23	0	0	**431**	**860**
AM Totals	**0**	**0**	**0**	**0**	**0**	**1,240**	**124**	**0**	**0**	**1,364**	**440**	**3**	**0**	**0**	**443**	**2,020**	**79**	**2**	**0**	**2,101**	**3,908**
14:00 to 15:00	0	0	0	0	**0**	439	27	0	0	**466**	107	1	0	0	**108**	427	52	0	0	**479**	**1,053**
14:15 to 15:15	0	0	0	0	**0**	473	19	0	0	**492**	131	1	0	0	**132**	466	58	1	0	**525**	**1,149**
14:30 to 15:30	0	0	0	0	**0**	524	20	2	0	**546**	142	1	1	0	**144**	515	47	2	0	**564**	**1,254**
14:45 to 15:45	0	0	0	0	**0**	574	19	2	0	**595**	131	0	1	0	**132**	516	40	2	0	**558**	**1,285**
15:00 to 16:00	0	0	0	0	**0**	578	16	2	0	**596**	105	0	1	0	**106**	471	30	2	0	**503**	**1,205**
15:15 to 16:15	0	0	0	0	**0**	580	21	2	0	**603**	92	0	1	0	**93**	461	22	1	0	**484**	**1,180**
15:30 to 16:30	0	0	0	0	**0**	568	16	0	0	**584**	78	0	0	0	**78**	452	18	0	0	**470**	**1,132**
15:45 to 16:45	0	0	0	0	**0**	612	18	0	0	**630**	77	0	0	0	**77**	478	14	0	0	**492**	**1,199**
16:00 to 17:00	0	0	0	0	**0**	656	18	0	0	**674**	74	0	0	0	**74**	486	17	0	0	**503**	**1,251**
PM Totals	**0**	**0**	**0**	**0**	**0**	**1,673**	**61**	**2**	**0**	**1,736**	**286**	**1**	**1**	**0**	**288**	**1,384**	**99**	**2**	**0**	**1,485**	**3,509**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 9. Abell Rd / Garfield Rd W / Richmond Rd

Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



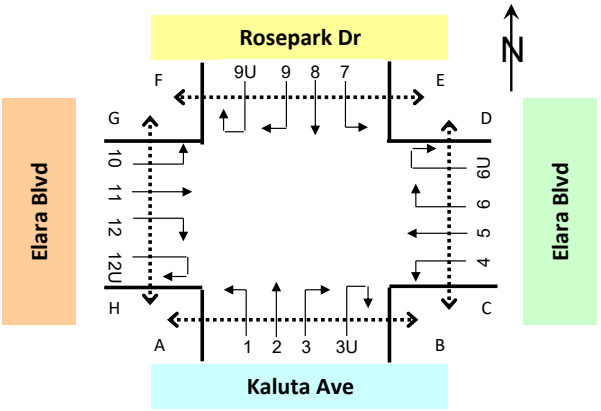
MATRIX Traffic and Transport Data

	Approach	Richmond Rd					Garfield Rd W					Richmond Rd					Abell Rd					Grand Total
	Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
AM	7:45 to 8:45	1,526	157	11	0	**1,694**	499	96	5	0	**600**	1,452	129	10	1	**1,592**	1,141	40	1	0	**1,182**	**5,068**
PM	14:45 to 15:45	1,788	215	8	0	**2,011**	563	72	7	0	**642**	1,258	124	11	0	**1,393**	678	59	2	0	**739**	**4,785**

Approach	Richmond Rd					Garfield Rd W					Richmond Rd					Abell Rd					Grand Total
Time Period	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	Lights	Heavies	Buses	Cyclists	Total	
7:00 to 8:00	1,458	208	10	3	**1,679**	370	92	7	0	**469**	1,542	112	12	1	**1,667**	961	38	0	0	**999**	**4,814**
7:15 to 8:15	1,475	194	11	3	**1,683**	396	90	6	0	**492**	1,496	111	13	1	**1,621**	1,108	34	1	0	**1,143**	**4,939**
7:30 to 8:30	1,525	174	11	1	**1,711**	442	90	5	0	**537**	1,514	111	13	1	**1,639**	1,113	35	1	0	**1,149**	**5,036**
7:45 to 8:45	1,526	157	11	0	**1,694**	499	96	5	0	**600**	1,452	129	10	1	**1,592**	1,141	40	1	0	**1,182**	**5,068**
8:00 to 9:00	1,511	186	10	0	**1,707**	525	90	3	0	**618**	1,342	128	13	1	**1,484**	996	37	1	0	**1,034**	**4,843**
8:15 to 9:15	1,451	192	7	0	**1,650**	514	93	2	0	**609**	1,216	131	13	1	**1,361**	800	41	0	0	**841**	**4,461**
8:30 to 9:30	1,349	202	6	0	**1,557**	467	88	4	0	**559**	1,128	143	12	0	**1,283**	626	36	0	0	**662**	**4,061**
8:45 to 9:45	1,287	222	8	0	**1,517**	373	87	4	0	**464**	1,057	138	12	0	**1,207**	477	33	0	0	**510**	**3,698**
9:00 to 10:00	1,201	219	7	0	**1,427**	329	106	4	0	**439**	1,008	143	10	0	**1,161**	449	37	0	0	**486**	**3,513**
AM Totals	**4,170**	**613**	**27**	**3**	**4,813**	**1,224**	**288**	**14**	**0**	**1,526**	**3,892**	**383**	**35**	**2**	**4,312**	**2,406**	**112**	**1**	**0**	**2,519**	**13,170**
14:00 to 15:00	1,681	216	13	0	**1,910**	336	89	6	0	**431**	1,058	141	10	1	**1,210**	516	59	0	0	**575**	**4,126**
14:15 to 15:15	1,655	204	13	0	**1,872**	436	82	4	0	**522**	1,100	131	8	1	**1,240**	585	69	0	0	**654**	**4,288**
14:30 to 15:30	1,689	203	11	0	**1,903**	549	80	7	0	**636**	1,162	132	9	0	**1,303**	662	61	2	0	**725**	**4,567**
14:45 to 15:45	1,788	215	8	0	**2,011**	563	72	7	0	**642**	1,258	124	11	0	**1,393**	678	59	2	0	**739**	**4,785**
15:00 to 16:00	1,733	200	8	0	**1,941**	604	76	7	0	**687**	1,275	106	15	0	**1,396**	620	50	2	0	**672**	**4,696**
15:15 to 16:15	1,786	189	9	0	**1,984**	524	75	6	0	**605**	1,254	95	18	0	**1,367**	567	39	2	0	**608**	**4,564**
15:30 to 16:30	1,792	187	9	0	**1,988**	438	71	6	0	**515**	1,249	79	17	0	**1,345**	573	33	0	0	**606**	**4,454**
15:45 to 16:45	1,830	167	9	0	**2,006**	438	66	4	0	**508**	1,286	66	19	0	**1,371**	561	26	0	0	**587**	**4,472**
16:00 to 17:00	1,912	156	12	0	**2,080**	437	58	4	0	**499**	1,244	61	16	0	**1,321**	556	26	0	0	**582**	**4,482**
PM Totals	**5,326**	**572**	**33**	**0**	**5,931**	**1,377**	**223**	**17**	**0**	**1,617**	**3,577**	**308**	**41**	**1**	**3,927**	**1,692**	**135**	**2**	**0**	**1,829**	**13,304**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 1. Elara Blvd / Kaluta Ave / Rosepark Dr

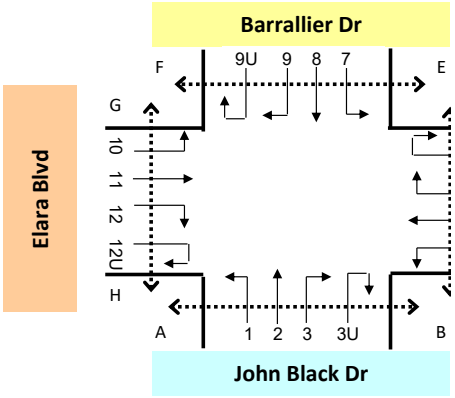
Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Pedestrian Data



Direction	Pedestrians							
Time Period	B to A	A to B	D to C	C to D	F to E	E to F	H to G	G to H
7:00 to 7:15	0	0	0	0	0	0	0	0
7:15 to 7:30	0	0	0	0	0	0	0	0
7:30 to 7:45	0	0	0	0	0	2	0	0
7:45 to 8:00	1	0	1	1	0	1	0	0
8:00 to 8:15	0	0	0	0	0	0	0	0
8:15 to 8:30	1	0	0	1	0	2	0	0
8:30 to 8:45	2	0	0	0	0	1	0	0
8:45 to 9:00	0	2	0	0	3	2	0	0
9:00 to 9:15	2	0	0	0	0	0	0	0
9:15 to 9:30	0	1	0	0	0	0	0	0
9:30 to 9:45	0	0	0	0	0	2	0	0
9:45 to 10:00	0	1	0	0	0	0	0	0
AM Totals	**6**	**4**	**1**	**2**	**3**	**10**	**0**	**0**
14:00 to 14:15	2	0	0	0	0	0	0	0
14:15 to 14:30	0	0	0	0	2	0	0	0
14:30 to 14:45	0	0	0	0	0	0	0	0
14:45 to 15:00	0	2	0	1	0	0	0	0
15:00 to 15:15	0	4	0	0	0	0	0	2
15:15 to 15:30	0	0	0	0	0	0	0	0
15:30 to 15:45	1	4	0	1	7	1	0	2
15:45 to 16:00	2	0	0	0	3	0	0	0
16:00 to 16:15	0	0	1	0	1	0	0	0
16:15 to 16:30	1	3	0	0	0	1	0	0
16:30 to 16:45	1	0	0	0	1	1	0	0
16:45 to 17:00	0	2	1	0	3	0	0	0
PM Totals	**7**	**15**	**2**	**2**	**17**	**3**	**0**	**4**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 2. Elara Blvd / John Black Dr / Barrallier Dr

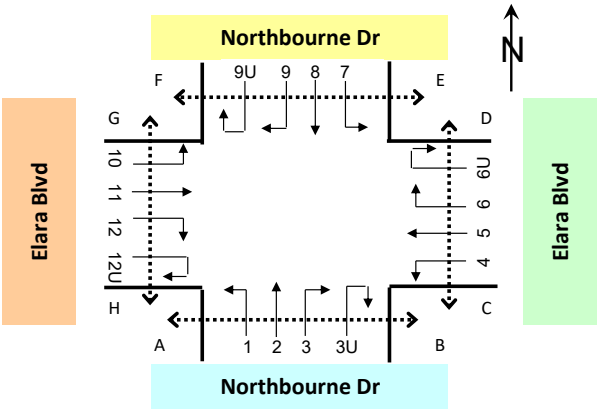
Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Pedestrian Data



Direction	Pedestrians							
Time Period	**B to A**	**A to B**	**D to C**	**C to D**	**F to E**	**E to F**	**H to G**	**G to H**
7:00 to 7:15	1	0	1	4	4	0	1	0
7:15 to 7:30	0	0	5	1	4	2	2	0
7:30 to 7:45	1	0	0	1	0	0	5	0
7:45 to 8:00	3	4	6	0	1	0	8	4
8:00 to 8:15	0	0	4	2	2	0	2	0
8:15 to 8:30	0	0	0	0	0	0	0	0
8:30 to 8:45	5	0	0	2	2	1	3	0
8:45 to 9:00	1	1	0	1	0	0	1	0
9:00 to 9:15	0	0	0	1	0	0	3	1
9:15 to 9:30	0	2	0	0	1	1	0	0
9:30 to 9:45	1	0	1	1	1	0	3	0
9:45 to 10:00	0	0	1	1	1	0	0	0
AM Totals	**12**	**7**	**18**	**14**	**16**	**4**	**28**	**5**
14:00 to 14:15	1	0	0	2	3	0	0	0
14:15 to 14:30	0	0	1	1	0	1	0	0
14:30 to 14:45	0	0	1	0	0	1	1	0
14:45 to 15:00	3	0	0	19	8	0	0	2
15:00 to 15:15	0	4	3	2	3	0	4	0
15:15 to 15:30	1	3	1	0	0	0	0	1
15:30 to 15:45	10	2	1	18	5	1	5	5
15:45 to 16:00	1	1	1	7	1	2	0	1
16:00 to 16:15	11	2	2	17	10	0	1	0
16:15 to 16:30	5	0	2	4	11	1	3	0
16:30 to 16:45	5	1	0	5	4	2	3	0
16:45 to 17:00	2	2	4	5	3	1	2	1
PM Totals	**39**	**15**	**16**	**80**	**48**	**9**	**19**	**10**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 3. Elara Blvd / Northbourne Dr

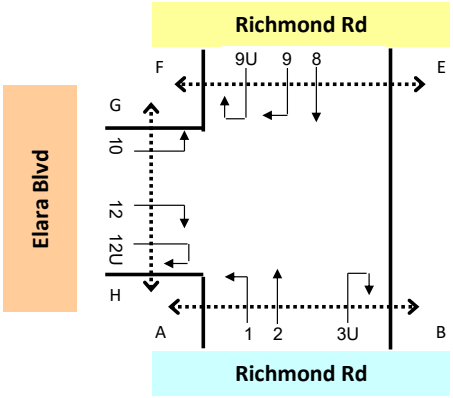
Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Pedestrian Data



Direction	Pedestrians							
Time Period	B to A	A to B	D to C	C to D	F to E	E to F	H to G	G to H
7:00 to 7:15	0	0	1	1	0	0	0	0
7:15 to 7:30	0	0	0	0	0	0	0	0
7:30 to 7:45	0	0	0	0	0	0	3	1
7:45 to 8:00	0	0	2	6	0	0	0	0
8:00 to 8:15	0	0	0	2	0	0	8	2
8:15 to 8:30	0	0	1	3	0	0	12	3
8:30 to 8:45	0	0	2	3	0	0	7	4
8:45 to 9:00	0	0	1	2	0	0	4	0
9:00 to 9:15	0	0	1	2	0	0	5	2
9:15 to 9:30	0	0	3	1	0	0	4	3
9:30 to 9:45	0	0	4	3	0	0	5	5
9:45 to 10:00	0	0	3	0	1	0	1	2
AM Totals	**0**	**0**	**18**	**23**	**1**	**0**	**49**	**22**
14:00 to 14:15	0	0	5	0	0	2	0	4
14:15 to 14:30	0	0	2	1	1	1	1	6
14:30 to 14:45	0	0	4	0	3	3	12	14
14:45 to 15:00	0	0	0	5	0	6	4	29
15:00 to 15:15	0	1	1	1	0	0	1	2
15:15 to 15:30	0	0	0	0	1	2	8	6
15:30 to 15:45	1	0	4	0	3	1	1	12
15:45 to 16:00	2	0	3	1	1	0	3	3
16:00 to 16:15	1	2	3	2	4	1	11	3
16:15 to 16:30	3	2	4	0	4	3	10	5
16:30 to 16:45	0	0	5	1	3	0	4	7
16:45 to 17:00	0	0	4	0	1	1	4	3
PM Totals	**7**	**5**	**35**	**11**	**21**	**20**	**59**	**94**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 4. Elara Blvd / Richmond Rd

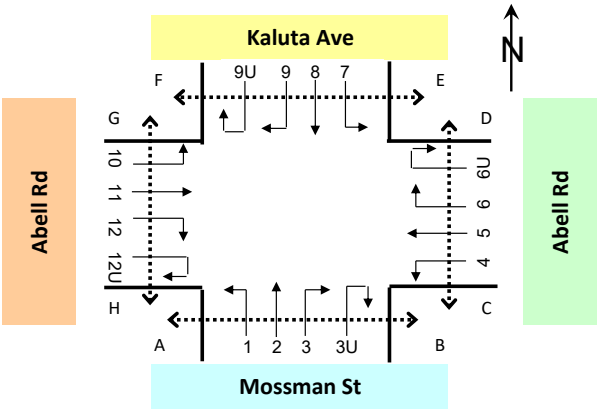
Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Pedestrian Data



Direction	Pedestrians					
Time Period	B to A	A to B	F to E	E to F	H to G	G to H
7:00 to 7:15	0	0	0	0	0	0
7:15 to 7:30	0	0	0	0	0	0
7:30 to 7:45	0	0	0	0	0	0
7:45 to 8:00	0	0	0	0	0	0
8:00 to 8:15	0	0	0	0	0	0
8:15 to 8:30	0	0	0	0	0	0
8:30 to 8:45	0	0	0	0	0	0
8:45 to 9:00	0	0	0	0	0	0
9:00 to 9:15	0	0	0	0	0	0
9:15 to 9:30	0	0	0	0	0	0
9:30 to 9:45	0	0	0	0	0	0
9:45 to 10:00	0	0	0	0	0	0
AM Totals	**0**	**0**	**0**	**0**	**0**	**0**
14:00 to 14:15	0	0	0	0	0	0
14:15 to 14:30	0	0	0	0	0	0
14:30 to 14:45	0	0	0	0	0	0
14:45 to 15:00	0	0	0	0	0	0
15:00 to 15:15	0	0	0	0	0	0
15:15 to 15:30	0	0	0	0	0	0
15:30 to 15:45	0	0	0	0	0	0
15:45 to 16:00	0	0	0	0	0	0
16:00 to 16:15	0	0	0	0	0	0
16:15 to 16:30	0	0	0	0	0	0
16:30 to 16:45	0	0	0	0	0	0
16:45 to 17:00	0	0	0	0	0	0
PM Totals	**0**	**0**	**0**	**0**	**0**	**0**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 5. Abell Rd / Kaluta Ave / Mossman St

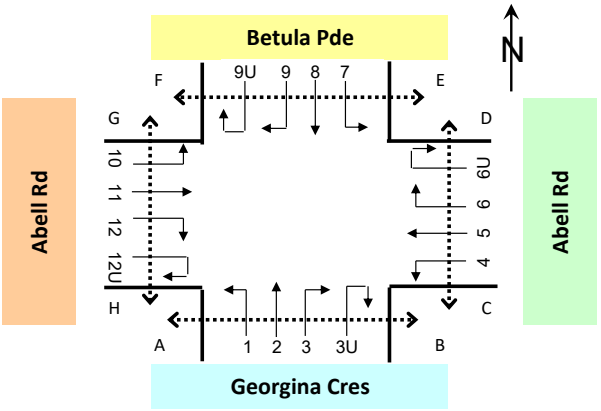
Day/Date : Tue 28rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Pedestrian Data



Direction	Pedestrians							
Time Period	B to A	A to B	D to C	C to D	F to E	E to F	H to G	G to H
7:00 to 7:15	0	0	0	0	0	0	0	0
7:15 to 7:30	0	0	0	1	0	0	0	0
7:30 to 7:45	0	0	0	0	0	0	0	0
7:45 to 8:00	0	0	0	0	0	4	0	0
8:00 to 8:15	0	0	0	0	0	2	0	0
8:15 to 8:30	0	0	0	0	0	5	0	0
8:30 to 8:45	0	0	4	0	4	2	0	0
8:45 to 9:00	0	0	0	0	3	0	0	0
9:00 to 9:15	0	0	2	2	0	2	0	0
9:15 to 9:30	0	2	1	0	2	0	0	2
9:30 to 9:45	0	0	1	0	0	2	0	0
9:45 to 10:00	0	0	0	2	0	2	0	0
AM Totals	**0**	**2**	**8**	**5**	**9**	**19**	**0**	**2**
14:00 to 14:15	0	0	0	0	0	1	0	0
14:15 to 14:30	0	0	0	0	0	0	0	0
14:30 to 14:45	0	0	0	0	1	0	0	0
14:45 to 15:00	0	0	0	0	0	0	0	0
15:00 to 15:15	0	0	0	0	3	0	0	0
15:15 to 15:30	0	0	0	0	0	0	0	0
15:30 to 15:45	0	0	0	0	0	0	0	0
15:45 to 16:00	0	0	1	0	1	3	0	0
16:00 to 16:15	0	0	0	0	0	2	0	0
16:15 to 16:30	0	0	0	0	0	1	0	0
16:30 to 16:45	0	0	0	0	0	0	0	0
16:45 to 17:00	0	0	0	0	1	0	0	0
PM Totals	**0**	**0**	**1**	**0**	**6**	**7**	**0**	**0**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 6. Abell Rd / Betula Pde / Georgina Cres

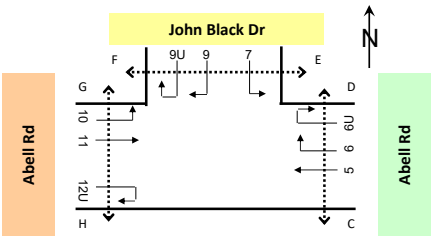
Day/Date : Tue 28th June 2022
Weather : Fine
Description : Classified Intersection Count
: Pedestrian Data



Direction	Pedestrians							
Time Period	B to A	A to B	D to C	C to D	F to E	E to F	H to G	G to H
7:00 to 7:15	0	0	1	0	0	0	0	0
7:15 to 7:30	0	0	0	0	0	0	0	1
7:30 to 7:45	0	0	0	0	3	0	0	0
7:45 to 8:00	0	0	2	0	0	1	0	0
8:00 to 8:15	1	1	6	3	0	3	0	1
8:15 to 8:30	3	0	0	0	0	2	2	0
8:30 to 8:45	0	2	0	0	2	1	0	0
8:45 to 9:00	0	0	1	2	3	3	0	1
9:00 to 9:15	2	0	0	0	0	2	0	0
9:15 to 9:30	0	1	3	0	1	3	0	0
9:30 to 9:45	1	1	0	1	0	2	0	0
9:45 to 10:00	0	0	0	0	0	0	0	0
AM Totals	**7**	**5**	**13**	**6**	**9**	**17**	**2**	**3**
14:00 to 14:15	0	0	0	0	0	1	0	0
14:15 to 14:30	0	0	0	0	0	0	0	0
14:30 to 14:45	0	0	1	0	1	0	0	0
14:45 to 15:00	0	1	2	3	0	0	0	0
15:00 to 15:15	1	1	2	0	3	0	0	0
15:15 to 15:30	0	0	0	5	0	0	0	0
15:30 to 15:45	1	1	0	0	0	0	0	0
15:45 to 16:00	0	0	0	0	0	0	0	0
16:00 to 16:15	0	0	0	0	0	5	0	0
16:15 to 16:30	1	0	2	0	0	0	1	0
16:30 to 16:45	0	0	0	1	0	0	0	0
16:45 to 17:00	1	2	1	0	0	1	0	0
PM Totals	**4**	**5**	**8**	**9**	**4**	**7**	**1**	**0**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 7. Abell Rd / John Black Dr

Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Pedestrian Data

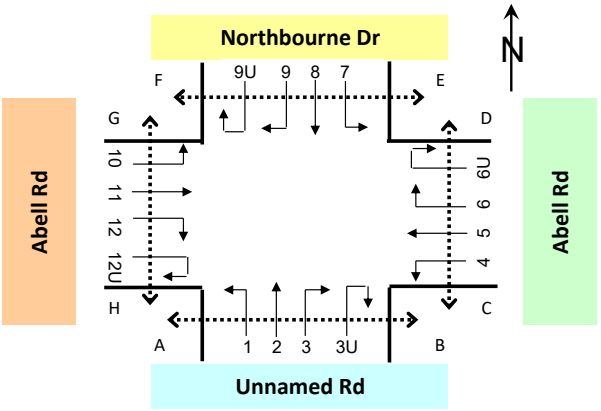


MATRIX Traffic and Transport Data

Direction		Pedestrians					
Time Period		D to C	C to D	F to E	E to F	H to G	G to H
7:00 to 7:15		0	0	0	0	0	0
7:15 to 7:30		1	1	0	0	0	3
7:30 to 7:45		0	0	1	0	0	0
7:45 to 8:00		0	0	0	0	0	0
8:00 to 8:15		2	0	2	0	1	7
8:15 to 8:30		1	0	2	0	2	0
8:30 to 8:45		0	1	0	1	0	0
8:45 to 9:00		0	1	0	1	1	0
9:00 to 9:15		0	1	0	0	1	1
9:15 to 9:30		1	0	5	1	0	3
9:30 to 9:45		0	0	0	0	0	0
9:45 to 10:00		0	3	0	0	0	2
AM Totals		**5**	**7**	**10**	**3**	**5**	**16**
14:00 to 14:15		0	0	0	2	0	1
14:15 to 14:30		0	0	0	0	0	0
14:30 to 14:45		0	3	0	0	3	2
14:45 to 15:00		0	1	0	0	10	3
15:00 to 15:15		0	0	3	0	0	1
15:15 to 15:30		1	1	0	5	2	0
15:30 to 15:45		0	0	0	1	1	1
15:45 to 16:00		2	1	1	0	0	0
16:00 to 16:15		2	6	2	0	3	0
16:15 to 16:30		0	2	1	0	1	0
16:30 to 16:45		0	0	7	1	6	1
16:45 to 17:00		0	1	0	2	1	3
PM Totals		**5**	**15**	**14**	**11**	**27**	**12**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 8. Abell Rd / Northbourne Dr

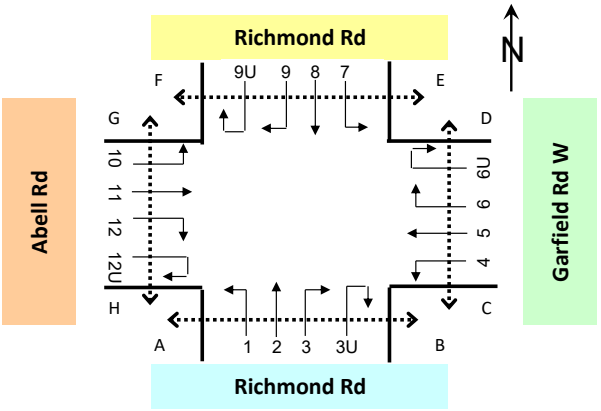
Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Pedestrian Data



Direction	Pedestrians							
Time Period	B to A	A to B	D to C	C to D	F to E	E to F	H to G	G to H
7:00 to 7:15	0	0	0	0	0	0	0	0
7:15 to 7:30	0	0	0	0	1	0	0	3
7:30 to 7:45	0	0	0	0	0	0	0	0
7:45 to 8:00	0	0	0	0	0	0	0	2
8:00 to 8:15	0	0	0	0	0	0	0	1
8:15 to 8:30	0	0	0	0	0	2	4	8
8:30 to 8:45	0	0	0	0	1	1	1	0
8:45 to 9:00	0	0	0	0	0	0	0	0
9:00 to 9:15	0	0	1	0	0	0	0	0
9:15 to 9:30	0	0	0	0	0	0	0	0
9:30 to 9:45	0	0	0	0	3	0	0	0
9:45 to 10:00	0	0	0	0	1	0	0	2
AM Totals	**0**	**0**	**1**	**0**	**6**	**3**	**5**	**16**
14:00 to 14:15	0	0	0	0	0	0	6	0
14:15 to 14:30	0	0	0	0	0	0	0	0
14:30 to 14:45	0	0	0	0	2	0	4	6
14:45 to 15:00	0	0	3	0	0	0	14	3
15:00 to 15:15	0	0	0	0	0	0	0	2
15:15 to 15:30	0	0	0	0	0	0	0	3
15:30 to 15:45	0	0	0	0	0	0	2	0
15:45 to 16:00	0	0	0	0	1	0	1	1
16:00 to 16:15	0	0	0	0	0	0	0	0
16:15 to 16:30	0	0	0	0	0	0	0	0
16:30 to 16:45	0	0	2	2	0	1	2	4
16:45 to 17:00	0	0	0	1	0	0	1	1
PM Totals	**0**	**0**	**5**	**3**	**3**	**1**	**30**	**20**

Job No. : AUNSW4186
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : Marsden Park
Location : 9. Abell Rd / Garfield Rd W / Richmond Rd

Day/Date : Thu 23rd June 2022
Weather : Fine
Description : Classified Intersection Count
: Pedestrian Data



Direction	Pedestrians							
Time Period	B to A	A to B	D to C	C to D	F to E	E to F	H to G	G to H
7:00 to 7:15	0	0	0	0	0	0	0	0
7:15 to 7:30	0	0	0	0	0	0	0	0
7:30 to 7:45	0	0	0	0	0	0	0	0
7:45 to 8:00	0	0	0	0	0	0	0	0
8:00 to 8:15	0	0	0	0	0	0	0	0
8:15 to 8:30	0	1	1	0	0	0	0	0
8:30 to 8:45	0	0	0	0	0	0	0	0
8:45 to 9:00	0	0	0	0	0	0	0	0
9:00 to 9:15	0	0	0	0	0	0	0	0
9:15 to 9:30	0	0	0	0	0	0	0	0
9:30 to 9:45	0	0	0	0	0	0	0	0
9:45 to 10:00	0	0	0	0	0	0	0	0
AM Totals	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**
14:00 to 14:15	0	0	0	0	0	0	0	0
14:15 to 14:30	0	0	0	0	0	0	0	0
14:30 to 14:45	0	0	0	0	0	0	0	0
14:45 to 15:00	0	0	0	0	0	0	0	0
15:00 to 15:15	0	1	1	0	0	0	0	0
15:15 to 15:30	0	0	0	0	0	0	0	0
15:30 to 15:45	0	0	0	0	0	0	0	0
15:45 to 16:00	0	0	0	0	0	0	0	0
16:00 to 16:15	0	0	0	0	0	0	0	0
16:15 to 16:30	0	0	0	0	0	0	0	0
16:30 to 16:45	0	0	0	0	0	0	0	0
16:45 to 17:00	0	0	0	0	0	0	0	0
PM Totals	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**

Appendix C Traffic Modelling Results

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MOVEMENT SUMMARY

Site: 1 [Elara Boulevard-Kaluta Avenue -AM-Existing (Site Folder: Existing)]

Network: N101 [AM-Existing (Network Folder: Existing)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	3	33.3	3	33.3	0.033	3.1	LOS A	0.1	0.4	0.16	0.48	0.16	45.2
2	T1	19	5.6	19	5.6	0.033	2.6	LOS A	0.1	0.4	0.16	0.48	0.16	47.3
3	R2	19	0.0	19	0.0	0.033	7.6	LOS A	0.1	0.4	0.16	0.48	0.16	43.8
3u	U	3	0.0	3	0.0	0.033	9.5	LOS A	0.1	0.4	0.16	0.48	0.16	43.8
Approach		44	4.8	44	4.8	0.033	5.3	LOS A	0.1	0.4	0.16	0.48	0.16	45.7
East: Elara boulevard														
4	L2	33	9.7	33	9.7	0.063	2.8	LOS A	0.1	0.8	0.10	0.46	0.10	45.9
5	T1	19	11.1	19	11.1	0.063	2.5	LOS A	0.1	0.8	0.10	0.46	0.10	48.2
6	R2	21	5.0	21	5.0	0.063	7.5	LOS A	0.1	0.8	0.10	0.46	0.10	48.8
6u	U	11	90.0	11	90.0	0.063	10.1	LOS A	0.1	0.8	0.10	0.46	0.10	45.9
Approach		83	19.0	83	19.0	0.063	4.8	LOS A	0.1	0.8	0.10	0.46	0.10	47.3
North: Kaluta Avenue														
7	L2	27	7.7	27	7.7	0.039	2.9	LOS A	0.1	0.5	0.15	0.35	0.15	44.0
8	T1	22	4.8	22	4.8	0.039	2.6	LOS A	0.1	0.5	0.15	0.35	0.15	44.0
9	R2	1	0.0	1	0.0	0.039	7.5	LOS A	0.1	0.5	0.15	0.35	0.15	49.0
9u	U	1	0.0	1	0.0	0.039	9.4	LOS A	0.1	0.5	0.15	0.35	0.15	50.9
Approach		52	6.1	52	6.1	0.039	3.0	LOS A	0.1	0.5	0.15	0.35	0.15	44.4
West: Elara boulevard														
10	L2	1	0.0	1	0.0	0.014	2.9	LOS A	0.0	0.2	0.21	0.35	0.21	45.5
11	T1	15	7.1	15	7.1	0.014	2.8	LOS A	0.0	0.2	0.21	0.35	0.21	40.3
12	R2	1	0.0	1	0.0	0.014	7.7	LOS A	0.0	0.2	0.21	0.35	0.21	40.3
12u	U	1	0.0	1	0.0	0.014	9.6	LOS A	0.0	0.2	0.21	0.35	0.21	50.1
Approach		18	5.9	18	5.9	0.014	3.5	LOS A	0.0	0.2	0.21	0.35	0.21	41.6
All Vehicles		197	11.2	197	11.2	0.063	4.3	LOS A	0.1	0.8	0.14	0.42	0.14	46.2

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 5 [Abell Road-Kaluta Avenue_ AM-Existing (Site Folder: Existing)] Network: N101 [AM-Existing (Network Folder: Existing)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	8	37.5	8	37.5	0.036	3.9	LOS A	0.1	0.6	0.29	0.50	0.29	42.6
2	T1	13	0.0	13	0.0	0.036	3.4	LOS A	0.1	0.6	0.29	0.50	0.29	36.4
3	R2	20	5.3	20	5.3	0.036	7.9	LOS A	0.1	0.6	0.29	0.50	0.29	36.4
3u	U	1	0.0	1	0.0	0.036	9.7	LOS A	0.1	0.6	0.29	0.50	0.29	45.6
Approach		42	10.0	42	10.0	0.036	5.8	LOS A	0.1	0.6	0.29	0.50	0.29	38.7
East: Abell Road														
4	L2	17	31.3	17	31.3	0.089	3.2	LOS A	0.2	1.2	0.12	0.43	0.12	42.8
5	T1	64	21.3	64	21.3	0.089	3.0	LOS A	0.2	1.2	0.12	0.43	0.12	46.2
6	R2	35	6.1	35	6.1	0.089	7.4	LOS A	0.2	1.2	0.12	0.43	0.12	39.5
6u	U	1	0.0	1	0.0	0.089	9.2	LOS A	0.2	1.2	0.12	0.43	0.12	39.5
Approach		117	18.0	117	18.0	0.089	4.4	LOS A	0.2	1.2	0.12	0.43	0.12	44.4
North: Kaluta Avenue														
7	L2	45	2.3	45	2.3	0.051	3.3	LOS A	0.1	0.6	0.23	0.45	0.23	44.8
8	T1	7	14.3	7	14.3	0.051	3.3	LOS A	0.1	0.6	0.23	0.45	0.23	47.4
9	R2	9	0.0	9	0.0	0.051	7.7	LOS A	0.1	0.6	0.23	0.45	0.23	48.0
9u	U	1	0.0	1	0.0	0.051	9.5	LOS A	0.1	0.6	0.23	0.45	0.23	44.8
Approach		63	3.3	63	3.3	0.051	4.0	LOS A	0.1	0.6	0.23	0.45	0.23	45.8
West: Abell Road														
10	L2	4	0.0	4	0.0	0.070	3.1	LOS A	0.1	0.9	0.18	0.39	0.18	42.6
11	T1	64	24.6	64	24.6	0.070	3.2	LOS A	0.1	0.9	0.18	0.39	0.18	42.6
12	R2	13	33.3	13	33.3	0.070	7.9	LOS A	0.1	0.9	0.18	0.39	0.18	46.3
12u	U	1	0.0	1	0.0	0.070	9.3	LOS A	0.1	0.9	0.18	0.39	0.18	49.0
Approach		82	24.4	82	24.4	0.070	4.0	LOS A	0.1	0.9	0.18	0.39	0.18	43.5
All Vehicles		304	15.6	304	15.6	0.089	4.4	LOS A	0.2	1.2	0.18	0.43	0.18	44.0

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [Elara Boulevard-John Black Drive - AM-Existing (Site Folder: Existing)]

Network: N101 [AM-Existing (Network Folder: Existing)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: John Black Drive														
1	L2	46	6.8	46	6.8	0.269	5.0	LOS A	0.8	5.6	0.53	0.57	0.53	43.5
2	T1	154	2.1	154	2.1	0.269	4.9	LOS A	0.8	5.6	0.53	0.57	0.53	46.1
3	R2	74	4.3	74	4.3	0.269	8.8	LOS A	0.8	5.6	0.53	0.57	0.53	46.5
3u	U	1	0.0	1	0.0	0.269	10.3	LOS A	0.8	5.6	0.53	0.57	0.53	43.5
Approach		275	3.4	275	3.4	0.269	6.0	LOS A	0.8	5.6	0.53	0.57	0.53	45.9
East: Elara boulevard														
4	L2	59	3.6	59	3.6	0.259	5.8	LOS A	0.7	5.4	0.63	0.66	0.63	42.1
5	T1	108	14.6	108	14.6	0.259	6.2	LOS A	0.7	5.4	0.63	0.66	0.63	42.1
6	R2	52	8.2	52	8.2	0.259	9.8	LOS A	0.7	5.4	0.63	0.66	0.63	45.2
6u	U	4	0.0	4	0.0	0.259	11.2	LOS A	0.7	5.4	0.63	0.66	0.63	46.6
Approach		223	9.9	223	9.9	0.259	7.0	LOS A	0.7	5.4	0.63	0.66	0.63	43.2
North: John Black Drive														
7	L2	74	2.9	74	2.9	0.357	6.3	LOS A	1.1	7.7	0.68	0.66	0.68	44.6
8	T1	224	0.5	224	0.5	0.357	6.3	LOS A	1.1	7.7	0.68	0.66	0.68	39.5
9	R2	18	5.9	18	5.9	0.357	10.3	LOS A	1.1	7.7	0.68	0.66	0.68	39.5
9u	U	4	0.0	4	0.0	0.357	11.7	LOS A	1.1	7.7	0.68	0.66	0.68	45.4
Approach		320	1.3	320	1.3	0.357	6.6	LOS A	1.1	7.7	0.68	0.66	0.68	41.6
West: Elara boulevard														
10	L2	21	5.0	21	5.0	0.277	5.8	LOS A	0.8	5.6	0.61	0.64	0.61	45.2
11	T1	165	7.6	165	7.6	0.277	5.9	LOS A	0.8	5.6	0.61	0.64	0.61	46.5
12	R2	64	0.0	64	0.0	0.277	9.5	LOS A	0.8	5.6	0.61	0.64	0.61	43.7
12u	U	1	0.0	1	0.0	0.277	11.1	LOS A	0.8	5.6	0.61	0.64	0.61	43.7
Approach		252	5.4	252	5.4	0.277	6.9	LOS A	0.8	5.6	0.61	0.64	0.61	45.9
All Vehicles		1069	4.6	1069	4.6	0.357	6.6	LOS A	1.1	7.7	0.62	0.63	0.62	44.6

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 7 [Abell Road-John Black Drive - AM-Existing (Site Folder: Existing)]

Network: N101 [AM-Existing (Network Folder: Existing)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Abell Road														
5	T1	160	15.1	160	15.1	0.265	3.2	LOS A	0.6	4.4	0.21	0.51	0.21	43.9
6	R2	186	1.1	186	1.1	0.265	7.4	LOS A	0.6	4.4	0.21	0.51	0.21	43.9
6u	U	14	7.7	14	7.7	0.265	9.2	LOS A	0.6	4.4	0.21	0.51	0.21	48.0
Approach		360	7.6	360	7.6	0.265	5.6	LOS A	0.6	4.4	0.21	0.51	0.21	44.2
North: John Black Drive														
7	L2	252	0.8	252	0.8	0.318	5.4	LOS A	1.0	6.8	0.63	0.63	0.63	46.5
9	R2	57	5.6	57	5.6	0.318	9.9	LOS A	1.0	6.8	0.63	0.63	0.63	43.8
9u	U	2	0.0	2	0.0	0.318	11.5	LOS A	1.0	6.8	0.63	0.63	0.63	43.8
Approach		311	1.7	311	1.7	0.318	6.3	LOS A	1.0	6.8	0.63	0.63	0.63	46.2
West: Abell Road														
10	L2	65	9.7	65	9.7	0.272	4.0	LOS A	0.5	4.0	0.36	0.46	0.36	40.8
11	T1	245	8.6	245	8.6	0.272	3.8	LOS A	0.5	4.0	0.36	0.46	0.36	47.4
12u	U	1	0.0	1	0.0	0.272	9.8	LOS A	0.5	4.0	0.36	0.46	0.36	40.8
Approach		312	8.8	312	8.8	0.272	3.9	LOS A	0.5	4.0	0.36	0.46	0.36	46.8
All Vehicles		982	6.1	982	6.1	0.318	5.3	LOS A	1.0	6.8	0.39	0.53	0.39	45.8

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 6 [Abell Road-Betula Parade - AM-Existing (Site Folder: Existing)]

Network: N101 [AM-Existing (Network Folder: Existing)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Betula Parade														
1	L2	4	25.0	4	25.0	0.115	3.8	LOS A	0.2	1.6	0.29	0.57	0.29	37.3
2	T1	18	0.0	18	0.0	0.115	3.4	LOS A	0.2	1.6	0.29	0.57	0.29	45.9
3	R2	115	7.3	115	7.3	0.115	8.0	LOS A	0.2	1.6	0.29	0.57	0.29	37.3
3u	U	1	0.0	1	0.0	0.115	9.7	LOS A	0.2	1.6	0.29	0.57	0.29	45.4
Approach		138	6.9	138	6.9	0.115	7.3	LOS A	0.2	1.6	0.29	0.57	0.29	39.6
East: Abell Road														
4	L2	82	7.7	82	7.7	0.146	3.0	LOS A	0.3	2.0	0.09	0.38	0.09	45.6
5	T1	106	18.8	106	18.8	0.146	2.9	LOS A	0.3	2.0	0.09	0.38	0.09	42.4
6	R2	21	0.0	21	0.0	0.146	7.3	LOS A	0.3	2.0	0.09	0.38	0.09	48.7
6u	U	1	0.0	1	0.0	0.146	9.2	LOS A	0.3	2.0	0.09	0.38	0.09	42.4
Approach		211	12.5	211	12.5	0.146	3.4	LOS A	0.3	2.0	0.09	0.38	0.09	45.0
North: Betula Parade														
7	L2	42	5.0	42	5.0	0.054	4.1	LOS A	0.1	0.8	0.40	0.48	0.40	45.1
8	T1	13	0.0	13	0.0	0.054	4.0	LOS A	0.1	0.8	0.40	0.48	0.40	47.6
9	R2	3	0.0	3	0.0	0.054	8.5	LOS A	0.1	0.8	0.40	0.48	0.40	45.1
9u	U	1	0.0	1	0.0	0.054	10.3	LOS A	0.1	0.8	0.40	0.48	0.40	49.2
Approach		59	3.6	59	3.6	0.054	4.4	LOS A	0.1	0.8	0.40	0.48	0.40	45.9
West: Abell Road														
10	L2	3	0.0	3	0.0	0.112	3.4	LOS A	0.2	1.5	0.28	0.40	0.28	46.5
11	T1	122	14.7	122	14.7	0.112	3.4	LOS A	0.2	1.5	0.28	0.40	0.28	39.9
12	R2	4	0.0	4	0.0	0.112	7.8	LOS A	0.2	1.5	0.28	0.40	0.28	46.9
12u	U	1	0.0	1	0.0	0.112	9.6	LOS A	0.2	1.5	0.28	0.40	0.28	39.9
Approach		131	13.7	131	13.7	0.112	3.6	LOS A	0.2	1.5	0.28	0.40	0.28	40.7
All Vehicles		538	10.4	538	10.4	0.146	4.6	LOS A	0.3	2.0	0.22	0.45	0.22	43.1

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 7 [Elara Boulevard-Richmond Road-AM-Existing (Site Folder: Existing)]

Network: N101 [AM-Existing-RICHMOND RD (Network Folder: Existing)]

AM peak - 7:45 to 8:45am
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 141 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	369	7.4	369	7.4	0.274	9.1	LOS A	2.3	17.4	0.25	0.68	0.25	61.3
22	T1	1117	11.7	1117	11.7	* 0.667	31.3	LOS C	18.1	139.0	0.84	0.75	0.84	68.4
Approach		1486	10.6	1486	10.6	0.667	25.8	LOS B	18.1	139.0	0.69	0.73	0.69	67.8
NorthWest: Richmond Road														
28	T1	1028	11.8	1028	11.8	0.455	14.6	LOS B	11.1	85.8	0.57	0.51	0.57	73.0
29	R2	140	7.5	140	7.5	* 0.659	73.4	LOS F	5.8	43.5	1.00	0.82	1.03	53.8
Approach		1168	11.3	1168	11.3	0.659	21.7	LOS B	11.1	85.8	0.62	0.55	0.62	69.8
SouthWest: Elara Boulevard														
30	L2	252	3.8	252	3.8	0.304	15.7	LOS B	4.0	29.0	0.50	0.71	0.50	70.8
32	R2	546	3.5	546	3.5	* 0.678	56.4	LOS D	11.7	84.1	0.94	0.83	0.94	12.9
Approach		798	3.6	798	3.6	0.678	43.6	LOS D	11.7	84.1	0.81	0.79	0.81	44.2
All Vehicles		3453	9.2	3453	9.2	0.678	28.5	LOS C	18.1	139.0	0.69	0.68	0.69	64.9

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
P52	Stage 2	53	64.8	LOS F	0.2	0.2	0.96	0.96	224.5	207.6	0.92
NorthWest: Richmond Road											
P71	Stage 1	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
P72	Stage 2	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
SouthWest: Elara Boulevard											
P8	Full	53	64.8	LOS F	0.2	0.2	0.96	0.96	232.2	217.6	0.94
All Pedestrians		263	64.8	LOS F	0.2	0.2	0.96	0.96	227.5	211.6	0.93

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: 8 [Abell Road-Richmond Road-AM-Existing (Site Folder: Existing)]

Network: N101 [AM-Existing-RICHMOND RD (Network Folder: Existing)]

AM peak - 7:45 to 8:45am
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	481	5.5	481	5.5	0.313	8.5	LOS A	2.1	15.2	0.20	0.67	0.20	57.5
22	T1	1157	10.6	1157	10.6	0.749	31.5	LOS C	18.2	137.7	0.81	0.72	0.81	33.4
23	R2	145	19.6	145	19.6	* 0.891	91.4	LOS F	3.4	28.1	1.00	0.89	1.40	18.9
Approach		1783	9.9	1783	9.9	0.891	30.2	LOS C	18.2	137.7	0.66	0.72	0.69	36.4
NorthEast: Garfield Road														
24	L2	260	23.9	260	23.9	0.522	66.4	LOS E	5.1	43.1	0.97	0.80	0.97	21.9
25	T1	103	11.2	103	11.2	0.435	72.5	LOS F	2.2	16.5	1.00	0.75	1.00	17.5
26	R2	269	12.5	269	12.5	0.270	47.4	LOS D	4.3	33.4	0.81	0.77	0.81	11.3
Approach		633	17.0	633	17.0	0.522	59.3	LOS E	5.1	43.1	0.91	0.78	0.91	18.0
NorthWest: Richmond Road														
27	L2	219	9.1	219	9.1	0.176	14.7	LOS B	2.9	22.0	0.35	0.70	0.35	55.9
28	T1	1444	8.5	1444	8.5	* 0.931	51.3	LOS D	32.2	241.1	0.98	1.01	1.14	41.6
29	R2	9	33.3	9	33.3	0.126	80.6	LOS F	0.4	3.6	0.97	0.68	0.97	28.5
Approach		1673	8.7	1673	8.7	0.931	46.7	LOS D	32.2	241.1	0.90	0.97	1.03	42.5
SouthWest: Abell Road														
30	L2	52	8.2	52	8.2	0.057	16.3	LOS B	0.7	5.5	0.41	0.64	0.41	34.6
31	T1	220	5.3	220	5.3	* 0.901	83.7	LOS F	5.2	38.1	1.00	0.98	1.44	15.9
32	R2	973	2.8	973	2.8	* 0.912	73.3	LOS F	23.2	166.1	1.00	1.00	1.22	24.6
Approach		1244	3.5	1244	3.5	0.912	72.8	LOS F	23.2	166.1	0.98	0.98	1.23	23.2
All Vehicles		5333	8.9	5333	8.9	0.931	48.7	LOS D	32.2	241.1	0.84	0.87	0.95	32.5

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	20	64.2	LOS F	0.1	0.1	0.96	0.96	231.5	217.5	0.94
P52	Stage 2	20	64.2	LOS F	0.1	0.1	0.96	0.96	226.4	210.9	0.93
NorthEast: Garfield Road											
P6	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	244.6	234.4	0.96
P6B	Slip/ Bypass	53	64.3	LOS F	0.2	0.2	0.96	0.96	224.0	207.6	0.93

NorthWest: Richmond Road											
P71	Stage 1	53	64.3	LOS F	0.2	0.2	0.96	0.96	229.0	214.2	0.94
P72	Stage 2	53	64.3	LOS F	0.2	0.2	0.96	0.96	226.5	210.9	0.93
P7B	Slip/ Bypass	53	64.3	LOS F	0.2	0.2	0.96	0.96	221.4	204.3	0.92
SouthWest: Abell Road											
P8	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	244.6	234.4	0.96
All Pedestrians		356	64.3	LOS F	0.2	0.2	0.96	0.96	231.4	217.2	0.94

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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MOVEMENT SUMMARY

Site: 1 [Elara Boulevard-Kaluta Avenue -PM-Existing (Site Folder: Existing)]

Network: N101 [PM-Existing (Network Folder: Existing)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	2	0.0	2	0.0	0.021	2.8	LOS A	0.0	0.2	0.14	0.44	0.14	46.0
2	T1	15	7.1	15	7.1	0.021	2.6	LOS A	0.0	0.2	0.14	0.44	0.14	47.7
3	R2	9	0.0	9	0.0	0.021	7.5	LOS A	0.0	0.2	0.14	0.44	0.14	44.5
3u	U	1	0.0	1	0.0	0.021	9.4	LOS A	0.0	0.2	0.14	0.44	0.14	44.5
Approach		27	3.8	27	3.8	0.021	4.6	LOS A	0.0	0.2	0.14	0.44	0.14	46.6
East: Elara boulevard														
4	L2	17	6.3	17	6.3	0.045	2.7	LOS A	0.1	0.5	0.08	0.51	0.08	45.2
5	T1	11	0.0	11	0.0	0.045	2.5	LOS A	0.1	0.5	0.08	0.51	0.08	47.6
6	R2	28	0.0	28	0.0	0.045	7.4	LOS A	0.1	0.5	0.08	0.51	0.08	48.2
6u	U	7	85.7	7	85.7	0.045	10.0	LOS A	0.1	0.5	0.08	0.51	0.08	45.2
Approach		63	11.7	63	11.7	0.045	5.6	LOS A	0.1	0.5	0.08	0.51	0.08	47.2
North: Kaluta Avenue														
7	L2	19	5.6	19	5.6	0.026	2.8	LOS A	0.0	0.3	0.11	0.36	0.11	44.0
8	T1	14	15.4	14	15.4	0.026	2.6	LOS A	0.0	0.3	0.11	0.36	0.11	44.0
9	R2	1	0.0	1	0.0	0.026	7.5	LOS A	0.0	0.3	0.11	0.36	0.11	49.1
9u	U	1	0.0	1	0.0	0.026	9.4	LOS A	0.0	0.3	0.11	0.36	0.11	50.9
Approach		35	9.1	35	9.1	0.026	3.1	LOS A	0.0	0.3	0.11	0.36	0.11	44.6
West: Elara boulevard														
10	L2	1	0.0	1	0.0	0.011	2.9	LOS A	0.0	0.2	0.19	0.36	0.19	45.4
11	T1	11	10.0	11	10.0	0.011	2.7	LOS A	0.0	0.2	0.19	0.36	0.19	40.2
12	R2	1	0.0	1	0.0	0.011	7.6	LOS A	0.0	0.2	0.19	0.36	0.19	40.2
12u	U	1	0.0	1	0.0	0.011	9.5	LOS A	0.0	0.2	0.19	0.36	0.19	49.9
Approach		14	7.7	14	7.7	0.011	3.7	LOS A	0.0	0.2	0.19	0.36	0.19	41.9
All Vehicles		139	9.1	139	9.1	0.045	4.6	LOS A	0.1	0.5	0.11	0.44	0.11	46.4

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 5 [Abell Road-Kaluta Avenue_ PM-Existing (Site Folder: Existing)] Network: N101 [PM-Existing (Network Folder: Existing)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	5	20.0	5	20.0	0.043	3.3	LOS A	0.1	0.7	0.21	0.52	0.21	42.5
2	T1	8	0.0	8	0.0	0.043	3.1	LOS A	0.1	0.7	0.21	0.52	0.21	36.0
3	R2	36	23.5	36	23.5	0.043	7.9	LOS A	0.1	0.7	0.21	0.52	0.21	36.0
3u	U	1	0.0	1	0.0	0.043	9.4	LOS A	0.1	0.7	0.21	0.52	0.21	45.2
Approach		51	18.8	51	18.8	0.043	6.6	LOS A	0.1	0.7	0.21	0.52	0.21	37.4
East: Abell Road														
4	L2	11	40.0	11	40.0	0.048	3.2	LOS A	0.1	0.6	0.08	0.46	0.08	42.5
5	T1	29	17.9	29	17.9	0.048	2.9	LOS A	0.1	0.6	0.08	0.46	0.08	46.0
6	R2	23	4.5	23	4.5	0.048	7.4	LOS A	0.1	0.6	0.08	0.46	0.08	39.2
6u	U	1	0.0	1	0.0	0.048	9.1	LOS A	0.1	0.6	0.08	0.46	0.08	39.2
Approach		64	16.4	64	16.4	0.048	4.7	LOS A	0.1	0.6	0.08	0.46	0.08	43.7
North: Kaluta Avenue														
7	L2	24	8.7	24	8.7	0.027	3.5	LOS A	0.0	0.3	0.26	0.46	0.26	44.7
8	T1	3	0.0	3	0.0	0.027	3.2	LOS A	0.0	0.3	0.26	0.46	0.26	47.3
9	R2	4	0.0	4	0.0	0.027	7.8	LOS A	0.0	0.3	0.26	0.46	0.26	47.9
9u	U	1	0.0	1	0.0	0.027	9.6	LOS A	0.0	0.3	0.26	0.46	0.26	44.7
Approach		33	6.5	33	6.5	0.027	4.2	LOS A	0.0	0.3	0.26	0.46	0.26	45.5
West: Abell Road														
10	L2	1	0.0	1	0.0	0.080	3.1	LOS A	0.1	1.0	0.18	0.37	0.18	43.0
11	T1	86	18.3	86	18.3	0.080	3.1	LOS A	0.1	1.0	0.18	0.37	0.18	43.0
12	R2	7	28.6	7	28.6	0.080	7.8	LOS A	0.1	1.0	0.18	0.37	0.18	46.7
12u	U	1	0.0	1	0.0	0.080	9.3	LOS A	0.1	1.0	0.18	0.37	0.18	49.3
Approach		96	18.7	96	18.7	0.080	3.6	LOS A	0.1	1.0	0.18	0.37	0.18	43.5
All Vehicles		243	16.5	243	16.5	0.080	4.6	LOS A	0.1	1.0	0.17	0.43	0.17	43.0

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [Elara Boulevard-John Black Drive - PM-Existing (Site Folder: Existing)]

Network: N101 [PM-Existing (Network Folder: Existing)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: John Black Drive														
1	L2	47	2.2	47	2.2	0.188	4.8	LOS A	0.5	3.5	0.50	0.54	0.50	44.0
2	T1	118	1.8	118	1.8	0.188	4.9	LOS A	0.5	3.5	0.50	0.54	0.50	46.4
3	R2	23	4.5	23	4.5	0.188	8.7	LOS A	0.5	3.5	0.50	0.54	0.50	46.9
3u	U	2	0.0	2	0.0	0.188	10.2	LOS A	0.5	3.5	0.50	0.54	0.50	44.0
Approach		191	2.2	191	2.2	0.188	5.4	LOS A	0.5	3.5	0.50	0.54	0.50	46.0
East: Elara boulevard														
4	L2	45	0.0	45	0.0	0.219	4.5	LOS A	0.6	4.3	0.46	0.55	0.46	42.9
5	T1	112	10.4	112	10.4	0.219	4.7	LOS A	0.6	4.3	0.46	0.55	0.46	42.9
6	R2	69	6.1	69	6.1	0.219	8.4	LOS A	0.6	4.3	0.46	0.55	0.46	45.8
6u	U	3	0.0	3	0.0	0.219	9.9	LOS A	0.6	4.3	0.46	0.55	0.46	47.1
Approach		229	6.9	229	6.9	0.219	5.8	LOS A	0.6	4.3	0.46	0.55	0.46	44.2
North: John Black Drive														
7	L2	56	11.3	56	11.3	0.183	4.9	LOS A	0.5	3.6	0.49	0.52	0.49	45.3
8	T1	117	1.8	117	1.8	0.183	4.8	LOS A	0.5	3.6	0.49	0.52	0.49	40.9
9	R2	12	0.0	12	0.0	0.183	8.5	LOS A	0.5	3.6	0.49	0.52	0.49	40.9
9u	U	1	0.0	1	0.0	0.183	10.2	LOS A	0.5	3.6	0.49	0.52	0.49	46.3
Approach		185	4.5	185	4.5	0.183	5.1	LOS A	0.5	3.6	0.49	0.52	0.49	43.1
West: Elara boulevard														
10	L2	4	0.0	4	0.0	0.161	4.8	LOS A	0.4	3.1	0.50	0.55	0.50	45.6
11	T1	116	13.6	116	13.6	0.161	5.2	LOS A	0.4	3.1	0.50	0.55	0.50	46.8
12	R2	33	0.0	33	0.0	0.161	8.7	LOS A	0.4	3.1	0.50	0.55	0.50	44.2
12u	U	1	0.0	1	0.0	0.161	10.3	LOS A	0.4	3.1	0.50	0.55	0.50	44.2
Approach		154	10.3	154	10.3	0.161	6.0	LOS A	0.4	3.1	0.50	0.55	0.50	46.4
All Vehicles		759	5.8	759	5.8	0.219	5.6	LOS A	0.6	4.3	0.48	0.54	0.48	45.1

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 7 [Abell Road-John Black Drive - PM-Existing (Site Folder: Existing)]

Network: N101 [PM-Existing (Network Folder: Existing)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Abell Road														
5	T1	107	10.8	107	10.8	0.185	3.1	LOS A	0.4	2.7	0.16	0.51	0.16	44.1
6	R2	142	3.0	142	3.0	0.185	7.4	LOS A	0.4	2.7	0.16	0.51	0.16	44.1
6u	U	5	20.0	5	20.0	0.185	9.3	LOS A	0.4	2.7	0.16	0.51	0.16	47.9
Approach		255	6.6	255	6.6	0.185	5.6	LOS A	0.4	2.7	0.16	0.51	0.16	44.2
North: John Black Drive														
7	L2	127	1.7	127	1.7	0.176	5.1	LOS A	0.5	3.3	0.56	0.59	0.56	46.5
9	R2	44	0.0	44	0.0	0.176	9.3	LOS A	0.5	3.3	0.56	0.59	0.56	43.8
9u	U	1	0.0	1	0.0	0.176	11.1	LOS A	0.5	3.3	0.56	0.59	0.56	43.8
Approach		173	1.2	173	1.2	0.176	6.2	LOS A	0.5	3.3	0.56	0.59	0.56	46.1
West: Abell Road														
10	L2	27	0.0	27	0.0	0.230	3.6	LOS A	0.4	3.3	0.29	0.42	0.29	41.3
11	T1	238	16.8	238	16.8	0.230	3.6	LOS A	0.4	3.3	0.29	0.42	0.29	47.5
12u	U	1	0.0	1	0.0	0.230	9.5	LOS A	0.4	3.3	0.29	0.42	0.29	41.3
Approach		266	15.0	266	15.0	0.230	3.7	LOS A	0.4	3.3	0.29	0.42	0.29	47.3
All Vehicles		694	8.5	694	8.5	0.230	5.0	LOS A	0.5	3.3	0.31	0.50	0.31	46.0

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 6 [Abell Road-Betula Parade - PM-Existing (Site Folder: Existing)]

Network: N101 [PM-Existing (Network Folder: Existing)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Betula Parade														
1	L2	5	0.0	5	0.0	0.082	3.2	LOS A	0.1	1.2	0.23	0.56	0.23	37.5
2	T1	7	0.0	7	0.0	0.082	3.2	LOS A	0.1	1.2	0.23	0.56	0.23	46.0
3	R2	85	14.8	85	14.8	0.082	7.8	LOS A	0.1	1.2	0.23	0.56	0.23	37.5
3u	U	1	0.0	1	0.0	0.082	9.5	LOS A	0.1	1.2	0.23	0.56	0.23	45.6
Approach		99	12.8	99	12.8	0.082	7.3	LOS A	0.1	1.2	0.23	0.56	0.23	39.0
East: Abell Road														
4	L2	48	2.2	48	2.2	0.093	3.0	LOS A	0.2	1.2	0.08	0.43	0.08	45.2
5	T1	55	15.4	55	15.4	0.093	2.9	LOS A	0.2	1.2	0.08	0.43	0.08	41.7
6	R2	31	3.4	31	3.4	0.093	7.4	LOS A	0.2	1.2	0.08	0.43	0.08	48.3
6u	U	1	0.0	1	0.0	0.093	9.2	LOS A	0.2	1.2	0.08	0.43	0.08	41.7
Approach		135	7.8	135	7.8	0.093	4.0	LOS A	0.2	1.2	0.08	0.43	0.08	45.4
North: Betula Parade														
7	L2	32	6.7	32	6.7	0.043	4.1	LOS A	0.1	0.6	0.40	0.47	0.40	45.1
8	T1	13	0.0	13	0.0	0.043	3.9	LOS A	0.1	0.6	0.40	0.47	0.40	47.6
9	R2	2	0.0	2	0.0	0.043	8.4	LOS A	0.1	0.6	0.40	0.47	0.40	45.1
9u	U	1	0.0	1	0.0	0.043	10.3	LOS A	0.1	0.6	0.40	0.47	0.40	49.2
Approach		47	4.4	47	4.4	0.043	4.4	LOS A	0.1	0.6	0.40	0.47	0.40	46.1
West: Abell Road														
10	L2	1	0.0	1	0.0	0.125	3.3	LOS A	0.2	1.7	0.25	0.38	0.25	46.7
11	T1	141	17.9	141	17.9	0.125	3.4	LOS A	0.2	1.7	0.25	0.38	0.25	40.3
12	R2	3	0.0	3	0.0	0.125	7.7	LOS A	0.2	1.7	0.25	0.38	0.25	47.1
12u	U	1	0.0	1	0.0	0.125	9.5	LOS A	0.2	1.7	0.25	0.38	0.25	40.3
Approach		146	17.3	146	17.3	0.125	3.5	LOS A	0.2	1.7	0.25	0.38	0.25	40.7
All Vehicles		427	11.8	427	11.8	0.125	4.6	LOS A	0.2	1.7	0.21	0.45	0.21	43.0

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 7 [Elara Boulevard-Richmond Road-PM-Existing (Site Folder: Existing)]

Network: N101 [PM-Existing-RICHMOND RD (Network Folder: Existing)]

PM peak - 2:30pm-3:30pm
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 135 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	405	4.9	405	4.9	0.293	9.2	LOS A	2.6	19.3	0.26	0.68	0.26	61.3
22	T1	1280	14.3	1280	14.3	* 0.691	19.0	LOS B	15.1	118.1	0.64	0.58	0.64	72.5
Approach		1685	12.1	1685	12.1	0.691	16.7	LOS B	15.1	118.1	0.55	0.60	0.55	71.6
NorthWest: Richmond Road														
28	T1	978	12.5	978	12.5	0.398	3.3	LOS A	2.8	21.4	0.15	0.14	0.15	78.3
29	R2	138	6.9	138	6.9	* 0.657	71.0	LOS F	5.5	41.0	1.00	0.82	1.04	54.4
Approach		1116	11.8	1116	11.8	0.657	11.6	LOS A	5.5	41.0	0.26	0.22	0.26	74.0
SouthWest: Elara Boulevard														
30	L2	168	3.8	168	3.8	0.233	13.9	LOS A	2.2	15.8	0.44	0.68	0.44	71.6
32	R2	425	6.7	425	6.7	* 0.679	61.7	LOS E	8.5	63.2	0.98	0.83	1.00	12.0
Approach		594	5.9	594	5.9	0.679	48.1	LOS D	8.5	63.2	0.83	0.79	0.84	40.8
All Vehicles		3395	10.9	3395	10.9	0.691	20.5	LOS B	15.1	118.1	0.50	0.51	0.51	68.8

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
P52	Stage 2	53	61.8	LOS F	0.2	0.2	0.96	0.96	221.5	207.6	0.94
NorthWest: Richmond Road											
P71	Stage 1	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
P72	Stage 2	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
SouthWest: Elara Boulevard											
P8	Full	53	61.8	LOS F	0.2	0.2	0.96	0.96	229.2	217.6	0.95
All Pedestrians		263	61.8	LOS F	0.2	0.2	0.96	0.96	224.5	211.6	0.94

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: 8 [Abell Road-Richmond Road-PM-Existing (Site Folder: Existing)]

Network: N101 [PM-Existing-RICHMOND RD (Network Folder: Existing)]

PM peak - 2:30 to 3:30pm
Site Category: Existing Design
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 155 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	467	4.7	467	4.7	0.298	8.5	LOS A	2.2	15.9	0.19	0.66	0.19	57.6
22	T1	1333	11.5	1333	11.5	0.676	18.8	LOS B	16.4	125.9	0.58	0.53	0.58	43.7
23	R2	203	24.9	203	24.9	* 0.587	46.7	LOS D	2.7	23.0	1.00	0.78	1.00	29.5
Approach		2003	11.2	2003	11.2	0.676	19.2	LOS B	16.4	125.9	0.53	0.59	0.53	44.7
NorthEast: Garfield Road														
24	L2	277	20.2	277	20.2	* 0.456	40.5	LOS C	3.8	31.1	0.93	0.79	0.93	29.4
25	T1	103	7.1	103	7.1	0.704	87.6	LOS F	2.5	18.7	1.00	0.80	1.17	15.2
26	R2	289	9.8	289	9.8	0.369	61.2	LOS E	5.7	43.0	0.89	0.79	0.89	9.0
Approach		669	13.7	669	13.7	0.704	56.7	LOS E	5.7	43.0	0.93	0.79	0.95	18.6
NorthWest: Richmond Road														
27	L2	208	13.1	208	13.1	0.312	42.3	LOS C	6.6	51.2	0.74	0.79	0.74	37.8
28	T1	1145	10.3	1145	10.3	* 0.733	32.9	LOS C	19.0	144.2	0.78	0.70	0.78	50.2
29	R2	18	17.6	18	17.6	0.280	91.3	LOS F	0.9	7.0	1.00	0.70	1.00	26.5
Approach		1372	10.8	1372	10.8	0.733	35.1	LOS C	19.0	144.2	0.77	0.71	0.77	47.8
SouthWest: Abell Road														
30	L2	66	27.0	66	27.0	0.075	15.9	LOS B	0.9	8.1	0.37	0.64	0.37	35.7
31	T1	117	5.4	117	5.4	* 0.790	88.2	LOS F	2.9	21.3	1.00	0.85	1.27	15.3
32	R2	581	7.4	581	7.4	* 0.729	66.4	LOS E	12.6	94.0	0.99	0.86	1.00	25.8
Approach		764	8.8	764	8.8	0.790	65.3	LOS E	12.6	94.0	0.94	0.84	0.99	24.3
All Vehicles		4808	11.1	4808	11.1	0.790	36.3	LOS C	19.0	144.2	0.72	0.69	0.73	37.1

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	71.8	LOS F	0.2	0.2	0.96	0.96	239.1	217.5	0.91
P52	Stage 2	53	71.8	LOS F	0.2	0.2	0.96	0.96	234.0	210.9	0.90
NorthEast: Garfield Road											
P6	Full	53	71.8	LOS F	0.2	0.2	0.96	0.96	252.1	234.4	0.93
P6B	Slip/ Bypass	53	71.8	LOS F	0.2	0.2	0.96	0.96	231.5	207.6	0.90

NorthWest: Richmond Road										
P71	Stage 1	53	71.8	LOS F	0.2	0.2	0.96	0.96	236.5	214.2	0.91
P72	Stage 2	53	71.8	LOS F	0.2	0.2	0.96	0.96	234.0	210.9	0.90
P7B	Slip/ Bypass	53	71.8	LOS F	0.2	0.2	0.96	0.96	228.9	204.3	0.89
SouthWest: Abell Road										
P8	Full	53	71.8	LOS F	0.2	0.2	0.96	0.96	252.1	234.4	0.93
All Pedestrians		421	71.8	LOS F	0.2	0.2	0.96	0.96	238.5	216.8	0.91

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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MOVEMENT SUMMARY

Site: 1 [Elara Boulevard-Kaluta Avenue -AM- Existing + Dev (Site Folder: Existing + Dev)]

Network: N101 [AM-existing +Dev-WEST PRECINCT (Network Folder: Existing + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	24	4.3	24	4.3	0.470	4.1	LOS A	1.2	8.4	0.49	0.63	0.49	43.7
2	T1	111	1.0	111	1.0	0.470	3.8	LOS A	1.2	8.4	0.49	0.63	0.49	45.7
3	R2	429	0.0	429	0.0	0.470	8.7	LOS A	1.2	8.4	0.49	0.63	0.49	41.7
3u	U	3	0.0	3	0.0	0.470	10.6	LOS A	1.2	8.4	0.49	0.63	0.49	41.7
Approach		567	0.4	567	0.4	0.470	7.6	LOS A	1.2	8.4	0.49	0.63	0.49	42.8
East: Elara boulevard														
4	L2	33	9.7	33	9.7	0.178	2.8	LOS A	0.4	2.7	0.12	0.34	0.12	46.7
5	T1	201	1.0	201	1.0	0.178	2.5	LOS A	0.4	2.7	0.12	0.34	0.12	48.9
6	R2	21	5.0	21	5.0	0.178	7.5	LOS A	0.4	2.7	0.12	0.34	0.12	49.4
6u	U	11	90.0	11	90.0	0.178	10.1	LOS A	0.4	2.7	0.12	0.34	0.12	46.7
Approach		265	6.0	265	6.0	0.178	3.2	LOS A	0.4	2.7	0.12	0.34	0.12	48.7
North: Kaluta Avenue														
7	L2	27	7.7	27	7.7	0.054	4.6	LOS A	0.1	0.8	0.52	0.53	0.52	41.3
8	T1	22	4.8	22	4.8	0.054	4.3	LOS A	0.1	0.8	0.52	0.53	0.52	41.3
9	R2	1	0.0	1	0.0	0.054	9.2	LOS A	0.1	0.8	0.52	0.53	0.52	46.9
9u	U	1	0.0	1	0.0	0.054	11.1	LOS A	0.1	0.8	0.52	0.53	0.52	49.0
Approach		52	6.1	52	6.1	0.054	4.7	LOS A	0.1	0.8	0.52	0.53	0.52	41.7
West: Elara boulevard														
10	L2	1	0.0	1	0.0	0.023	5.5	LOS A	0.1	0.4	0.64	0.56	0.64	43.1
11	T1	15	7.1	15	7.1	0.023	5.5	LOS A	0.1	0.4	0.64	0.56	0.64	36.1
12	R2	1	0.0	1	0.0	0.023	10.3	LOS A	0.1	0.4	0.64	0.56	0.64	36.1
12u	U	1	0.0	1	0.0	0.023	12.2	LOS A	0.1	0.4	0.64	0.56	0.64	46.4
Approach		18	5.9	18	5.9	0.023	6.2	LOS A	0.1	0.4	0.64	0.56	0.64	37.7
All Vehicles		902	2.5	902	2.5	0.470	6.1	LOS A	1.2	8.4	0.38	0.54	0.38	44.8

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 5 [Abell Road-Kaluta Avenue_ AM-Existing+Dev (Site Folder: Existing + Dev)]

Network: N101 [AM-existing +Dev-WEST PRECINCT (Network Folder: Existing + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	8	37.5	8	37.5	0.058	8.0	LOS A	0.1	1.0	0.67	0.68	0.67	40.2
2	T1	13	0.0	13	0.0	0.058	6.5	LOS A	0.1	1.0	0.67	0.68	0.67	32.5
3	R2	20	5.3	20	5.3	0.058	11.2	LOS A	0.1	1.0	0.67	0.68	0.67	32.5
3u	U	1	0.0	1	0.0	0.058	12.8	LOS A	0.1	1.0	0.67	0.68	0.67	42.2
Approach		42	10.0	42	10.0	0.058	9.2	LOS A	0.1	1.0	0.67	0.68	0.67	35.2
East: Abell Road														
4	L2	17	31.3	17	31.3	0.402	3.9	LOS A	1.0	7.2	0.32	0.56	0.32	40.4
5	T1	143	9.6	143	9.6	0.402	3.4	LOS A	1.0	7.2	0.32	0.56	0.32	43.9
6	R2	375	0.6	375	0.6	0.402	7.9	LOS A	1.0	7.2	0.32	0.56	0.32	36.0
6u	U	1	0.0	1	0.0	0.402	9.7	LOS A	1.0	7.2	0.32	0.56	0.32	36.0
Approach		536	3.9	536	3.9	0.402	6.5	LOS A	1.0	7.2	0.32	0.56	0.32	39.3
North: Kaluta Avenue														
7	L2	143	0.7	143	0.7	0.186	3.3	LOS A	0.4	2.7	0.27	0.51	0.27	43.9
8	T1	7	14.3	7	14.3	0.186	3.3	LOS A	0.4	2.7	0.27	0.51	0.27	46.6
9	R2	91	0.0	91	0.0	0.186	7.7	LOS A	0.4	2.7	0.27	0.51	0.27	47.3
9u	U	1	0.0	1	0.0	0.186	9.5	LOS A	0.4	2.7	0.27	0.51	0.27	43.9
Approach		242	0.9	242	0.9	0.186	5.0	LOS A	0.4	2.7	0.27	0.51	0.27	45.5
West: Abell Road														
10	L2	106	0.0	106	0.0	0.191	4.6	LOS A	0.4	2.8	0.49	0.58	0.49	41.0
11	T1	64	24.6	64	24.6	0.191	4.9	LOS A	0.4	2.8	0.49	0.58	0.49	41.0
12	R2	13	33.3	13	33.3	0.191	9.7	LOS A	0.4	2.8	0.49	0.58	0.49	45.2
12u	U	1	0.0	1	0.0	0.191	10.8	LOS A	0.4	2.8	0.49	0.58	0.49	48.0
Approach		184	10.9	184	10.9	0.191	5.1	LOS A	0.4	2.8	0.49	0.58	0.49	41.5
All Vehicles		1004	4.7	1004	4.7	0.402	6.0	LOS A	1.0	7.2	0.36	0.55	0.36	41.7

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [Elara Boulevard-John Black Drive - AM- Existing+Dev (Site Folder: Existing + Dev)]

Network: N101 [AM-existing +Dev (Network Folder: Existing + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: John Black Drive														
1	L2	46	6.8	46	6.8	0.304	6.0	LOS A	0.9	6.4	0.64	0.65	0.64	42.9
2	T1	154	2.1	154	2.1	0.304	5.8	LOS A	0.9	6.4	0.64	0.65	0.64	45.6
3	R2	74	4.3	74	4.3	0.304	9.7	LOS A	0.9	6.4	0.64	0.65	0.64	46.2
3u	U	1	0.0	1	0.0	0.304	11.2	LOS A	0.9	6.4	0.64	0.65	0.64	42.9
Approach		275	3.4	275	3.4	0.304	6.9	LOS A	0.9	6.4	0.64	0.65	0.64	45.5
East: Elara boulevard														
4	L2	59	3.6	59	3.6	0.378	7.3	LOS A	1.1	8.2	0.77	0.77	0.77	41.2
5	T1	172	9.2	172	9.2	0.378	7.5	LOS A	1.1	8.2	0.77	0.77	0.77	41.2
6	R2	52	8.2	52	8.2	0.378	11.3	LOS A	1.1	8.2	0.77	0.77	0.77	44.6
6u	U	4	0.0	4	0.0	0.378	12.5	LOS A	1.1	8.2	0.77	0.77	0.77	46.0
Approach		286	7.7	286	7.7	0.378	8.2	LOS A	1.1	8.2	0.77	0.77	0.77	42.2
North: John Black Drive														
7	L2	74	2.9	74	2.9	0.556	12.6	LOS A	2.2	15.5	0.95	1.02	1.15	41.0
8	T1	224	0.5	224	0.5	0.556	12.5	LOS A	2.2	15.5	0.95	1.02	1.15	33.3
9	R2	53	2.0	53	2.0	0.556	16.4	LOS B	2.2	15.5	0.95	1.02	1.15	33.3
9u	U	4	0.0	4	0.0	0.556	17.8	LOS B	2.2	15.5	0.95	1.02	1.15	40.8
Approach		355	1.2	355	1.2	0.556	13.1	LOS A	2.2	15.5	0.95	1.02	1.15	36.0
West: Elara boulevard														
10	L2	56	1.9	56	1.9	0.598	7.3	LOS A	2.4	17.5	0.80	0.76	0.86	44.6
11	T1	355	3.6	355	3.6	0.598	7.4	LOS A	2.4	17.5	0.80	0.76	0.86	45.9
12	R2	156	0.0	156	0.0	0.598	11.0	LOS A	2.4	17.5	0.80	0.76	0.86	42.8
12u	U	1	0.0	1	0.0	0.598	12.7	LOS A	2.4	17.5	0.80	0.76	0.86	42.8
Approach		567	2.4	567	2.4	0.598	8.4	LOS A	2.4	17.5	0.80	0.76	0.86	45.2
All Vehicles		1483	3.3	1483	3.3	0.598	9.2	LOS A	2.4	17.5	0.80	0.80	0.87	43.3

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 7 [Abell Road-John Black Drive - AM- Existing+ Dev (Site Folder: Existing + Dev)]

Network: N101 [AM-existing +Dev (Network Folder: Existing + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Abell Road														
5	T1	457	5.3	457	5.3	0.518	3.7	LOS A	1.6	11.4	0.44	0.51	0.44	43.9
6	R2	186	1.1	186	1.1	0.518	7.9	LOS A	1.6	11.4	0.44	0.51	0.44	43.9
6u	U	14	7.7	14	7.7	0.518	9.8	LOS A	1.6	11.4	0.44	0.51	0.44	48.0
Approach		657	4.2	657	4.2	0.518	5.0	LOS A	1.6	11.4	0.44	0.51	0.44	44.1
North: John Black Drive														
7	L2	333	0.6	333	0.6	0.494	6.2	LOS A	1.7	12.1	0.75	0.71	0.75	45.9
9	R2	138	2.3	138	2.3	0.494	10.6	LOS A	1.7	12.1	0.75	0.71	0.75	42.7
9u	U	2	0.0	2	0.0	0.494	12.2	LOS A	1.7	12.1	0.75	0.71	0.75	42.7
Approach		473	1.1	473	1.1	0.494	7.5	LOS A	1.7	12.1	0.75	0.71	0.75	45.3
West: Abell Road														
10	L2	100	6.3	100	6.3	0.328	4.0	LOS A	0.7	5.3	0.40	0.47	0.40	40.5
11	T1	277	7.6	277	7.6	0.328	3.9	LOS A	0.7	5.3	0.40	0.47	0.40	47.3
12u	U	1	0.0	1	0.0	0.328	9.8	LOS A	0.7	5.3	0.40	0.47	0.40	40.5
Approach		378	7.2	378	7.2	0.328	3.9	LOS A	0.7	5.3	0.40	0.47	0.40	46.4
All Vehicles		1507	4.0	1507	4.0	0.518	5.5	LOS A	1.7	12.1	0.53	0.56	0.53	45.1

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 6 [Abell Road-Betula Parade - AM- Existing+ Dev (Site Folder: Existing + Dev)]

Network: N101 [AM-existing +Dev (Network Folder: Existing + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Betula Parade														
1	L2	46	2.3	46	2.3	0.197	5.6	LOS A	0.4	3.2	0.59	0.71	0.59	36.2
2	T1	18	0.0	18	0.0	0.197	5.5	LOS A	0.4	3.2	0.59	0.71	0.59	45.4
3	R2	115	7.3	115	7.3	0.197	10.2	LOS A	0.4	3.2	0.59	0.71	0.59	36.2
3u	U	1	0.0	1	0.0	0.197	11.8	LOS A	0.4	3.2	0.59	0.71	0.59	44.7
Approach		180	5.3	180	5.3	0.197	8.5	LOS A	0.4	3.2	0.59	0.71	0.59	38.2
East: Abell Road														
4	L2	82	7.7	82	7.7	0.405	3.2	LOS A	0.9	6.7	0.21	0.37	0.21	45.2
5	T1	483	4.1	483	4.1	0.405	3.1	LOS A	0.9	6.7	0.21	0.37	0.21	42.0
6	R2	21	0.0	21	0.0	0.405	7.5	LOS A	0.9	6.7	0.21	0.37	0.21	48.5
6u	U	1	0.0	1	0.0	0.405	9.4	LOS A	0.9	6.7	0.21	0.37	0.21	42.0
Approach		587	4.5	587	4.5	0.405	3.3	LOS A	0.9	6.7	0.21	0.37	0.21	43.2
North: Betula Parade														
7	L2	42	5.0	42	5.0	0.068	4.6	LOS A	0.1	1.0	0.48	0.53	0.48	44.7
8	T1	23	0.0	23	0.0	0.068	4.5	LOS A	0.1	1.0	0.48	0.53	0.48	47.4
9	R2	3	0.0	3	0.0	0.068	9.0	LOS A	0.1	1.0	0.48	0.53	0.48	44.7
9u	U	1	0.0	1	0.0	0.068	10.8	LOS A	0.1	1.0	0.48	0.53	0.48	49.0
Approach		69	3.0	69	3.0	0.068	4.9	LOS A	0.1	1.0	0.48	0.53	0.48	45.9
West: Abell Road														
10	L2	3	0.0	3	0.0	0.191	3.5	LOS A	0.4	2.8	0.31	0.44	0.31	46.1
11	T1	188	9.5	188	9.5	0.191	3.4	LOS A	0.4	2.8	0.31	0.44	0.31	38.9
12	R2	36	0.0	36	0.0	0.191	7.8	LOS A	0.4	2.8	0.31	0.44	0.31	46.1
12u	U	1	0.0	1	0.0	0.191	9.7	LOS A	0.4	2.8	0.31	0.44	0.31	38.9
Approach		228	7.8	228	7.8	0.191	4.2	LOS A	0.4	2.8	0.31	0.44	0.31	40.9
All Vehicles		1065	5.2	1065	5.2	0.405	4.5	LOS A	0.9	6.7	0.32	0.45	0.32	42.1

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 7 [Elara Boulevard-Richmond Road-AM-Existing + Dev (Site Folder: Existing + Dev)]

Network: N101 [AM-Existing +Dev-RICHMOND RD (Network Folder: Existing + Dev)]

AM peak - 7:45 to 8:45am
Site Category: Existing + Dev
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 141 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	369	7.4	369	7.4	0.279	9.3	LOS A	2.5	18.5	0.26	0.68	0.26	61.1
22	T1	1117	11.7	1117	11.7	* 0.723	35.7	LOS C	19.3	148.5	0.89	0.80	0.89	67.0
Approach		1486	10.6	1486	10.6	0.723	29.1	LOS C	19.3	148.5	0.73	0.77	0.73	66.6
NorthWest: Richmond Road														
28	T1	1028	11.8	1028	11.8	0.482	17.6	LOS B	12.2	94.0	0.62	0.56	0.62	71.7
29	R2	154	6.8	154	6.8	* 0.720	75.0	LOS F	6.5	48.5	1.00	0.84	1.08	53.5
Approach		1182	11.1	1182	11.1	0.720	25.0	LOS B	12.2	94.0	0.67	0.59	0.68	68.5
SouthWest: Elara Boulevard														
30	L2	252	3.8	252	3.8	0.289	16.3	LOS B	4.1	29.8	0.51	0.71	0.51	70.5
32	R2	652	2.9	652	2.9	* 0.717	53.6	LOS D	14.0	100.7	0.94	0.84	0.94	13.4
Approach		903	3.1	903	3.1	0.717	43.2	LOS D	14.0	100.7	0.82	0.81	0.82	42.4
All Vehicles		3572	8.9	3572	8.9	0.723	31.3	LOS C	19.3	148.5	0.73	0.72	0.74	63.4

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
P52	Stage 2	53	64.8	LOS F	0.2	0.2	0.96	0.96	224.5	207.6	0.92
NorthWest: Richmond Road											
P71	Stage 1	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
P72	Stage 2	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
SouthWest: Elara Boulevard											
P8	Full	53	64.8	LOS F	0.2	0.2	0.96	0.96	232.2	217.6	0.94
All Pedestrians		263	64.8	LOS F	0.2	0.2	0.96	0.96	227.5	211.6	0.93

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: 8 [Abell Road-Richmond Road-AM-Existing + Dev (Site Folder: Existing + Dev)]

Network: N101 [AM-Existing +Dev-RICHMOND RD (Network Folder: Existing + Dev)]

AM peak - 7:45 to 8:45am
Site Category: Existing + Dev
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 141 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	661	4.0	661	4.0	0.426	8.6	LOS A	3.3	24.2	0.23	0.68	0.23	57.4
22	T1	1157	10.6	1157	10.6	0.730	30.0	LOS C	17.7	133.8	0.78	0.70	0.78	34.3
23	R2	145	19.6	145	19.6	* 0.898	94.6	LOS F	3.5	28.9	1.00	0.93	1.51	18.4
Approach		1963	9.0	1963	9.0	0.898	27.6	LOS B	17.7	133.8	0.61	0.71	0.65	38.5
NorthEast: Garfield Road														
24	L2	260	23.9	260	23.9	0.526	66.9	LOS E	5.2	43.5	0.97	0.80	0.97	21.8
25	T1	107	10.8	107	10.8	0.455	73.2	LOS F	2.3	17.2	1.00	0.75	1.00	17.4
26	R2	269	12.5	269	12.5	0.279	48.8	LOS D	4.4	34.1	0.82	0.78	0.82	11.0
Approach		637	16.9	637	16.9	0.526	60.3	LOS E	5.2	43.5	0.91	0.78	0.91	17.8
NorthWest: Richmond Road														
27	L2	219	9.1	219	9.1	0.175	14.6	LOS B	2.9	22.0	0.35	0.70	0.35	55.9
28	T1	1549	7.9	1549	7.9	* 0.970	64.2	LOS E	39.4	293.8	1.00	1.11	1.25	37.1
29	R2	9	33.3	9	33.3	0.127	81.1	LOS F	0.4	3.6	0.98	0.68	0.98	28.4
Approach		1778	8.2	1778	8.2	0.970	58.1	LOS E	39.4	293.8	0.92	1.06	1.14	38.2
SouthWest: Abell Road														
30	L2	52	8.2	52	8.2	0.056	16.2	LOS B	0.7	5.5	0.41	0.64	0.41	34.7
31	T1	220	5.3	220	5.3	* 0.907	85.1	LOS F	5.3	38.5	1.00	0.99	1.46	15.7
32	R2	973	2.8	973	2.8	* 0.942	83.1	LOS F	24.9	178.6	1.00	1.03	1.30	22.7
Approach		1244	3.5	1244	3.5	0.942	80.7	LOS F	24.9	178.6	0.98	1.01	1.29	21.7
All Vehicles		5622	8.4	5622	8.4	0.970	52.7	LOS D	39.4	293.8	0.82	0.89	0.97	31.3

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	64.8	LOS F	0.2	0.2	0.96	0.96	232.1	217.5	0.94
P52	Stage 2	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
NorthEast: Garfield Road											
P6	Full	53	64.8	LOS F	0.2	0.2	0.96	0.96	245.1	234.4	0.96
P6B	Slip/ Bypass	53	64.8	LOS F	0.2	0.2	0.96	0.96	224.5	207.6	0.92

NorthWest: Richmond Road											
P71	Stage 1	53	64.8	LOS F	0.2	0.2	0.96	0.96	229.5	214.2	0.93
P72	Stage 2	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
P7B	Slip/ Bypass	53	64.8	LOS F	0.2	0.2	0.96	0.96	221.9	204.3	0.92
SouthWest: Abell Road											
P8	Full	53	64.8	LOS F	0.2	0.2	0.96	0.96	245.1	234.4	0.96
All Pedestrians		421	64.8	LOS F	0.2	0.2	0.96	0.96	231.5	216.8	0.94

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: 1 [Elara Boulevard-Kaluta Avenue -PM- Existing+Dev (Site Folder: Existing + Dev)]

Network: N101 [PM-existing +Dev-WEST PRECINCT (Network Folder: Existing + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	23	0.0	23	0.0	0.447	3.9	LOS A	1.1	7.7	0.45	0.61	0.45	43.9
2	T1	106	1.0	106	1.0	0.447	3.6	LOS A	1.1	7.7	0.45	0.61	0.45	45.8
3	R2	420	0.0	420	0.0	0.447	8.6	LOS A	1.1	7.7	0.45	0.61	0.45	41.8
3u	U	1	0.0	1	0.0	0.447	10.5	LOS A	1.1	7.7	0.45	0.61	0.45	41.8
Approach		551	0.2	551	0.2	0.447	7.4	LOS A	1.1	7.7	0.45	0.61	0.45	42.9
East: Elara boulevard														
4	L2	17	6.3	17	6.3	0.150	2.7	LOS A	0.3	2.1	0.09	0.35	0.09	46.7
5	T1	179	0.0	179	0.0	0.150	2.5	LOS A	0.3	2.1	0.09	0.35	0.09	48.9
6	R2	28	0.0	28	0.0	0.150	7.4	LOS A	0.3	2.1	0.09	0.35	0.09	49.4
6u	U	7	85.7	7	85.7	0.150	10.0	LOS A	0.3	2.1	0.09	0.35	0.09	46.7
Approach		232	3.2	232	3.2	0.150	3.3	LOS A	0.3	2.1	0.09	0.35	0.09	48.8
North: Kaluta Avenue														
7	L2	19	5.6	19	5.6	0.036	4.5	LOS A	0.1	0.5	0.51	0.52	0.51	41.3
8	T1	14	15.4	14	15.4	0.036	4.4	LOS A	0.1	0.5	0.51	0.52	0.51	41.3
9	R2	1	0.0	1	0.0	0.036	9.1	LOS A	0.1	0.5	0.51	0.52	0.51	46.9
9u	U	1	0.0	1	0.0	0.036	11.0	LOS A	0.1	0.5	0.51	0.52	0.51	49.0
Approach		35	9.1	35	9.1	0.036	4.8	LOS A	0.1	0.5	0.51	0.52	0.51	41.9
West: Elara boulevard														
10	L2	1	0.0	1	0.0	0.034	5.5	LOS A	0.1	0.5	0.63	0.56	0.63	43.3
11	T1	24	4.3	24	4.3	0.034	5.4	LOS A	0.1	0.5	0.63	0.56	0.63	36.5
12	R2	1	0.0	1	0.0	0.034	10.2	LOS A	0.1	0.5	0.63	0.56	0.63	36.5
12u	U	1	0.0	1	0.0	0.034	12.1	LOS A	0.1	0.5	0.63	0.56	0.63	46.8
Approach		27	3.8	27	3.8	0.034	5.9	LOS A	0.1	0.5	0.63	0.56	0.63	37.5
All Vehicles		844	1.5	844	1.5	0.447	6.1	LOS A	1.1	7.7	0.36	0.54	0.36	44.7

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 5 [Abell Road-Kaluta Avenue_ PM-Existing -Dev (Site Folder: Existing + Dev)]

Network: N101 [PM-existing +Dev-WEST PRECINCT (Network Folder: Existing + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	5	20.0	5	20.0	0.065	6.2	LOS A	0.1	1.1	0.60	0.67	0.60	40.5
2	T1	8	0.0	8	0.0	0.065	5.5	LOS A	0.1	1.1	0.60	0.67	0.60	32.7
3	R2	36	23.5	36	23.5	0.065	10.8	LOS A	0.1	1.1	0.60	0.67	0.60	32.7
3u	U	1	0.0	1	0.0	0.065	11.8	LOS A	0.1	1.1	0.60	0.67	0.60	42.3
Approach		51	18.8	51	18.8	0.065	9.5	LOS A	0.1	1.1	0.60	0.67	0.60	34.4
East: Abell Road														
4	L2	11	40.0	11	40.0	0.300	3.8	LOS A	0.7	4.9	0.28	0.58	0.28	39.7
5	T1	29	17.9	29	17.9	0.300	3.3	LOS A	0.7	4.9	0.28	0.58	0.28	43.3
6	R2	363	0.3	363	0.3	0.300	7.7	LOS A	0.7	4.9	0.28	0.58	0.28	35.2
6u	U	1	0.0	1	0.0	0.300	9.5	LOS A	0.7	4.9	0.28	0.58	0.28	35.2
Approach		404	2.6	404	2.6	0.300	7.3	LOS A	0.7	4.9	0.28	0.58	0.28	36.4
North: Kaluta Avenue														
7	L2	122	1.7	122	1.7	0.183	3.8	LOS A	0.4	2.7	0.39	0.56	0.39	43.3
8	T1	3	0.0	3	0.0	0.183	3.7	LOS A	0.4	2.7	0.39	0.56	0.39	46.2
9	R2	85	0.0	85	0.0	0.183	8.2	LOS A	0.4	2.7	0.39	0.56	0.39	46.9
9u	U	1	0.0	1	0.0	0.183	10.0	LOS A	0.4	2.7	0.39	0.56	0.39	43.3
Approach		212	1.0	212	1.0	0.183	5.6	LOS A	0.4	2.7	0.39	0.56	0.39	45.1
West: Abell Road														
10	L2	103	0.0	103	0.0	0.274	4.7	LOS A	0.6	4.1	0.52	0.58	0.52	40.9
11	T1	162	9.7	162	9.7	0.274	4.8	LOS A	0.6	4.1	0.52	0.58	0.52	40.9
12	R2	7	28.6	7	28.6	0.274	9.8	LOS A	0.6	4.1	0.52	0.58	0.52	45.2
12u	U	1	0.0	1	0.0	0.274	10.9	LOS A	0.6	4.1	0.52	0.58	0.52	47.9
Approach		274	6.5	274	6.5	0.274	4.9	LOS A	0.6	4.1	0.52	0.58	0.52	41.1
All Vehicles		940	4.3	940	4.3	0.300	6.3	LOS A	0.7	4.9	0.39	0.58	0.39	40.5

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [Elara Boulevard-John Black Drive - PM- Existing+Dev (Site Folder: Existing + Dev)]

Network: N101 [PM-existing +Dev (Network Folder: Existing + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: John Black Drive														
1	L2	47	2.2	47	2.2	0.188	4.8	LOS A	0.5	3.5	0.50	0.54	0.50	44.0
2	T1	118	1.8	118	1.8	0.188	4.9	LOS A	0.5	3.5	0.50	0.54	0.50	46.4
3	R2	23	4.5	23	4.5	0.188	8.7	LOS A	0.5	3.5	0.50	0.54	0.50	46.9
3u	U	2	0.0	2	0.0	0.188	10.2	LOS A	0.5	3.5	0.50	0.54	0.50	44.0
Approach		191	2.2	191	2.2	0.188	5.4	LOS A	0.5	3.5	0.50	0.54	0.50	46.0
East: Elara boulevard														
4	L2	45	0.0	45	0.0	0.220	4.5	LOS A	0.6	4.4	0.46	0.55	0.46	42.9
5	T1	112	10.4	112	10.4	0.220	4.7	LOS A	0.6	4.4	0.46	0.55	0.46	42.9
6	R2	69	6.1	69	6.1	0.220	8.4	LOS A	0.6	4.4	0.46	0.55	0.46	45.8
6u	U	3	0.0	3	0.0	0.220	9.9	LOS A	0.6	4.4	0.46	0.55	0.46	47.1
Approach		229	6.9	229	6.9	0.220	5.8	LOS A	0.6	4.4	0.46	0.55	0.46	44.2
North: John Black Drive														
7	L2	56	11.3	56	11.3	0.191	5.3	LOS A	0.5	3.8	0.53	0.55	0.53	45.1
8	T1	117	1.8	117	1.8	0.191	5.1	LOS A	0.5	3.8	0.53	0.55	0.53	40.7
9	R2	12	0.0	12	0.0	0.191	8.8	LOS A	0.5	3.8	0.53	0.55	0.53	40.7
9u	U	1	0.0	1	0.0	0.191	10.5	LOS A	0.5	3.8	0.53	0.55	0.53	46.1
Approach		185	4.5	185	4.5	0.191	5.4	LOS A	0.5	3.8	0.53	0.55	0.53	42.9
West: Elara boulevard														
10	L2	4	0.0	4	0.0	0.195	4.9	LOS A	0.5	3.8	0.51	0.55	0.51	45.7
11	T1	151	10.5	151	10.5	0.195	5.2	LOS A	0.5	3.8	0.51	0.55	0.51	46.9
12	R2	33	0.0	33	0.0	0.195	8.7	LOS A	0.5	3.8	0.51	0.55	0.51	44.3
12u	U	1	0.0	1	0.0	0.195	10.4	LOS A	0.5	3.8	0.51	0.55	0.51	44.3
Approach		188	8.4	188	8.4	0.195	5.8	LOS A	0.5	3.8	0.51	0.55	0.51	46.6
All Vehicles		794	5.6	794	5.6	0.220	5.6	LOS A	0.6	4.4	0.50	0.55	0.50	45.2

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 7 [Abell Road-John Black Drive - PM- Existing +Dev (Site Folder: Existing + Dev)]

Network: N101 [PM-existing +Dev (Network Folder: Existing + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Abell Road														
5	T1	324	3.6	324	3.6	0.370	3.5	LOS A	0.9	6.7	0.35	0.49	0.35	44.3
6	R2	142	3.0	142	3.0	0.370	7.8	LOS A	0.9	6.7	0.35	0.49	0.35	44.3
6u	U	5	20.0	5	20.0	0.370	9.8	LOS A	0.9	6.7	0.35	0.49	0.35	48.1
Approach		472	3.6	472	3.6	0.370	4.8	LOS A	0.9	6.7	0.35	0.49	0.35	44.4
North: John Black Drive														
7	L2	208	1.0	208	1.0	0.380	6.6	LOS A	1.2	8.2	0.73	0.73	0.73	45.6
9	R2	125	0.0	125	0.0	0.380	10.8	LOS A	1.2	8.2	0.73	0.73	0.73	42.2
9u	U	1	0.0	1	0.0	0.380	12.6	LOS A	1.2	8.2	0.73	0.73	0.73	42.2
Approach		335	0.6	335	0.6	0.380	8.2	LOS A	1.2	8.2	0.73	0.73	0.73	44.7
West: Abell Road														
10	L2	62	0.0	62	0.0	0.338	3.7	LOS A	0.7	5.5	0.34	0.43	0.34	41.0
11	T1	345	11.6	345	11.6	0.338	3.6	LOS A	0.7	5.5	0.34	0.43	0.34	47.4
12u	U	1	0.0	1	0.0	0.338	9.6	LOS A	0.7	5.5	0.34	0.43	0.34	41.0
Approach		408	9.8	408	9.8	0.338	3.7	LOS A	0.7	5.5	0.34	0.43	0.34	47.0
All Vehicles		1215	4.9	1215	4.9	0.380	5.4	LOS A	1.2	8.2	0.45	0.54	0.45	45.4

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 6 [Abell Road-Betula Parade - PM- Existing +Dev (Site Folder: Existing + Dev)]

Network: N101 [PM-existing +Dev (Network Folder: Existing + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Betula Parade														
1	L2	47	0.0	47	0.0	0.144	4.7	LOS A	0.3	2.2	0.50	0.64	0.50	37.4
2	T1	7	0.0	7	0.0	0.144	4.6	LOS A	0.3	2.2	0.50	0.64	0.50	46.0
3	R2	85	14.8	85	14.8	0.144	9.5	LOS A	0.3	2.2	0.50	0.64	0.50	37.4
3u	U	1	0.0	1	0.0	0.144	10.9	LOS A	0.3	2.2	0.50	0.64	0.50	45.7
Approach		141	9.0	141	9.0	0.144	7.6	LOS A	0.3	2.2	0.50	0.64	0.50	38.5
East: Abell Road														
4	L2	48	2.2	48	2.2	0.299	3.1	LOS A	0.6	4.3	0.19	0.37	0.19	45.4
5	T1	353	2.4	353	2.4	0.299	3.0	LOS A	0.6	4.3	0.19	0.37	0.19	42.0
6	R2	31	3.4	31	3.4	0.299	7.5	LOS A	0.6	4.3	0.19	0.37	0.19	48.4
6u	U	1	0.0	1	0.0	0.299	9.3	LOS A	0.6	4.3	0.19	0.37	0.19	42.0
Approach		433	2.4	433	2.4	0.299	3.4	LOS A	0.6	4.3	0.19	0.37	0.19	43.5
North: Betula Parade														
7	L2	32	6.7	32	6.7	0.060	5.1	LOS A	0.1	0.9	0.53	0.55	0.53	44.5
8	T1	23	0.0	23	0.0	0.060	4.9	LOS A	0.1	0.9	0.53	0.55	0.53	47.2
9	R2	2	0.0	2	0.0	0.060	9.4	LOS A	0.1	0.9	0.53	0.55	0.53	44.5
9u	U	1	0.0	1	0.0	0.060	11.2	LOS A	0.1	0.9	0.53	0.55	0.53	48.8
Approach		58	3.6	58	3.6	0.060	5.2	LOS A	0.1	0.9	0.53	0.55	0.53	45.9
West: Abell Road														
10	L2	1	0.0	1	0.0	0.253	3.4	LOS A	0.5	3.8	0.29	0.41	0.29	46.3
11	T1	283	8.9	283	8.9	0.253	3.3	LOS A	0.5	3.8	0.29	0.41	0.29	39.4
12	R2	35	0.0	35	0.0	0.253	7.8	LOS A	0.5	3.8	0.29	0.41	0.29	46.5
12u	U	1	0.0	1	0.0	0.253	9.6	LOS A	0.5	3.8	0.29	0.41	0.29	39.4
Approach		320	7.9	320	7.9	0.253	3.8	LOS A	0.5	3.8	0.29	0.41	0.29	40.7
All Vehicles		952	5.3	952	5.3	0.299	4.3	LOS A	0.6	4.3	0.29	0.44	0.29	42.3

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 7 [Elara Boulevard-Richmond Road-PM-Existing + Dev (Site Folder: Existing + Dev)]

Network: N101 [PM-Existing +Dev-RICHMOND RD (Network Folder: Existing + Dev)]

PM peak - 2:30 - 3:30pm
Site Category: Existing + Dev
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 135 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	405	4.9	405	4.9	0.295	9.2	LOS A	2.6	19.2	0.27	0.68	0.27	61.3
22	T1	1280	14.3	1280	14.3	* 0.733	29.1	LOS C	20.3	159.5	0.86	0.78	0.86	69.1
Approach		1685	12.1	1685	12.1	0.733	24.3	LOS B	20.3	159.5	0.72	0.76	0.72	68.5
NorthWest: Richmond Road														
28	T1	978	12.5	978	12.5	0.421	12.3	LOS A	9.4	73.0	0.53	0.47	0.53	74.0
29	R2	138	6.9	138	6.9	* 0.701	73.0	LOS F	5.6	41.8	1.00	0.83	1.08	53.9
Approach		1116	11.8	1116	11.8	0.701	19.8	LOS B	9.4	73.0	0.58	0.52	0.59	70.5
SouthWest: Elara Boulevard														
30	L2	182	3.5	182	3.5	0.244	17.7	LOS B	3.0	21.8	0.53	0.71	0.53	70.1
32	R2	531	5.4	531	5.4	* 0.725	58.9	LOS E	11.0	80.6	0.97	0.85	1.01	12.4
Approach		713	4.9	713	4.9	0.725	48.4	LOS D	11.0	80.6	0.86	0.82	0.89	39.0
All Vehicles		3514	10.5	3514	10.5	0.733	27.8	LOS B	20.3	159.5	0.70	0.69	0.71	65.4

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
P52	Stage 2	53	61.8	LOS F	0.2	0.2	0.96	0.96	221.5	207.6	0.94
NorthWest: Richmond Road											
P71	Stage 1	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
P72	Stage 2	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
SouthWest: Elara Boulevard											
P8	Full	53	61.8	LOS F	0.2	0.2	0.96	0.96	229.2	217.6	0.95
All Pedestrians		263	61.8	LOS F	0.2	0.2	0.96	0.96	224.5	211.6	0.94

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: 8 [Abell Road-Richmond Road-PM-Existing + Dev (Site Folder: Existing + Dev)]

Network: N101 [PM-Existing +Dev-RICHMOND RD (Network Folder: Existing + Dev)]

PM peak - 2:30 - 3:30pm
Site Category: Existing + Dev
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 135 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	573	3.9	573	3.9	0.369	8.7	LOS A	2.8	20.5	0.23	0.68	0.23	57.3
22	T1	1333	11.5	1333	11.5	0.747	26.9	LOS B	21.4	163.9	0.83	0.75	0.83	36.5
23	R2	203	24.9	203	24.9	* 0.621	42.7	LOS D	2.4	20.1	1.00	0.79	1.03	31.1
Approach		2108	10.7	2108	10.7	0.747	23.5	LOS B	21.4	163.9	0.68	0.74	0.69	41.2
NorthEast: Garfield Road														
24	L2	277	20.2	277	20.2	* 0.443	35.8	LOS C	3.3	26.9	0.93	0.79	0.93	31.3
25	T1	103	7.1	103	7.1	0.613	75.0	LOS F	2.2	16.1	1.00	0.77	1.08	17.1
26	R2	289	9.8	289	9.8	0.375	54.9	LOS D	5.0	37.8	0.90	0.79	0.90	9.9
Approach		669	13.7	669	13.7	0.613	50.1	LOS D	5.0	37.8	0.92	0.79	0.94	20.3
NorthWest: Richmond Road														
27	L2	208	13.1	208	13.1	0.338	41.2	LOS C	6.1	47.2	0.77	0.79	0.77	38.3
28	T1	1251	9.4	1251	9.4	* 0.843	42.6	LOS D	23.9	180.2	0.96	0.91	1.02	45.2
29	R2	18	17.6	18	17.6	0.244	79.7	LOS F	0.7	6.0	1.00	0.70	1.00	28.8
Approach		1477	10.0	1477	10.0	0.843	42.9	LOS D	23.9	180.2	0.94	0.89	0.99	44.1
SouthWest: Abell Road														
30	L2	66	27.0	66	27.0	0.089	21.1	LOS B	1.1	9.8	0.50	0.67	0.50	31.0
31	T1	121	5.2	121	5.2	* 0.712	75.0	LOS F	2.6	19.0	1.00	0.82	1.18	17.3
32	R2	656	6.6	656	6.6	* 0.832	66.0	LOS E	13.7	101.4	1.00	0.93	1.14	26.0
Approach		843	8.0	843	8.0	0.832	63.8	LOS E	13.7	101.4	0.96	0.89	1.09	24.9
All Vehicles		5098	10.4	5098	10.4	0.843	39.3	LOS C	23.9	180.2	0.83	0.81	0.87	35.9

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	61.8	LOS F	0.2	0.2	0.96	0.96	229.1	217.5	0.95
P52	Stage 2	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
NorthEast: Garfield Road											
P6	Full	53	61.8	LOS F	0.2	0.2	0.96	0.96	242.1	234.4	0.97
P6B	Slip/ Bypass	53	61.8	LOS F	0.2	0.2	0.96	0.96	221.5	207.6	0.94

NorthWest: Richmond Road											
P71	Stage 1	53	61.8	LOS F	0.2	0.2	0.96	0.96	226.5	214.2	0.95
P72	Stage 2	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
P7B	Slip/ Bypass	53	61.8	LOS F	0.2	0.2	0.96	0.96	218.9	204.3	0.93
SouthWest: Abell Road											
P8	Full	53	61.8	LOS F	0.2	0.2	0.96	0.96	242.1	234.4	0.97
All Pedestrians		421	61.8	LOS F	0.2	0.2	0.96	0.96	228.5	216.8	0.95

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: 1 [Elara Boulevard-Kaluta Avenue -AM-2032 (Site Folder: 2032)]

Network: N101 [AM-2032-WEST PRECINCT (Network Folder: 2032)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	7	28.6	7	29.2	0.080	3.4	LOS A	0.1	1.0	0.26	0.50	0.26	44.9
2	T1	44	4.8	43	4.9	0.080	2.9	LOS A	0.1	1.0	0.26	0.50	0.26	47.0
3	R2	44	0.0	43	0.0	0.080	7.8	LOS A	0.1	1.0	0.26	0.50	0.26	43.4
3u	U	7	0.0	7	0.0	0.080	9.7	LOS A	0.1	1.0	0.26	0.50	0.26	43.4
Approach		103	4.1	100 N1	4.2	0.080	5.6	LOS A	0.1	1.0	0.26	0.50	0.26	45.4
East: Elara boulevard														
4	L2	77	9.6	75	9.8	0.146	2.9	LOS A	0.3	2.1	0.18	0.46	0.18	45.6
5	T1	44	9.5	43	9.7	0.146	2.7	LOS A	0.3	2.1	0.18	0.46	0.18	48.0
6	R2	49	4.3	48	4.4	0.146	7.6	LOS A	0.3	2.1	0.18	0.46	0.18	48.6
6u	U	24	91.3	24	91.4	0.146	10.3	LOS A	0.3	2.1	0.18	0.46	0.18	45.6
Approach		195	18.4	189 N1	18.6	0.146	5.0	LOS A	0.3	2.1	0.18	0.46	0.18	47.1
North: Kaluta Avenue														
7	L2	64	8.2	64	8.2	0.094	3.2	LOS A	0.2	1.2	0.24	0.38	0.24	43.4
8	T1	52	4.1	52	4.1	0.094	2.9	LOS A	0.2	1.2	0.24	0.38	0.24	43.4
9	R2	1	0.0	1	0.0	0.094	7.8	LOS A	0.2	1.2	0.24	0.38	0.24	48.6
9u	U	1	0.0	1	0.0	0.094	9.7	LOS A	0.2	1.2	0.24	0.38	0.24	50.5
Approach		118	6.2	118	6.3	0.094	3.1	LOS A	0.2	1.2	0.24	0.38	0.24	43.6
West: Elara boulevard														
10	L2	1	0.0	1	0.0	0.032	3.4	LOS A	0.1	0.5	0.34	0.38	0.34	45.1
11	T1	35	6.1	35	6.1	0.032	3.3	LOS A	0.1	0.5	0.34	0.38	0.34	39.5
12	R2	1	0.0	1	0.0	0.032	8.1	LOS A	0.1	0.5	0.34	0.38	0.34	39.5
12u	U	1	0.0	1	0.0	0.032	10.0	LOS A	0.1	0.5	0.34	0.38	0.34	49.5
Approach		38	5.6	38	5.6	0.032	3.6	LOS A	0.1	0.5	0.34	0.38	0.34	40.2
All Vehicles		454	10.9	445 N1	11.1	0.146	4.5	LOS A	0.3	2.1	0.23	0.44	0.23	45.8

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

MOVEMENT SUMMARY

Site: 5 [Abell Road-Kaluta Avenue_ AM-2032 (Site Folder: 2032)]

Network: N101 [AM-2032-WEST PRECINCT (Network Folder: 2032)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	20	36.8	20	36.8	0.096	5.1	LOS A	0.2	1.6	0.46	0.57	0.46	41.9
2	T1	29	0.0	29	0.0	0.096	4.2	LOS A	0.2	1.6	0.46	0.57	0.46	35.3
3	R2	46	4.5	46	4.5	0.096	8.9	LOS A	0.2	1.6	0.46	0.57	0.46	35.3
3u	U	1	0.0	1	0.0	0.096	10.6	LOS A	0.2	1.6	0.46	0.57	0.46	44.7
Approach		97	9.8	97	9.8	0.096	6.7	LOS A	0.2	1.6	0.46	0.57	0.46	37.7
East: Abell Road														
4	L2	40	31.6	39	32.6	0.209	3.5	LOS A	0.4	3.4	0.22	0.45	0.22	42.3
5	T1	152	21.5	145	22.3	0.209	3.2	LOS A	0.4	3.4	0.22	0.45	0.22	45.7
6	R2	82	6.4	78	6.7	0.209	7.6	LOS A	0.4	3.4	0.22	0.45	0.22	38.8
6u	U	1	0.0	1	0.0	0.209	9.4	LOS A	0.4	3.4	0.22	0.45	0.22	38.8
Approach		275	18.4	263[N1]	19.1	0.209	4.6	LOS A	0.4	3.4	0.22	0.45	0.22	43.9
North: Kaluta Avenue														
7	L2	106	2.0	104	2.0	0.128	3.9	LOS A	0.2	1.7	0.38	0.52	0.38	44.3
8	T1	17	12.5	17	12.7	0.128	3.9	LOS A	0.2	1.7	0.38	0.52	0.38	46.9
9	R2	22	0.0	22	0.0	0.128	8.3	LOS A	0.2	1.7	0.38	0.52	0.38	47.6
9u	U	1	0.0	1	0.0	0.128	10.1	LOS A	0.2	1.7	0.38	0.52	0.38	44.3
Approach		146	2.9	144[N1]	2.9	0.128	4.6	LOS A	0.2	1.7	0.38	0.52	0.38	45.3
West: Abell Road														
10	L2	9	0.0	9	0.0	0.174	3.5	LOS A	0.3	2.6	0.30	0.45	0.30	41.8
11	T1	151	24.5	151	24.5	0.174	3.6	LOS A	0.3	2.6	0.30	0.45	0.30	41.8
12	R2	29	32.1	29	32.1	0.174	8.3	LOS A	0.3	2.6	0.30	0.45	0.30	45.7
12u	U	1	0.0	1	0.0	0.174	9.7	LOS A	0.3	2.6	0.30	0.45	0.30	48.4
Approach		191	24.3	191	24.3	0.174	4.4	LOS A	0.3	2.6	0.30	0.45	0.30	42.6
All Vehicles		708	15.6	694[N1]	15.9	0.209	4.8	LOS A	0.4	3.4	0.31	0.48	0.31	43.3

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

MOVEMENT SUMMARY

Site: 2 [Elara Boulevard-John Black Drive - AM-2032 (Site Folder: 2032)]

Network: N101 [AM-2032-WEST PRECINCT (Network Folder: 2032)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: John Black Drive														
1	L2	108	6.8	108	6.8	0.864	23.0	LOS B	7.1	51.4	1.00	1.34	1.81	32.5
2	T1	361	2.0	360	2.0	0.864	22.7	LOS B	7.1	51.4	1.00	1.34	1.81	37.4
3	R2	173	4.3	172	4.3	0.864	26.7	LOS B	7.1	51.4	1.00	1.34	1.81	38.8
3u	U	2	0.0	2	0.0	0.864	28.0	LOS B	7.1	51.4	1.00	1.34	1.81	32.5
Approach		644	3.4	643 N1	3.4	0.864	23.9	LOS B	7.1	51.4	1.00	1.34	1.81	37.2
East: Elara boulevard														
4	L2	139	3.8	139	3.8	0.834	24.1	LOS B	5.7	42.9	1.00	1.40	1.84	30.1
5	T1	255	14.5	255	14.5	0.834	24.8	LOS B	5.7	42.9	1.00	1.40	1.84	30.1
6	R2	121	7.8	121	7.8	0.834	28.2	LOS B	5.7	42.9	1.00	1.40	1.84	35.8
6u	U	9	0.0	9	0.0	0.834	29.3	LOS C	5.7	42.9	1.00	1.40	1.84	38.0
Approach		524	9.8	524	9.8	0.834	25.5	LOS B	5.7	42.9	1.00	1.40	1.84	31.9
North: John Black Drive														
7	L2	174	3.0	174	3.0	1.380	368.1	LOS F	60.2	426.3	1.00	6.16	12.32	7.2
8	T1	526	0.4	526	0.4	1.380	368.0	LOS F	60.2	426.3	1.00	6.16	12.32	3.3
9	R2	42	5.0	42	5.0	1.380	372.1	LOS F	60.2	426.3	1.00	6.16	12.32	3.3
9u	U	9	0.0	9	0.0	1.380	373.4	LOS F	60.2	426.3	1.00	6.16	12.32	6.0
Approach		752	1.3	752	1.3	1.380	368.3	LOS F	60.2	426.3	1.00	6.16	12.32	4.3
West: Elara boulevard														
10	L2	49	4.3	49	4.3	1.071	114.5	LOS F	20.3	148.9	1.00	3.00	5.34	19.5
11	T1	387	7.6	386	7.5	1.071	114.8	LOS F	20.3	148.9	1.00	3.00	5.34	21.5
12	R2	151	0.0	150	0.0	1.071	118.0	LOS F	20.3	148.9	1.00	3.00	5.34	15.1
12u	U	2	0.0	2	0.0	1.071	119.6	LOS F	20.3	148.9	1.00	3.00	5.34	15.1
Approach		589	5.4	588 N1	5.3	1.071	115.6	LOS F	20.3	148.9	1.00	3.00	5.34	19.9
All Vehicles		2509	4.6	2506 N1	4.6	1.380	149.0	LOS F	60.2	426.3	1.00	3.19	5.80	13.4

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

MOVEMENT SUMMARY

Site: 7 [Abell Road-John Black Drive - AM-2032 (Site Folder: 2032)]

Network: N101 [AM-2032-WEST PRECINCT (Network Folder: 2032)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Abell Road														
5	T1	376	15.1	376	15.1	0.654	3.8	LOS A	2.7	19.9	0.53	0.54	0.53	42.8
6	R2	438	1.2	438	1.2	0.654	8.0	LOS A	2.7	19.9	0.53	0.54	0.53	42.8
6u	U	32	6.7	32	6.7	0.654	9.8	LOS A	2.7	19.9	0.53	0.54	0.53	47.3
Approach		845	7.6	845	7.6	0.654	6.2	LOS A	2.7	19.9	0.53	0.54	0.53	43.1
North: John Black Drive														
7	L2	591	0.9	477	1.1	0.975	60.6	LOS E	12.8	91.2	1.00	2.11	3.35	29.2
9	R2	134	5.5	109	6.5	0.975	65.3	LOS E	12.8	91.2	1.00	2.11	3.35	20.8
9u	U	5	0.0	4	0.0	0.975	66.5	LOS E	12.8	91.2	1.00	2.11	3.35	20.8
Approach		729	1.7	590 N1	2.0	0.975	61.5	LOS E	12.8	91.2	1.00	2.11	3.35	28.0
West: Abell Road														
10	L2	153	9.7	152	9.7	0.790	11.2	LOS A	4.2	31.6	0.92	1.07	1.28	33.0
11	T1	576	8.6	574	8.6	0.790	11.0	LOS A	4.2	31.6	0.92	1.07	1.28	43.4
12u	U	1	0.0	1	0.0	0.790	16.7	LOS B	4.2	31.6	0.92	1.07	1.28	33.0
Approach		729	8.8	728 N1	8.8	0.790	11.0	LOS A	4.2	31.6	0.92	1.07	1.28	42.3
All Vehicles		2304	6.1	2163 N1	6.5	0.975	22.9	LOS B	12.8	91.2	0.79	1.15	1.55	35.9

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

MOVEMENT SUMMARY

Site: 6 [Abell Road-Betula Parade - AM-2032 (Site Folder: 2032)]

Network: N101 [AM-2032-WEST PRECINCT (Network Folder: 2032)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Betula Parade														
1	L2	9	22.2	9	22.2	0.307	5.1	LOS A	0.7	5.2	0.51	0.67	0.51	36.2
2	T1	42	0.0	42	0.0	0.307	4.5	LOS A	0.7	5.2	0.51	0.67	0.51	45.3
3	R2	269	7.4	269	7.4	0.307	9.2	LOS A	0.7	5.2	0.51	0.67	0.51	36.2
3u	U	1	0.0	1	0.0	0.307	10.8	LOS A	0.7	5.2	0.51	0.67	0.51	44.5
Approach		322	6.9	322	6.9	0.307	8.5	LOS A	0.7	5.2	0.51	0.67	0.51	38.6
East: Abell Road														
4	L2	193	7.7	183	8.0	0.334	3.1	LOS A	0.8	6.1	0.19	0.39	0.19	45.1
5	T1	249	19.0	238	19.8	0.334	3.1	LOS A	0.8	6.1	0.19	0.39	0.19	41.7
6	R2	49	0.0	47	0.0	0.334	7.5	LOS A	0.8	6.1	0.19	0.39	0.19	48.4
6u	U	2	0.0	2	0.0	0.334	9.3	LOS A	0.8	6.1	0.19	0.39	0.19	41.7
Approach		494	12.6	470 N1	13.2	0.334	3.6	LOS A	0.8	6.1	0.19	0.39	0.19	44.5
North: Betula Parade														
7	L2	98	4.3	98	4.3	0.164	6.4	LOS A	0.4	2.8	0.66	0.68	0.66	43.5
8	T1	29	0.0	29	0.0	0.164	6.3	LOS A	0.4	2.8	0.66	0.68	0.66	46.4
9	R2	7	0.0	7	0.0	0.164	10.8	LOS A	0.4	2.8	0.66	0.68	0.66	43.5
9u	U	1	0.0	1	0.0	0.164	12.6	LOS A	0.4	2.8	0.66	0.68	0.66	48.3
Approach		136	3.1	136	3.1	0.164	6.7	LOS A	0.4	2.8	0.66	0.68	0.66	44.4
West: Abell Road														
10	L2	7	0.0	7	0.0	0.304	4.5	LOS A	0.7	5.1	0.52	0.53	0.52	45.6
11	T1	286	14.7	285	14.8	0.304	4.6	LOS A	0.7	5.1	0.52	0.53	0.52	37.7
12	R2	9	0.0	9	0.0	0.304	8.9	LOS A	0.7	5.1	0.52	0.53	0.52	45.3
12u	U	1	0.0	1	0.0	0.304	10.7	LOS A	0.7	5.1	0.52	0.53	0.52	37.7
Approach		304	13.8	302 N1	13.9	0.304	4.8	LOS A	0.7	5.1	0.52	0.53	0.52	38.6
All Vehicles		1256	10.4	1230 N1	10.6	0.334	5.5	LOS A	0.8	6.1	0.41	0.53	0.41	41.9

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

MOVEMENT SUMMARY

Site: 7 [Elara Boulevard-Richmond Road-AM-2032 (Site Folder: 2032)]

Network: N101 [AM-2032-RICHMOND RD (Network Folder: 2032)]

AM peak - 7:45 to 8:45am
Site Category: 2032 Conditions
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 141 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	867	7.4	670	8.3	0.571	12.6	LOS A	9.3	70.0	0.47	0.75	0.47	57.9
22	T1	1340	11.7	1027	11.8	1.329	360.1	LOS F	56.8	436.4	1.00	1.94	2.77	26.5
Approach		2207	10.0	1697 N1	10.4	1.329	222.8	LOS F	56.8	436.4	0.79	1.47	1.87	28.5
NorthWest: Richmond Road														
28	T1	1234	11.8	1234	11.8	* 1.367	397.6	LOS F	75.8	584.2	1.00	2.13	2.91	21.6
29	R2	328	7.4	328	7.4	1.312	356.1	LOS F	35.4	263.2	1.00	1.48	2.76	24.0
Approach		1562	10.8	1562	10.8	1.367	388.9	LOS F	75.8	584.2	1.00	2.00	2.88	22.1
SouthWest: Elara Boulevard														
30	L2	591	3.7	591	3.7	0.545	15.8	LOS B	10.2	73.6	0.56	0.74	0.56	70.7
32	R2	1282	3.4	1282	3.4	* 1.352	390.4	LOS F	89.3	643.9	1.00	1.76	2.86	2.2
Approach		1873	3.5	1873	3.5	1.352	272.3	LOS F	89.3	643.9	0.86	1.44	2.14	13.8
All Vehicles		5642	8.1	5131 N1	8.9	1.367	291.4	LOS F	89.3	643.9	0.88	1.62	2.27	21.4

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
P52	Stage 2	53	64.8	LOS F	0.2	0.2	0.96	0.96	224.5	207.6	0.92
NorthWest: Richmond Road											
P71	Stage 1	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
P72	Stage 2	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
SouthWest: Elara Boulevard											
P8	Full	53	64.8	LOS F	0.2	0.2	0.96	0.96	232.2	217.6	0.94
All Pedestrians		263	64.8	LOS F	0.2	0.2	0.96	0.96	227.5	211.6	0.93

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: 8 [Abell Road-Richmond Road-AM-2032 (Site Folder: 2032)]

Network: N101 [AM-2032-RICHMOND RD (Network Folder: 2032)]

AM peak - 7:45 to 8:45am
Site Category: 2032 Conditions
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	1129	5.5	1129	5.5	0.772	13.1	LOS A	14.0	102.9	0.53	0.80	0.53	53.3
22	T1	1388	10.5	1388	10.5	* 1.597	584.0	LOS F	96.7	733.2	1.00	2.43	3.48	3.1
23	R2	341	19.4	341	19.4	* 1.626	627.7	LOS F	24.4	199.2	1.00	1.76	3.69	3.4
Approach		2859	9.6	2859	9.6	1.626	363.7	LOS F	96.7	733.2	0.81	1.71	2.34	5.6
NorthEast: Garfield Road														
24	L2	609	23.8	609	23.8	0.997	116.8	LOS F	18.0	151.5	1.00	1.10	1.58	14.8
25	T1	240	10.5	240	10.5	0.762	74.0	LOS F	5.2	39.9	1.00	0.86	1.16	17.3
26	R2	633	12.5	633	12.5	0.436	36.0	LOS C	9.2	71.0	0.75	0.80	0.75	14.1
Approach		1482	16.8	1482	16.8	0.997	75.4	LOS F	18.0	151.5	0.89	0.93	1.16	15.1
NorthWest: Richmond Road														
27	L2	515	9.2	391	9.4	0.331	17.9	LOS B	6.6	50.1	0.45	0.73	0.45	53.2
28	T1	1733	8.5	1316	8.7	1.476	481.2	LOS F	83.4	625.1	1.00	2.26	3.18	8.1
29	R2	22	33.3	17	34.0	0.176	78.2	LOS F	0.7	6.4	0.98	0.70	0.98	29.0
Approach		2269	8.9	1724 N1	9.1	1.476	372.2	LOS F	83.4	625.1	0.87	1.89	2.54	9.5
SouthWest: Abell Road														
30	L2	121	7.8	121	7.8	0.247	27.1	LOS B	3.1	23.3	0.66	0.75	0.66	26.4
31	T1	516	5.1	516	5.1	* 1.587	582.9	LOS F	35.7	260.2	1.00	2.13	3.56	2.8
32	R2	2283	2.8	2283	2.8	* 1.604	605.8	LOS F	171.5	1229.5	1.00	2.20	3.54	4.3
Approach		2920	3.4	2920	3.4	1.604	577.8	LOS F	171.5	1229.5	0.99	2.13	3.43	4.1
All Vehicles		9531	8.7	8985 N1	9.2	1.626	387.3	LOS F	171.5	1229.5	0.89	1.75	2.54	6.0

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	64.3	LOS F	0.2	0.2	0.96	0.96	231.6	217.5	0.94
P52	Stage 2	53	64.3	LOS F	0.2	0.2	0.96	0.96	226.5	210.9	0.93
NorthEast: Garfield Road											
P6	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	244.6	234.4	0.96

P6B	Slip/ Bypass	53	64.3	LOS F	0.2	0.2	0.96	0.96	224.0	207.6	0.93
NorthWest: Richmond Road											
P71	Stage 1	53	64.3	LOS F	0.2	0.2	0.96	0.96	229.0	214.2	0.94
P72	Stage 2	53	64.3	LOS F	0.2	0.2	0.96	0.96	226.5	210.9	0.93
P7B	Slip/ Bypass	53	64.3	LOS F	0.2	0.2	0.96	0.96	221.4	204.3	0.92
SouthWest: Abell Road											
P8	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	244.6	234.4	0.96
All Pedestrians		421	64.3	LOS F	0.2	0.2	0.96	0.96	231.0	216.8	0.94

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: 1 [Elara Boulevard-Kaluta Avenue -PM-2032 (Site Folder: 2032)]

Network: N101 [PM-2032-WEST PRECINCT (Network Folder: 2032)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	5	0.0	5	0.0	0.050	3.1	LOS A	0.1	0.6	0.24	0.45	0.24	45.7
2	T1	35	6.1	35	6.1	0.050	2.9	LOS A	0.1	0.6	0.24	0.45	0.24	47.5
3	R2	22	0.0	22	0.0	0.050	7.8	LOS A	0.1	0.6	0.24	0.45	0.24	44.2
3u	U	1	0.0	1	0.0	0.050	9.7	LOS A	0.1	0.6	0.24	0.45	0.24	44.2
Approach		63	3.3	63	3.3	0.050	4.7	LOS A	0.1	0.6	0.24	0.45	0.24	46.4
East: Elara boulevard														
4	L2	39	5.4	39	5.4	0.106	2.8	LOS A	0.2	1.4	0.13	0.50	0.13	45.0
5	T1	24	0.0	24	0.0	0.106	2.5	LOS A	0.2	1.4	0.13	0.50	0.13	47.5
6	R2	66	0.0	66	0.0	0.106	7.5	LOS A	0.2	1.4	0.13	0.50	0.13	48.1
6u	U	17	87.5	17	87.5	0.106	10.1	LOS A	0.2	1.4	0.13	0.50	0.13	45.0
Approach		146	11.5	146	11.5	0.106	5.7	LOS A	0.2	1.4	0.13	0.50	0.13	47.0
North: Kaluta Avenue														
7	L2	44	4.8	44	4.8	0.063	2.9	LOS A	0.1	0.8	0.18	0.36	0.18	43.7
8	T1	33	16.1	33	16.1	0.063	2.8	LOS A	0.1	0.8	0.18	0.36	0.18	43.7
9	R2	2	0.0	2	0.0	0.063	7.6	LOS A	0.1	0.8	0.18	0.36	0.18	48.8
9u	U	1	0.0	1	0.0	0.063	9.5	LOS A	0.1	0.8	0.18	0.36	0.18	50.7
Approach		80	9.2	80	9.2	0.063	3.1	LOS A	0.1	0.8	0.18	0.36	0.18	44.1
West: Elara boulevard														
10	L2	1	0.0	1	0.0	0.023	3.2	LOS A	0.0	0.3	0.30	0.37	0.30	45.2
11	T1	24	8.7	24	8.7	0.023	3.1	LOS A	0.0	0.3	0.30	0.37	0.30	39.7
12	R2	1	0.0	1	0.0	0.023	8.0	LOS A	0.0	0.3	0.30	0.37	0.30	39.7
12u	U	1	0.0	1	0.0	0.023	9.9	LOS A	0.0	0.3	0.30	0.37	0.30	49.6
Approach		27	7.7	27	7.7	0.023	3.6	LOS A	0.0	0.3	0.30	0.37	0.30	40.6
All Vehicles		317	9.0	317	9.0	0.106	4.7	LOS A	0.2	1.4	0.18	0.45	0.18	46.2

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 5 [Abell Road-Kaluta Avenue_ PM-2032 (Site Folder: 2032)]

Network: N101 [PM-2032-WEST PRECINCT (Network Folder: 2032)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	12	18.2	12	18.2	0.108	3.9	LOS A	0.2	1.9	0.35	0.55	0.35	42.0
2	T1	20	0.0	20	0.0	0.108	3.5	LOS A	0.2	1.9	0.35	0.55	0.35	35.2
3	R2	84	23.8	84	23.8	0.108	8.5	LOS A	0.2	1.9	0.35	0.55	0.35	35.2
3u	U	1	0.0	1	0.0	0.108	9.9	LOS A	0.2	1.9	0.35	0.55	0.35	44.5
Approach		117	18.9	117	18.9	0.108	7.2	LOS A	0.2	1.9	0.35	0.55	0.35	36.5
East: Abell Road														
4	L2	24	39.1	24	39.1	0.113	3.3	LOS A	0.2	1.6	0.14	0.45	0.14	42.3
5	T1	69	18.2	69	18.2	0.113	3.0	LOS A	0.2	1.6	0.14	0.45	0.14	45.8
6	R2	54	3.9	54	3.9	0.113	7.4	LOS A	0.2	1.6	0.14	0.45	0.14	38.9
6u	U	1	0.0	1	0.0	0.113	9.2	LOS A	0.2	1.6	0.14	0.45	0.14	38.9
Approach		148	16.3	148	16.3	0.113	4.7	LOS A	0.2	1.6	0.14	0.45	0.14	43.5
North: Kaluta Avenue														
7	L2	57	9.3	57	9.3	0.072	4.4	LOS A	0.1	1.0	0.43	0.54	0.43	44.1
8	T1	7	0.0	7	0.0	0.072	4.1	LOS A	0.1	1.0	0.43	0.54	0.43	46.8
9	R2	9	0.0	9	0.0	0.072	8.6	LOS A	0.1	1.0	0.43	0.54	0.43	47.5
9u	U	1	0.0	1	0.0	0.072	10.4	LOS A	0.1	1.0	0.43	0.54	0.43	44.1
Approach		75	7.0	75	7.0	0.072	4.9	LOS A	0.1	1.0	0.43	0.54	0.43	45.0
West: Abell Road														
10	L2	2	0.0	2	0.0	0.199	3.6	LOS A	0.4	3.0	0.32	0.43	0.32	42.0
11	T1	202	18.2	202	18.2	0.199	3.6	LOS A	0.4	3.0	0.32	0.43	0.32	42.0
12	R2	18	29.4	18	29.4	0.199	8.4	LOS A	0.4	3.0	0.32	0.43	0.32	45.9
12u	U	1	0.0	1	0.0	0.199	9.7	LOS A	0.4	3.0	0.32	0.43	0.32	48.5
Approach		223	18.9	223	18.9	0.199	4.0	LOS A	0.4	3.0	0.32	0.43	0.32	42.4
All Vehicles		563	16.6	563	16.6	0.199	5.0	LOS A	0.4	3.0	0.29	0.48	0.29	42.2

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [Elara Boulevard-John Black Drive - PM-2032 (Site Folder: 2032)]

Network: N101 [PM-2032-WEST PRECINCT (Network Folder: 2032)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: John Black Drive														
1	L2	111	1.9	111	1.9	0.618	11.4	LOS A	2.7	19.4	0.95	1.00	1.16	39.3
2	T1	277	1.9	277	1.9	0.618	11.5	LOS A	2.7	19.4	0.95	1.00	1.16	43.0
3	R2	54	3.9	54	3.9	0.618	15.4	LOS B	2.7	19.4	0.95	1.00	1.16	43.8
3u	U	5	0.0	5	0.0	0.618	16.8	LOS B	2.7	19.4	0.95	1.00	1.16	39.3
Approach		446	2.1	446	2.1	0.618	12.0	LOS A	2.7	19.4	0.95	1.00	1.16	42.4
East: Elara boulevard														
4	L2	106	0.0	106	0.0	0.671	10.7	LOS A	3.3	24.2	0.93	0.97	1.15	37.9
5	T1	262	10.4	262	10.4	0.671	11.2	LOS A	3.3	24.2	0.93	0.97	1.15	37.9
6	R2	163	5.8	163	5.8	0.671	14.8	LOS B	3.3	24.2	0.93	0.97	1.15	42.2
6u	U	7	0.0	7	0.0	0.671	16.2	LOS B	3.3	24.2	0.93	0.97	1.15	43.9
Approach		539	6.8	539	6.8	0.671	12.3	LOS A	3.3	24.2	0.93	0.97	1.15	39.7
North: John Black Drive														
7	L2	131	11.3	131	11.3	0.583	10.7	LOS A	2.4	17.6	0.91	0.93	1.06	42.3
8	T1	275	1.9	275	1.9	0.583	10.2	LOS A	2.4	17.6	0.91	0.93	1.06	35.5
9	R2	27	0.0	27	0.0	0.583	13.9	LOS A	2.4	17.6	0.91	0.93	1.06	35.5
9u	U	2	0.0	2	0.0	0.583	15.6	LOS B	2.4	17.6	0.91	0.93	1.06	42.5
Approach		435	4.6	435	4.6	0.583	10.6	LOS A	2.4	17.6	0.91	0.93	1.06	38.7
West: Elara boulevard														
10	L2	9	0.0	9	0.0	0.530	10.1	LOS A	1.9	14.7	0.89	0.94	1.03	43.0
11	T1	272	13.6	272	13.6	0.530	10.9	LOS A	1.9	14.7	0.89	0.94	1.03	44.4
12	R2	77	0.0	77	0.0	0.530	14.0	LOS A	1.9	14.7	0.89	0.94	1.03	40.6
12u	U	2	0.0	2	0.0	0.530	15.6	LOS B	1.9	14.7	0.89	0.94	1.03	40.6
Approach		360	10.2	360	10.2	0.530	11.6	LOS A	1.9	14.7	0.89	0.94	1.03	43.8
All Vehicles		1780	5.8	1780	5.8	0.671	11.7	LOS A	3.3	24.2	0.92	0.96	1.11	41.4

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 7 [Abell Road-John Black Drive - PM-2032 (Site Folder: 2032)]

Network: N101 [PM-2032-WEST PRECINCT (Network Folder: 2032)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Abell Road														
5	T1	253	10.8	253	10.8	0.462	3.5	LOS A	1.4	10.4	0.39	0.53	0.39	43.3
6	R2	333	2.8	333	2.8	0.462	7.7	LOS A	1.4	10.4	0.39	0.53	0.39	43.3
6u	U	12	18.2	12	18.2	0.462	9.7	LOS A	1.4	10.4	0.39	0.53	0.39	47.5
Approach		597	6.5	597	6.5	0.462	6.0	LOS A	1.4	10.4	0.39	0.53	0.39	43.5
North: John Black Drive														
7	L2	299	1.8	299	1.8	0.633	15.0	LOS B	2.9	20.6	1.00	1.12	1.34	42.1
9	R2	104	0.0	104	0.0	0.633	19.2	LOS B	2.9	20.6	1.00	1.12	1.34	36.6
9u	U	2	0.0	2	0.0	0.633	20.9	LOS B	2.9	20.6	1.00	1.12	1.34	36.6
Approach		405	1.3	405	1.3	0.633	16.1	LOS B	2.9	20.6	1.00	1.12	1.34	41.2
West: Abell Road														
10	L2	64	0.0	64	0.0	0.628	6.2	LOS A	2.1	16.9	0.68	0.74	0.77	38.1
11	T1	559	16.9	559	16.9	0.628	6.4	LOS A	2.1	16.9	0.68	0.74	0.77	46.1
12u	U	2	0.0	2	0.0	0.628	12.1	LOS A	2.1	16.9	0.68	0.74	0.77	38.1
Approach		625	15.2	625	15.2	0.628	6.4	LOS A	2.1	16.9	0.68	0.74	0.77	45.7
All Vehicles		1627	8.5	1627	8.5	0.633	8.7	LOS A	2.9	20.6	0.65	0.76	0.77	43.5

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 6 [Abell Road-Betula Parade - PM-2032 (Site Folder: 2032)]

Network: N101 [PM-2032-WEST PRECINCT (Network Folder: 2032)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Betula Parade														
1	L2	13	0.0	13	0.0	0.211	3.9	LOS A	0.4	3.4	0.40	0.62	0.40	36.6
2	T1	17	0.0	17	0.0	0.211	3.8	LOS A	0.4	3.4	0.40	0.62	0.40	45.5
3	R2	200	14.7	200	14.7	0.211	8.6	LOS A	0.4	3.4	0.40	0.62	0.40	36.6
3u	U	1	0.0	1	0.0	0.211	10.2	LOS A	0.4	3.4	0.40	0.62	0.40	44.9
Approach		231	12.8	231	12.8	0.211	8.0	LOS A	0.4	3.4	0.40	0.62	0.40	38.1
East: Abell Road														
4	L2	114	1.9	114	1.9	0.221	3.1	LOS A	0.5	3.4	0.16	0.43	0.16	44.8
5	T1	128	15.6	128	15.6	0.221	3.0	LOS A	0.5	3.4	0.16	0.43	0.16	41.1
6	R2	72	2.9	72	2.9	0.221	7.4	LOS A	0.5	3.4	0.16	0.43	0.16	48.1
6u	U	1	0.0	1	0.0	0.221	9.3	LOS A	0.5	3.4	0.16	0.43	0.16	41.1
Approach		315	7.7	315	7.7	0.221	4.1	LOS A	0.5	3.4	0.16	0.43	0.16	45.1
North: Betula Parade														
7	L2	75	7.0	75	7.0	0.134	6.3	LOS A	0.3	2.3	0.65	0.66	0.65	43.6
8	T1	29	0.0	29	0.0	0.134	6.1	LOS A	0.3	2.3	0.65	0.66	0.65	46.5
9	R2	5	0.0	5	0.0	0.134	10.6	LOS A	0.3	2.3	0.65	0.66	0.65	43.6
9u	U	1	0.0	1	0.0	0.134	12.4	LOS A	0.3	2.3	0.65	0.66	0.65	48.3
Approach		111	4.8	111	4.8	0.134	6.5	LOS A	0.3	2.3	0.65	0.66	0.65	44.6
West: Abell Road														
10	L2	2	0.0	2	0.0	0.330	4.2	LOS A	0.7	5.5	0.47	0.50	0.47	45.8
11	T1	331	17.8	331	17.8	0.330	4.4	LOS A	0.7	5.5	0.47	0.50	0.47	38.1
12	R2	7	0.0	7	0.0	0.330	8.6	LOS A	0.7	5.5	0.47	0.50	0.47	45.6
12u	U	1	0.0	1	0.0	0.330	10.4	LOS A	0.7	5.5	0.47	0.50	0.47	38.1
Approach		341	17.3	341	17.3	0.330	4.5	LOS A	0.7	5.5	0.47	0.50	0.47	38.5
All Vehicles		997	11.8	997	11.8	0.330	5.4	LOS A	0.7	5.5	0.38	0.52	0.38	41.9

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 7 [Elara Boulevard-Richmond Road-PM-2032 (Site Folder: 2032)]

Network: N101 [PM-2032-RICHMOND RD (Network Folder: 2032)]

PM peak - 2:30 - 3:30pm
Site Category: 2032 Conditions
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 135 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	951	4.9	832	5.2	0.691	14.3	LOS A	14.6	106.9	0.61	0.80	0.61	56.3
22	T1	1536	14.3	1339	14.3	* 1.150	198.6	LOS F	54.4	426.4	1.00	1.65	2.07	38.0
Approach		2486	10.7	2171 N1	10.8	1.150	128.0	LOS F	54.4	426.4	0.85	1.32	1.51	39.6
NorthWest: Richmond Road														
28	T1	1174	12.5	1174	12.5	0.748	19.3	LOS B	15.0	116.0	0.68	0.62	0.68	70.9
29	R2	323	6.8	323	6.8	* 1.173	237.4	LOS F	27.4	203.4	1.00	1.32	2.31	31.3
Approach		1497	11.3	1497	11.3	1.173	66.4	LOS E	27.4	203.4	0.75	0.77	1.03	55.1
SouthWest: Elara Boulevard														
30	L2	395	3.7	395	3.7	0.460	21.8	LOS B	7.9	57.4	0.64	0.75	0.64	68.7
32	R2	999	6.7	999	6.7	* 1.166	229.8	LOS F	51.4	380.6	1.00	1.45	2.25	3.7
Approach		1394	5.9	1394	5.9	1.166	170.9	LOS F	51.4	380.6	0.90	1.26	1.79	18.5
All Vehicles		5377	9.6	5062 N1	10.2	1.173	121.6	LOS F	54.4	426.4	0.83	1.14	1.45	38.2

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
P52	Stage 2	53	61.8	LOS F	0.2	0.2	0.96	0.96	221.5	207.6	0.94
NorthWest: Richmond Road											
P71	Stage 1	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
P72	Stage 2	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
SouthWest: Elara Boulevard											
P8	Full	53	61.8	LOS F	0.2	0.2	0.96	0.96	229.2	217.6	0.95
All Pedestrians		263	61.8	LOS F	0.2	0.2	0.96	0.96	224.5	211.6	0.94

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: 8 [Abell Road-Richmond Road-PM-2032 (Site Folder: 2032)]

Network: N101 [PM-2032-RICHMOND RD (Network Folder: 2032)]

PM peak - 2:30 - 3:30pm
Site Category: 2032 Conditions
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 155 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	1097	4.7	1097	4.7	0.741	13.2	LOS A	15.2	110.8	0.49	0.79	0.49	53.0
22	T1	1599	11.5	1599	11.5	* 1.249	283.8	LOS F	86.7	664.2	1.00	1.89	2.29	5.8
23	R2	477	24.9	477	24.9	* 1.234	269.2	LOS F	19.5	165.6	1.00	1.34	2.40	6.7
Approach		3173	11.1	3173	11.1	1.249	188.1	LOS F	86.7	664.2	0.82	1.43	1.68	9.8
NorthEast: Garfield Road														
24	L2	651	20.2	651	20.2	0.916	72.8	LOS F	13.7	112.3	1.00	1.02	1.28	20.8
25	T1	242	7.0	242	7.0	1.102	184.7	LOS F	9.3	68.5	1.00	1.19	2.01	8.0
26	R2	679	9.8	679	9.8	0.574	51.3	LOS D	12.8	97.2	0.88	0.83	0.88	10.5
Approach		1572	13.7	1572	13.7	1.102	80.7	LOS F	13.7	112.3	0.95	0.97	1.22	14.2
NorthWest: Richmond Road														
27	L2	489	13.1	459	13.4	1.227	290.8	LOS F	46.6	363.5	1.00	1.37	2.32	9.4
28	T1	1374	10.3	1288	10.5	1.266	304.5	LOS F	68.3	519.4	1.00	1.84	2.36	12.0
29	R2	42	17.5	40	18.0	0.339	84.7	LOS F	1.8	14.7	0.99	0.74	0.99	27.8
Approach		1905	11.2	1787 N1	11.4	1.266	296.1	LOS F	68.3	519.4	1.00	1.69	2.32	11.4
SouthWest: Abell Road														
30	L2	156	27.0	156	27.0	0.418	53.0	LOS D	6.2	53.4	0.90	0.86	0.90	17.3
31	T1	273	5.0	273	5.0	* 1.237	290.7	LOS F	13.6	99.0	1.00	1.45	2.45	5.3
32	R2	1363	7.4	1363	7.4	* 1.247	300.5	LOS F	75.8	564.5	1.00	1.58	2.34	8.1
Approach		1792	8.8	1792	8.8	1.247	277.5	LOS F	75.8	564.5	0.99	1.50	2.23	7.8
All Vehicles		8441	11.1	8323 N1	11.3	1.266	210.3	LOS F	86.7	664.2	0.92	1.41	1.85	10.1

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	71.8	LOS F	0.2	0.2	0.96	0.96	239.1	217.5	0.91
P52	Stage 2	53	71.8	LOS F	0.2	0.2	0.96	0.96	234.0	210.9	0.90
NorthEast: Garfield Road											
P6	Full	53	71.8	LOS F	0.2	0.2	0.96	0.96	252.1	234.4	0.93

P6B	Slip/ Bypass	53	71.8	LOS F	0.2	0.2	0.96	0.96	231.5	207.6	0.90
NorthWest: Richmond Road											
P71	Stage 1	53	71.8	LOS F	0.2	0.2	0.96	0.96	236.5	214.2	0.91
P72	Stage 2	53	71.8	LOS F	0.2	0.2	0.96	0.96	234.0	210.9	0.90
P7B	Slip/ Bypass	53	71.8	LOS F	0.2	0.2	0.96	0.96	228.9	204.3	0.89
SouthWest: Abell Road											
P8	Full	53	71.8	LOS F	0.2	0.2	0.96	0.96	252.1	234.4	0.93
All Pedestrians		421	71.8	LOS F	0.2	0.2	0.96	0.96	238.5	216.8	0.91

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: 1 [Elara Boulevard-Kaluta Avenue -AM- 2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [AM-2032 +Dev-WEST PRECINCT (Network Folder: 2032 + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	28	7.4	27	7.7	0.525	3.5	LOS A	1.4	10.0	0.59	0.63	0.59	37.0
2	T1	135	1.6	127	1.6	0.525	2.8	LOS A	1.4	10.0	0.59	0.63	0.59	38.3
3	R2	455	0.0	429	0.0	0.525	7.4	LOS A	1.4	10.0	0.59	0.63	0.59	39.2
3u	U	7	0.0	7	0.0	0.525	8.8	LOS A	1.4	10.0	0.59	0.63	0.59	35.4
Approach		625	0.7	590 N1	0.7	0.525	6.2	LOS A	1.4	10.0	0.59	0.63	0.59	38.9
East: Elara boulevard														
4	L2	77	9.6	77	9.6	0.271	1.7	LOS A	0.6	4.6	0.21	0.27	0.21	38.4
5	T1	226	1.9	226	1.9	0.271	1.0	LOS A	0.6	4.6	0.21	0.27	0.21	40.2
6	R2	49	4.3	49	4.3	0.271	5.7	LOS A	0.6	4.6	0.21	0.27	0.21	40.8
6u	U	24	91.3	24	91.3	0.271	7.8	LOS A	0.6	4.6	0.21	0.27	0.21	41.2
Approach		377	9.5	377	9.5	0.271	2.2	LOS A	0.6	4.6	0.21	0.27	0.21	40.1
North: Kaluta Avenue														
7	L2	64	8.2	64	8.2	0.128	3.7	LOS A	0.3	2.1	0.58	0.51	0.58	38.7
8	T1	52	4.1	52	4.1	0.128	3.0	LOS A	0.3	2.1	0.58	0.51	0.58	35.4
9	R2	1	0.0	1	0.0	0.128	7.6	LOS A	0.3	2.1	0.58	0.51	0.58	40.3
9u	U	1	0.0	1	0.0	0.128	9.1	LOS A	0.3	2.1	0.58	0.51	0.58	41.6
Approach		118	6.2	118	6.3	0.128	3.5	LOS A	0.3	2.1	0.58	0.51	0.58	38.0
West: Elara boulevard														
10	L2	1	0.0	1	0.0	0.052	4.9	LOS A	0.1	0.9	0.69	0.57	0.69	37.0
11	T1	35	6.1	35	6.1	0.052	4.5	LOS A	0.1	0.9	0.69	0.57	0.69	39.0
12	R2	1	0.0	1	0.0	0.052	8.9	LOS A	0.1	0.9	0.69	0.57	0.69	32.3
12u	U	1	0.0	1	0.0	0.052	10.4	LOS A	0.1	0.9	0.69	0.57	0.69	41.3
Approach		38	5.6	38	5.6	0.052	4.8	LOS A	0.1	0.9	0.69	0.57	0.69	38.9
All Vehicles		1158	4.3	1123 N1	4.4	0.525	4.5	LOS A	1.4	10.0	0.47	0.49	0.47	39.2

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

MOVEMENT SUMMARY

Site: 5 [Abell Road-Kaluta Avenue_ AM-2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [AM-2032 +Dev-WEST PRECINCT (Network Folder: 2032 + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	20	36.8	20	36.8	0.150	8.3	LOS A	0.4	2.8	0.77	0.75	0.77	34.4
2	T1	29	0.0	29	0.0	0.150	6.2	LOS A	0.4	2.8	0.77	0.75	0.77	28.3
3	R2	46	4.5	46	4.5	0.150	10.7	LOS A	0.4	2.8	0.77	0.75	0.77	28.3
3u	U	1	0.0	1	0.0	0.150	12.0	LOS A	0.4	2.8	0.77	0.75	0.77	36.7
Approach		97	9.8	97	9.8	0.150	8.9	LOS A	0.4	2.8	0.77	0.75	0.77	30.4
East: Abell Road														
4	L2	40	31.6	37	33.1	0.511	3.1	LOS A	1.5	11.1	0.45	0.51	0.45	35.5
5	T1	231	14.2	213	15.0	0.511	2.3	LOS A	1.5	11.1	0.45	0.51	0.45	37.7
6	R2	422	1.2	387	1.3	0.511	6.4	LOS A	1.5	11.1	0.45	0.51	0.45	32.0
6u	U	1	0.0	1	0.0	0.511	7.9	LOS A	1.5	11.1	0.45	0.51	0.45	32.0
Approach		694	7.3	639 N1	7.8	0.511	4.8	LOS A	1.5	11.1	0.45	0.51	0.45	35.0
North: Kaluta Avenue														
7	L2	204	1.0	204	1.0	0.289	2.9	LOS A	0.7	4.7	0.46	0.53	0.46	36.6
8	T1	17	12.5	17	12.5	0.289	2.6	LOS A	0.7	4.7	0.46	0.53	0.46	38.9
9	R2	103	0.0	103	0.0	0.289	6.7	LOS A	0.7	4.7	0.46	0.53	0.46	39.5
9u	U	1	0.0	1	0.0	0.289	8.1	LOS A	0.7	4.7	0.46	0.53	0.46	36.6
Approach		325	1.3	325	1.3	0.289	4.1	LOS A	0.7	4.7	0.46	0.53	0.46	37.9
West: Abell Road														
10	L2	112	0.0	112	0.0	0.329	3.9	LOS A	0.7	5.7	0.59	0.59	0.59	34.7
11	T1	151	24.5	151	24.5	0.329	3.9	LOS A	0.7	5.7	0.59	0.59	0.59	34.7
12	R2	29	32.1	29	32.1	0.329	8.4	LOS A	0.7	5.7	0.59	0.59	0.59	38.9
12u	U	1	0.0	1	0.0	0.329	9.1	LOS A	0.7	5.7	0.59	0.59	0.59	40.5
Approach		293	15.8	293	15.8	0.329	4.4	LOS A	0.7	5.7	0.59	0.59	0.59	35.3
All Vehicles		1408	7.8	1353 N1	8.2	0.511	4.9	LOS A	1.5	11.1	0.50	0.55	0.50	35.8

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

MOVEMENT SUMMARY

Site: 2 [Elara Boulevard-John Black Drive - AM- 2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [AM-2032 +Dev (Network Folder: 2032 + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: John Black Drive														
1	L2	108	6.8	108	6.8	0.960	46.7	LOS D	11.8	84.8	1.00	1.90	2.89	32.9
2	T1	361	2.0	360	2.0	0.960	46.4	LOS D	11.8	84.8	1.00	1.90	2.89	29.8
3	R2	173	4.3	172	4.3	0.960	50.3	LOS D	11.8	84.8	1.00	1.90	2.89	31.7
3u	U	2	0.0	2	0.0	0.960	51.6	LOS D	11.8	84.8	1.00	1.90	2.89	24.1
Approach		644	3.4	642 N1	3.4	0.960	47.5	LOS D	11.8	84.8	1.00	1.90	2.89	30.9
East: Elara boulevard														
4	L2	139	3.8	139	3.8	0.925	38.6	LOS C	9.2	69.0	1.00	1.74	2.55	24.5
5	T1	317	11.6	317	11.6	0.925	39.3	LOS C	9.2	69.0	1.00	1.74	2.55	34.4
6	R2	121	7.8	121	7.8	0.925	42.8	LOS D	9.2	69.0	1.00	1.74	2.55	30.8
6u	U	9	0.0	9	0.0	0.925	43.8	LOS D	9.2	69.0	1.00	1.74	2.55	33.2
Approach		586	8.8	586	8.8	0.925	39.9	LOS C	9.2	69.0	1.00	1.74	2.55	32.0
North: John Black Drive														
7	L2	174	3.0	174	3.0	1.445	424.7	LOS F	69.1	488.5	1.00	6.70	13.52	6.4
8	T1	526	0.4	526	0.4	1.445	424.6	LOS F	69.1	488.5	1.00	6.70	13.52	2.9
9	R2	77	2.7	77	2.7	1.445	428.5	LOS F	69.1	488.5	1.00	6.70	13.52	7.4
9u	U	9	0.0	9	0.0	1.445	430.0	LOS F	69.1	488.5	1.00	6.70	13.52	5.3
Approach		786	1.2	786	1.2	1.445	425.1	LOS F	69.1	488.5	1.00	6.70	13.52	4.2
West: Elara boulevard														
10	L2	84	2.5	84	2.5	1.617	574.4	LOS F	95.2	686.2	1.00	8.12	16.44	5.7
11	T1	577	5.1	577	5.1	1.617	574.5	LOS F	95.2	686.2	1.00	8.12	16.44	6.5
12	R2	242	0.0	242	0.0	1.617	578.1	LOS F	95.2	686.2	1.00	8.12	16.44	4.0
12u	U	2	0.0	2	0.0	1.617	579.7	LOS F	95.2	686.2	1.00	8.12	16.44	7.3
Approach		905	3.5	905	3.5	1.617	575.5	LOS F	95.2	686.2	1.00	8.12	16.44	5.8
All Vehicles		2922	3.9	2920 N1	3.9	1.617	311.3	LOS F	95.2	686.2	1.00	5.09	9.88	8.6

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

MOVEMENT SUMMARY

Site: 7 [Abell Road-John Black Drive - AM- 2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [AM-2032 +Dev (Network Folder: 2032 + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Abell Road														
5	T1	673	8.5	673	8.5	0.896	6.2	LOS A	7.2	52.9	0.97	0.67	1.03	41.6
6	R2	438	1.2	438	1.2	0.896	10.4	LOS A	7.2	52.9	0.97	0.67	1.03	41.6
6u	U	32	6.7	32	6.7	0.896	12.3	LOS A	7.2	52.9	0.97	0.67	1.03	46.5
Approach		1142	5.6	1142	5.6	0.896	8.0	LOS A	7.2	52.9	0.97	0.67	1.03	41.8
North: John Black Drive														
7	L2	672	0.8	478	1.0	1.130	158.0	LOS F	28.3	201.3	1.00	3.61	6.58	17.6
9	R2	214	3.4	153	4.5	1.130	162.6	LOS F	28.3	201.3	1.00	3.61	6.58	10.8
9u	U	5	0.0	4	0.0	1.130	164.0	LOS F	28.3	201.3	1.00	3.61	6.58	10.8
Approach		891	1.4	635 N1	1.9	1.130	159.1	LOS F	28.3	201.3	1.00	3.61	6.58	16.1
West: Abell Road														
10	L2	188	7.8	188	7.8	0.915	18.8	LOS B	7.7	57.8	1.00	1.37	1.83	26.6
11	T1	607	8.1	607	8.2	0.915	18.6	LOS B	7.7	57.8	1.00	1.37	1.83	39.4
12u	U	1	0.0	1	0.0	0.915	24.4	LOS B	7.7	57.8	1.00	1.37	1.83	26.6
Approach		797	8.1	796 N1	8.1	0.915	18.7	LOS B	7.7	57.8	1.00	1.37	1.83	37.7
All Vehicles		2829	5.0	2574 N1	5.5	1.130	48.6	LOS D	28.3	201.3	0.99	1.61	2.65	26.7

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

MOVEMENT SUMMARY

Site: 6 [Abell Road-Betula Parade - AM- 2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [AM-2032 +Dev (Network Folder: 2032 + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Betula Parade														
1	L2	52	4.1	52	4.1	0.455	7.9	LOS A	1.3	9.8	0.79	0.89	0.85	33.4
2	T1	42	0.0	42	0.0	0.455	7.7	LOS A	1.3	9.8	0.79	0.89	0.85	43.8
3	R2	269	7.4	269	7.4	0.455	12.5	LOS A	1.3	9.8	0.79	0.89	0.85	33.4
3u	U	1	0.0	1	0.0	0.455	14.0	LOS A	1.3	9.8	0.79	0.89	0.85	42.3
Approach		364	6.1	364	6.1	0.455	11.3	LOS A	1.3	9.8	0.79	0.89	0.85	35.8
East: Abell Road														
4	L2	193	7.7	176	8.2	0.571	3.5	LOS A	1.8	13.1	0.35	0.41	0.35	44.5
5	T1	627	7.6	572	8.1	0.571	3.3	LOS A	1.8	13.1	0.35	0.41	0.35	40.7
6	R2	49	0.0	45	0.0	0.571	7.8	LOS A	1.8	13.1	0.35	0.41	0.35	47.9
6u	U	2	0.0	2	0.0	0.571	9.6	LOS A	1.8	13.1	0.35	0.41	0.35	40.7
Approach		872	7.1	795 N1	7.7	0.571	3.6	LOS A	1.8	13.1	0.35	0.41	0.35	42.7
North: Betula Parade														
7	L2	98	4.3	98	4.3	0.195	7.4	LOS A	0.5	3.5	0.73	0.74	0.73	42.9
8	T1	40	0.0	40	0.0	0.195	7.2	LOS A	0.5	3.5	0.73	0.74	0.73	45.9
9	R2	7	0.0	7	0.0	0.195	11.7	LOS A	0.5	3.5	0.73	0.74	0.73	42.9
9u	U	1	0.0	1	0.0	0.195	13.5	LOS A	0.5	3.5	0.73	0.74	0.73	47.8
Approach		146	2.9	146	2.9	0.195	7.6	LOS A	0.5	3.5	0.73	0.74	0.73	43.9
West: Abell Road														
10	L2	7	0.0	7	0.0	0.406	4.7	LOS A	1.0	7.7	0.59	0.56	0.59	45.2
11	T1	354	11.9	353	11.9	0.406	4.8	LOS A	1.0	7.7	0.59	0.56	0.59	36.8
12	R2	41	0.0	41	0.0	0.406	9.0	LOS A	1.0	7.7	0.59	0.56	0.59	44.6
12u	U	1	0.0	1	0.0	0.406	10.9	LOS A	1.0	7.7	0.59	0.56	0.59	36.8
Approach		403	10.4	403	10.5	0.406	5.2	LOS A	1.0	7.7	0.59	0.56	0.59	38.4
All Vehicles		1785	7.3	1708 N 1	7.6	0.571	6.0	LOS A	1.8	13.1	0.53	0.58	0.54	40.5

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

MOVEMENT SUMMARY

Site: 7 [Elara Boulevard-Richmond Road-AM-2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [AM-2032 +Dev-RICHMOND RD (Network Folder: 2032 + Dev)]

AM peak - 7:45 to 8:45am
Site Category: 2032 Conditions + Dev
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 141 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	867	7.4	662	8.3	0.566	12.5	LOS A	9.1	68.4	0.47	0.75	0.47	57.9
22	T1	1340	11.7	1013	11.8	1.404	425.0	LOS F	60.9	467.5	1.00	2.04	3.01	23.7
Approach		2207	10.0	1674 N1	10.4	1.404	262.0	LOS F	60.9	467.5	0.79	1.53	2.01	25.6
NorthWest: Richmond Road														
28	T1	1234	11.8	1234	11.8	* 1.363	394.0	LOS F	75.4	581.5	1.00	2.13	2.90	21.7
29	R2	342	7.1	342	7.1	1.364	400.3	LOS F	39.2	291.1	1.00	1.54	2.93	22.2
Approach		1576	10.8	1576	10.8	1.364	395.4	LOS F	75.4	581.5	1.00	2.00	2.91	21.8
SouthWest: Elara Boulevard														
30	L2	591	3.7	591	3.7	0.533	14.8	LOS B	9.6	69.5	0.54	0.73	0.54	71.0
32	R2	1387	3.2	1387	3.2	* 1.362	398.2	LOS F	97.9	703.7	1.00	1.78	2.89	2.2
Approach		1978	3.4	1978	3.4	1.362	283.7	LOS F	97.9	703.7	0.86	1.46	2.19	12.9
All Vehicles		5761	7.9	5228 N1	8.7	1.404	310.4	LOS F	97.9	703.7	0.88	1.65	2.35	20.2

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
P52	Stage 2	53	64.8	LOS F	0.2	0.2	0.96	0.96	224.5	207.6	0.92
NorthWest: Richmond Road											
P71	Stage 1	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
P72	Stage 2	53	64.8	LOS F	0.2	0.2	0.96	0.96	227.0	210.9	0.93
SouthWest: Elara Boulevard											
P8	Full	53	64.8	LOS F	0.2	0.2	0.96	0.96	232.2	217.6	0.94
All Pedestrians		263	64.8	LOS F	0.2	0.2	0.96	0.96	227.5	211.6	0.93

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: 8 [Abell Road-Richmond Road-AM-2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [AM-2032 +Dev-RICHMOND RD (Network Folder: 2032 + Dev)]

AM peak - 7:45 to 8:45am
Site Category: 2032 Conditions + Dev
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	1309	4.7	1309	4.7	0.891	16.7	LOS B	27.3	199.2	0.73	0.88	0.73	50.7
22	T1	1388	10.5	1388	10.5	* 1.610	595.3	LOS F	97.7	740.3	1.00	2.45	3.52	3.0
23	R2	341	19.4	341	19.4	* 1.626	627.7	LOS F	24.4	199.2	1.00	1.76	3.69	3.4
Approach		3039	9.0	3039	9.0	1.626	349.6	LOS F	97.7	740.3	0.88	1.70	2.34	5.9
NorthEast: Garfield Road														
24	L2	609	23.8	609	23.8	0.997	116.8	LOS F	18.0	151.5	1.00	1.10	1.58	14.8
25	T1	245	10.3	245	10.3	0.778	74.6	LOS F	5.4	41.0	1.00	0.87	1.18	17.2
26	R2	633	12.5	633	12.5	0.481	38.1	LOS C	9.6	74.2	0.78	0.81	0.78	13.5
Approach		1487	16.8	1487	16.8	0.997	76.4	LOS F	18.0	151.5	0.90	0.94	1.17	14.9
NorthWest: Richmond Road														
27	L2	515	9.2	377	9.5	0.319	17.8	LOS B	6.3	47.8	0.44	0.73	0.44	53.3
28	T1	1838	8.0	1346	8.3	1.423	434.4	LOS F	81.3	607.1	1.00	2.19	3.03	8.9
29	R2	22	33.3	16	34.2	0.170	78.2	LOS F	0.7	6.2	0.98	0.70	0.98	29.0
Approach		2375	8.5	1739 N1	8.8	1.423	340.8	LOS F	81.3	607.1	0.88	1.86	2.45	10.3
SouthWest: Abell Road														
30	L2	121	7.8	121	7.8	0.248	29.3	LOS C	3.2	24.2	0.69	0.76	0.69	25.2
31	T1	516	5.1	516	5.1	* 1.587	582.9	LOS F	35.7	260.2	1.00	2.13	3.56	2.8
32	R2	2283	2.8	2283	2.8	* 1.647	644.1	LOS F	175.5	1258.0	1.00	2.25	3.64	4.1
Approach		2920	3.4	2920	3.4	1.647	607.8	LOS F	175.5	1258.0	0.99	2.17	3.51	3.9
All Vehicles		9821	8.4	9186 N1	9.0	1.647	385.8	LOS F	175.5	1258.0	0.92	1.76	2.54	6.0

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	64.3	LOS F	0.2	0.2	0.96	0.96	231.6	217.5	0.94
P52	Stage 2	53	64.3	LOS F	0.2	0.2	0.96	0.96	226.5	210.9	0.93
NorthEast: Garfield Road											
P6	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	244.6	234.4	0.96

P6B	Slip/ Bypass	53	64.3	LOS F	0.2	0.2	0.96	0.96	224.0	207.6	0.93
NorthWest: Richmond Road											
P71	Stage 1	53	64.3	LOS F	0.2	0.2	0.96	0.96	229.0	214.2	0.94
P72	Stage 2	53	64.3	LOS F	0.2	0.2	0.96	0.96	226.5	210.9	0.93
P7B	Slip/ Bypass	53	64.3	LOS F	0.2	0.2	0.96	0.96	221.4	204.3	0.92
SouthWest: Abell Road											
P8	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	244.6	234.4	0.96
All Pedestrians		421	64.3	LOS F	0.2	0.2	0.96	0.96	231.0	216.8	0.94

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: 1 [Elara Boulevard-Kaluta Avenue -PM- 2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [PM-2032 +Dev-WEST PRECINCT (Network Folder: 2032 + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	26	0.0	26	0.0	0.505	3.1	LOS A	1.3	9.3	0.55	0.60	0.55	37.1
2	T1	125	1.7	125	1.7	0.505	2.5	LOS A	1.3	9.3	0.55	0.60	0.55	38.4
3	R2	433	0.0	433	0.0	0.505	7.1	LOS A	1.3	9.3	0.55	0.60	0.55	35.5
3u	U	1	0.0	1	0.0	0.505	8.6	LOS A	1.3	9.3	0.55	0.60	0.55	40.0
Approach		585	0.4	585	0.4	0.505	6.0	LOS A	1.3	9.3	0.55	0.60	0.55	36.4
East: Elara boulevard														
4	L2	39	5.4	39	5.4	0.215	1.6	LOS A	0.5	3.4	0.16	0.28	0.16	39.4
5	T1	193	0.0	193	0.0	0.215	0.9	LOS A	0.5	3.4	0.16	0.28	0.16	40.2
6	R2	66	0.0	66	0.0	0.215	5.5	LOS A	0.5	3.4	0.16	0.28	0.16	40.8
6u	U	17	87.5	17	87.5	0.215	7.5	LOS A	0.5	3.4	0.16	0.28	0.16	38.4
Approach		315	5.4	315	5.4	0.215	2.3	LOS A	0.5	3.4	0.16	0.28	0.16	40.1
North: Kaluta Avenue														
7	L2	44	4.8	44	4.8	0.087	3.5	LOS A	0.2	1.4	0.56	0.49	0.56	35.5
8	T1	33	16.1	33	16.1	0.087	3.1	LOS A	0.2	1.4	0.56	0.49	0.56	39.5
9	R2	2	0.0	2	0.0	0.087	7.4	LOS A	0.2	1.4	0.56	0.49	0.56	40.3
9u	U	1	0.0	1	0.0	0.087	8.9	LOS A	0.2	1.4	0.56	0.49	0.56	41.7
Approach		80	9.2	80	9.2	0.087	3.5	LOS A	0.2	1.4	0.56	0.49	0.56	38.1
West: Elara boulevard														
10	L2	1	0.0	1	0.0	0.056	4.9	LOS A	0.1	0.9	0.69	0.56	0.69	37.0
11	T1	38	5.6	38	5.6	0.056	4.5	LOS A	0.1	0.9	0.69	0.56	0.69	32.4
12	R2	1	0.0	1	0.0	0.056	9.0	LOS A	0.1	0.9	0.69	0.56	0.69	39.6
12u	U	1	0.0	1	0.0	0.056	10.4	LOS A	0.1	0.9	0.69	0.56	0.69	41.3
Approach		41	5.1	41	5.1	0.056	4.8	LOS A	0.1	0.9	0.69	0.56	0.69	33.4
All Vehicles		1021	2.8	1021	2.8	0.505	4.6	LOS A	1.3	9.3	0.43	0.49	0.43	37.9

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 5 [Abell Road-Kaluta Avenue_ PM-2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [PM-2032 +Dev-WEST PRECINCT (Network Folder: 2032 + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kaluta Avenue														
1	L2	12	18.2	12	18.2	0.161	5.8	LOS A	0.4	3.1	0.68	0.72	0.68	34.8
2	T1	20	0.0	20	0.0	0.161	4.8	LOS A	0.4	3.1	0.68	0.72	0.68	37.0
3	R2	84	23.8	84	23.8	0.161	9.9	LOS A	0.4	3.1	0.68	0.72	0.68	28.9
3u	U	1	0.0	1	0.0	0.161	10.5	LOS A	0.4	3.1	0.68	0.72	0.68	37.2
Approach		117	18.9	117	18.9	0.161	8.6	LOS A	0.4	3.1	0.68	0.72	0.68	32.4
East: Abell Road														
4	L2	24	39.1	24	39.5	0.370	2.7	LOS A	0.9	6.9	0.34	0.52	0.34	35.3
5	T1	69	18.2	69	18.4	0.370	1.9	LOS A	0.9	6.9	0.34	0.52	0.34	37.5
6	R2	394	0.5	388	0.5	0.370	6.1	LOS A	0.9	6.9	0.34	0.52	0.34	38.6
6u	U	1	0.0	1	0.0	0.370	7.5	LOS A	0.9	6.9	0.34	0.52	0.34	31.7
Approach		488	5.0	482 N1	5.0	0.370	5.3	LOS A	0.9	6.9	0.34	0.52	0.34	38.3
North: Kaluta Avenue														
7	L2	156	3.4	156	3.4	0.257	3.7	LOS A	0.6	4.2	0.56	0.62	0.56	36.2
8	T1	7	0.0	7	0.0	0.257	3.2	LOS A	0.6	4.2	0.56	0.62	0.56	38.5
9	R2	91	0.0	91	0.0	0.257	7.5	LOS A	0.6	4.2	0.56	0.62	0.56	39.2
9u	U	1	0.0	1	0.0	0.257	8.9	LOS A	0.6	4.2	0.56	0.62	0.56	40.0
Approach		255	2.1	255	2.1	0.257	5.1	LOS A	0.6	4.2	0.56	0.62	0.56	37.6
West: Abell Road														
10	L2	104	0.0	104	0.0	0.439	4.5	LOS A	1.1	8.0	0.64	0.63	0.65	38.0
11	T1	278	13.3	278	13.3	0.439	4.3	LOS A	1.1	8.0	0.64	0.63	0.65	34.5
12	R2	18	29.4	18	29.4	0.439	9.0	LOS A	1.1	8.0	0.64	0.63	0.65	38.7
12u	U	1	0.0	1	0.0	0.439	9.7	LOS A	1.1	8.0	0.64	0.63	0.65	40.3
Approach		401	10.5	401	10.5	0.439	4.6	LOS A	1.1	8.0	0.64	0.63	0.65	36.2
All Vehicles		1261	7.4	1254 N1	7.5	0.439	5.3	LOS A	1.1	8.0	0.52	0.59	0.52	37.2

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

MOVEMENT SUMMARY

Site: 2 [Elara Boulevard-John Black Drive - PM- 2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [PM-2032 +Dev (Network Folder: 2032 + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: John Black Drive														
1	L2	111	1.9	110	1.9	0.692	15.5	LOS B	3.4	24.4	1.00	1.15	1.39	36.7
2	T1	277	1.9	277	1.9	0.692	15.5	LOS B	3.4	24.4	1.00	1.15	1.39	40.9
3	R2	54	3.9	54	3.9	0.692	19.4	LOS B	3.4	24.4	1.00	1.15	1.39	42.0
3u	U	5	0.0	5	0.0	0.692	20.8	LOS B	3.4	24.4	1.00	1.15	1.39	36.7
Approach		446	2.1	446	2.1	0.692	16.0	LOS B	3.4	24.4	1.00	1.15	1.39	40.2
East: Elara boulevard														
4	L2	106	0.0	106	0.0	0.846	23.1	LOS B	6.3	46.3	1.00	1.38	1.85	30.5
5	T1	312	8.8	312	8.8	0.846	23.7	LOS B	6.3	46.3	1.00	1.38	1.85	30.5
6	R2	163	5.8	163	5.8	0.846	27.3	LOS B	6.3	46.3	1.00	1.38	1.85	36.2
6u	U	7	0.0	7	0.0	0.846	28.6	LOS C	6.3	46.3	1.00	1.38	1.85	38.3
Approach		588	6.3	588	6.3	0.846	24.7	LOS B	6.3	46.3	1.00	1.38	1.85	32.6
North: John Black Drive														
7	L2	131	11.3	131	11.3	0.958	62.3	LOS E	9.9	72.0	1.00	1.95	3.10	24.9
8	T1	275	1.9	275	1.9	0.958	61.5	LOS E	9.9	72.0	1.00	1.95	3.10	14.8
9	R2	62	0.0	62	0.0	0.958	65.2	LOS E	9.9	72.0	1.00	1.95	3.10	14.8
9u	U	2	0.0	2	0.0	0.958	66.8	LOS E	9.9	72.0	1.00	1.95	3.10	22.8
Approach		469	4.3	469	4.3	0.958	62.3	LOS E	9.9	72.0	1.00	1.95	3.10	18.4
West: Elara boulevard														
10	L2	45	0.0	45	0.0	0.978	51.8	LOS D	13.8	101.0	1.00	2.07	3.22	29.0
11	T1	475	7.8	475	7.8	0.978	52.4	LOS D	13.8	101.0	1.00	2.07	3.22	31.2
12	R2	167	0.0	167	0.0	0.978	55.6	LOS D	13.8	101.0	1.00	2.07	3.22	24.3
12u	U	2	0.0	2	0.0	0.978	57.2	LOS E	13.8	101.0	1.00	2.07	3.22	24.3
Approach		689	5.3	689	5.3	0.978	53.1	LOS D	13.8	101.0	1.00	2.07	3.22	29.7
All Vehicles		2194	4.7	2194	4.7	0.978	39.9	LOS C	13.8	101.0	1.00	1.67	2.45	29.5

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 7 [Abell Road-John Black Drive - PM- 2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [PM-2032 +Dev (Network Folder: 2032 + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Abell Road														
5	T1	469	5.8	469	5.8	0.673	4.2	LOS A	2.6	19.1	0.64	0.57	0.64	42.9
6	R2	333	2.8	333	2.8	0.673	8.4	LOS A	2.6	19.1	0.64	0.57	0.64	42.9
6u	U	12	18.2	12	18.2	0.673	10.5	LOS A	2.6	19.1	0.64	0.57	0.64	47.2
Approach		814	4.8	814	4.8	0.673	6.0	LOS A	2.6	19.1	0.64	0.57	0.64	43.0
North: John Black Drive														
7	L2	380	1.4	380	1.4	1.065	115.6	LOS F	19.7	139.2	1.00	2.89	5.14	21.3
9	R2	184	0.0	184	0.0	1.065	119.8	LOS F	19.7	139.2	1.00	2.89	5.14	13.6
9u	U	2	0.0	2	0.0	1.065	121.5	LOS F	19.7	139.2	1.00	2.89	5.14	13.6
Approach		566	0.9	566	0.9	1.065	117.0	LOS F	19.7	139.2	1.00	2.89	5.14	19.1
West: Abell Road														
10	L2	99	0.0	99	0.0	0.771	8.3	LOS A	3.8	29.8	0.85	0.90	1.06	35.8
11	T1	666	14.2	666	14.2	0.771	8.5	LOS A	3.8	29.8	0.85	0.90	1.06	44.9
12u	U	2	0.0	2	0.0	0.771	14.2	LOS A	3.8	29.8	0.85	0.90	1.06	35.8
Approach		767	12.3	767	12.3	0.771	8.5	LOS A	3.8	29.8	0.85	0.90	1.06	44.4
All Vehicles		2147	6.5	2147	6.5	1.065	36.2	LOS C	19.7	139.2	0.81	1.30	1.98	30.6

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 6 [Abell Road-Betula Parade - PM- 2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [PM-2032 +Dev (Network Folder: 2032 + Dev)]

New Site
Site Category: Roundabout
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Betula Parade														
1	L2	55	0.0	55	0.0	0.309	5.7	LOS A	0.7	5.6	0.64	0.75	0.64	35.5
2	T1	17	0.0	17	0.0	0.309	5.6	LOS A	0.7	5.6	0.64	0.75	0.64	45.0
3	R2	200	14.7	200	14.7	0.309	10.6	LOS A	0.7	5.6	0.64	0.75	0.64	35.5
3u	U	1	0.0	1	0.0	0.309	12.0	LOS A	0.7	5.6	0.64	0.75	0.64	44.1
Approach		273	10.8	273	10.8	0.309	9.3	LOS A	0.7	5.6	0.64	0.75	0.64	36.8
East: Abell Road														
4	L2	114	1.9	112	1.9	0.429	3.3	LOS A	1.1	7.8	0.28	0.41	0.28	44.7
5	T1	426	4.7	419	4.8	0.429	3.2	LOS A	1.1	7.8	0.28	0.41	0.28	41.0
6	R2	72	2.9	70	3.0	0.429	7.7	LOS A	1.1	7.8	0.28	0.41	0.28	48.0
6u	U	1	0.0	1	0.0	0.429	9.5	LOS A	1.1	7.8	0.28	0.41	0.28	41.0
Approach		613	4.0	602 N1	4.0	0.429	3.7	LOS A	1.1	7.8	0.28	0.41	0.28	43.5
North: Betula Parade														
7	L2	75	7.0	75	7.0	0.175	8.0	LOS A	0.4	3.2	0.77	0.76	0.77	42.4
8	T1	40	0.0	40	0.0	0.175	7.7	LOS A	0.4	3.2	0.77	0.76	0.77	45.5
9	R2	5	0.0	5	0.0	0.175	12.2	LOS A	0.4	3.2	0.77	0.76	0.77	42.4
9u	U	1	0.0	1	0.0	0.175	14.0	LOS A	0.4	3.2	0.77	0.76	0.77	47.6
Approach		121	4.3	121	4.3	0.175	8.1	LOS A	0.4	3.2	0.77	0.76	0.77	43.7
West: Abell Road														
10	L2	2	0.0	2	0.0	0.480	4.4	LOS A	1.2	9.5	0.56	0.53	0.56	45.3
11	T1	474	12.4	474	12.4	0.480	4.5	LOS A	1.2	9.5	0.56	0.53	0.56	37.1
12	R2	39	0.0	39	0.0	0.480	8.8	LOS A	1.2	9.5	0.56	0.53	0.56	44.9
12u	U	1	0.0	1	0.0	0.480	10.7	LOS A	1.2	9.5	0.56	0.53	0.56	37.1
Approach		516	11.4	516	11.4	0.480	4.9	LOS A	1.2	9.5	0.56	0.53	0.56	38.2
All Vehicles		1522	7.7	1512 N1	7.8	0.480	5.5	LOS A	1.2	9.5	0.48	0.54	0.48	40.9

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

MOVEMENT SUMMARY

Site: 7 [Elara Boulevard-Richmond Road-PM-2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [PM-2032 +Dev-RICHMOND RD (Network Folder: 2032 + Dev)]

PM peak - 2:30 - 3:30pm
Site Category: 2032 Conditions + Dev
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 135 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	951	4.9	804	5.3	0.667	13.6	LOS A	13.1	96.0	0.57	0.79	0.57	56.9
22	T1	1536	14.3	1293	14.3	* 1.222	266.3	LOS F	61.1	479.1	1.00	1.86	2.43	32.1
Approach		2486	10.7	2098 N1	10.9	1.222	169.4	LOS F	61.1	479.1	0.83	1.45	1.72	34.0
NorthWest: Richmond Road														
28	T1	1174	12.5	1174	12.5	0.905	50.9	LOS D	28.1	217.9	0.94	0.99	1.13	59.9
29	R2	323	6.8	323	6.8	* 1.232	285.8	LOS F	30.4	225.4	1.00	1.40	2.55	27.9
Approach		1497	11.3	1497	11.3	1.232	101.6	LOS F	30.4	225.4	0.95	1.08	1.44	47.5
SouthWest: Elara Boulevard														
30	L2	409	3.6	409	3.6	0.446	19.6	LOS B	7.7	55.3	0.61	0.74	0.61	69.4
32	R2	1104	6.1	1104	6.1	* 1.194	252.5	LOS F	59.9	441.2	1.00	1.51	2.36	3.4
Approach		1514	5.4	1514	5.4	1.194	189.5	LOS F	59.9	441.2	0.89	1.30	1.88	16.7
All Vehicles		5497	9.4	5108 N1	10.1	1.232	155.5	LOS F	61.1	479.1	0.89	1.30	1.69	33.0

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
P52	Stage 2	53	61.8	LOS F	0.2	0.2	0.96	0.96	221.5	207.6	0.94
NorthWest: Richmond Road											
P71	Stage 1	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
P72	Stage 2	53	61.8	LOS F	0.2	0.2	0.96	0.96	224.0	210.9	0.94
SouthWest: Elara Boulevard											
P8	Full	53	61.8	LOS F	0.2	0.2	0.96	0.96	229.2	217.6	0.95
All Pedestrians		263	61.8	LOS F	0.2	0.2	0.96	0.96	224.5	211.6	0.94

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: 8 [Abell Road-Richmond Road-PM-2032+Dev (Site Folder: 2032 + Dev)]

Network: N101 [PM-2032 +Dev-RICHMOND RD (Network Folder: 2032 + Dev)]

PM peak - 2:30 - 3:30pm
Site Category: 2032 Conditions + Dev
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 155 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Richmond Road														
21	L2	1202	4.3	1202	4.3	0.809	14.7	LOS B	21.4	155.6	0.58	0.83	0.58	51.8
22	T1	1598	11.4	1598	11.4	* 1.354	374.5	LOS F	98.4	753.5	1.00	2.12	2.63	4.5
23	R2	477	24.9	477	24.9	* 1.302	327.8	LOS F	21.8	184.9	1.00	1.41	2.61	5.7
Approach		3277	10.8	3277	10.8	1.354	235.7	LOS F	98.4	753.5	0.84	1.54	1.87	8.1
NorthEast: Garfield Road														
24	L2	651	20.2	651	20.2	0.943	84.3	LOS F	15.1	124.0	1.00	1.06	1.35	18.9
25	T1	242	7.0	242	7.0	1.102	184.7	LOS F	9.3	68.5	1.00	1.19	2.01	8.0
26	R2	679	9.8	679	9.8	0.654	53.7	LOS D	13.4	101.6	0.91	0.85	0.91	10.1
Approach		1572	13.7	1572	13.7	1.102	86.5	LOS F	15.1	124.0	0.96	0.99	1.26	13.4
NorthWest: Richmond Road														
27	L2	489	13.1	446	13.5	1.168	242.7	LOS F	41.3	322.4	1.00	1.29	2.11	11.0
28	T1	1479	9.5	1346	9.9	1.260	298.6	LOS F	70.8	536.4	1.00	1.84	2.34	12.2
29	R2	42	17.5	39	18.3	0.330	84.7	LOS F	1.8	14.3	0.99	0.74	0.99	27.8
Approach		2011	10.6	1830 N1	11.0	1.260	280.5	LOS F	70.8	536.4	1.00	1.68	2.25	12.0
SouthWest: Abell Road														
30	L2	156	27.0	156	27.0	0.419	54.6	LOS D	6.2	53.3	0.90	0.86	0.90	16.8
31	T1	278	4.9	278	4.9	* 1.260	310.0	LOS F	14.4	104.4	1.00	1.48	2.52	5.0
32	R2	1438	7.0	1438	7.0	* 1.329	370.8	LOS F	88.5	656.8	1.00	1.71	2.61	6.7
Approach		1872	8.4	1872	8.4	1.329	335.5	LOS F	88.5	656.8	0.99	1.61	2.45	6.6
All Vehicles		8731	10.7	8550 N1	11.0	1.354	239.7	LOS F	98.4	753.5	0.93	1.48	1.97	9.1

Site Level of Service (LOS) Method: Delay (RTA NSW). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Richmond Road											
P51	Stage 1	53	71.8	LOS F	0.2	0.2	0.96	0.96	239.1	217.5	0.91
P52	Stage 2	53	71.8	LOS F	0.2	0.2	0.96	0.96	234.0	210.9	0.90
NorthEast: Garfield Road											
P6	Full	53	71.8	LOS F	0.2	0.2	0.96	0.96	252.1	234.4	0.93

P6B	Slip/ Bypass	53	71.8	LOS F	0.2	0.2	0.96	0.96	231.5	207.6	0.90
NorthWest: Richmond Road											
P71	Stage 1	53	71.8	LOS F	0.2	0.2	0.96	0.96	236.5	214.2	0.91
P72	Stage 2	53	71.8	LOS F	0.2	0.2	0.96	0.96	234.0	210.9	0.90
P7B	Slip/ Bypass	53	71.8	LOS F	0.2	0.2	0.96	0.96	228.9	204.3	0.89
SouthWest: Abell Road											
P8	Full	53	71.8	LOS F	0.2	0.2	0.96	0.96	252.1	234.4	0.93
All Pedestrians		421	71.8	LOS F	0.2	0.2	0.96	0.96	238.5	216.8	0.91

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.

Appendix D School Transport Plan

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School Transport Plan

Marsden Park New High School and Melonba New Primary School

Prepared for School Infrastructure NSW / 16 August 2022

221021 & 221022

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Your Partner in Engineering

Contents

1.0 Preface and Summary 3
2.0 Transport Goals 3
2.1 Guiding Principles 3
2.2 Mode Share Targets 4
3.0 Policies and Procedures 5
4.0 School Transport Operations 6
4.1 Site Transport Access 6
4.2 Active Transport 6
4.3 Public Transport 7
4.4 Service and Loading 7
4.5 Drop-off and Pick-up (Kiss & Ride) 8
4.6 Car Parking 9
5.0 Communication Plan 10
5.1 Channels 10
5.1.1 New Starter Kits 10
5.1.2 Periodic Reminders 10
5.1.3 School Website 10
5.2 Messages 10
5.3 Transport Access Guide 11
6.0 Data Collection 13
6.1 Data Collection 13
6.2 Program Evaluation 14
6.3 Reporting of Findings 14
7.0 Governance Framework 15
7.1 Travel Coordinator Roles and Responsibilities 15
7.2 Internal School Stakeholders 15
7.3 State and Local Government Stakeholders 16

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*This School Transport Plan has been prepared in accordance with the Green Building Council Australia (GBCA) technical advice **R-14426 Sustainable Transport**, which outlines the documentation required for SINSW project transport assessments.*

As required by that guidance, this School Transport Plan has also been prepared in accordance with SINSW's Transport Assessment template.

For the purposes of this SSDA submission, this School Transport Plan is preliminary in nature and is intended to be dynamic and respond to the future operation of the site. It is anticipated that this STP will be developed into a more comprehensive and detailed STP prior to commencement of operations of the new development. This document may also form a reference point for further development of new operational plans in the future.

1.0 Preface and Summary

A School Transport Plan (STP) is a way to sustainably manage the transport needs of staff, students, volunteers and visitors to a development. The aim of the Plan is to reduce the environmental impact of travel to and from the site and to provide a clear plan of management for vehicle and pedestrian movements within and around the site.

This preliminary STP has been prepared to support the development and future operation of the school, and to satisfy conditions of the SEARs issued by the Department of Planning, requiring the provision of a STP and strategies to improve infrastructure.

The project-specific STP for the Marsden Park High School and Melonba Primary School project aims to:

- Encourage students to walk or cycle where possible, using the highly walkable local catchments and improved infrastructure being provided by this project;
- Encourage students to catch public transport where possible, and safely manage the new bus zone facility on Kaluta Avenue;
- Ensure good operation of the new kiss & ride zones at Kaluta Avenue (for MPHS) and Swallowtail Street (for MPS); and
- Reduce the number of staff travelling by car to site and, when staff do choose to drive, reduce the impact of staff parking on the amenity of the local area.

2.0 Transport Goals

2.1 Guiding Principles

The overall principles guiding this STP are:

- Students achieve daily physical activity requirements through active travel to school;
- Prioritise multi-modal transport planning and infrastructure provision to school;
- Consult with transport stakeholders early and regularly;
- Install supporting infrastructure to the school and on-site;
- Minimise traffic disruption to the school and community during construction;
- Implement and commit to a visible, funded, feasible Travel Plan;
- Monitor and evaluate the School Transport Plan process to revise and improve the process to achieve outcomes; and
- Increase consistency and quality of deliverables.

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2.2 Mode Share Targets

The anticipated travel demands for the project are estimated as shown in Table 2.1 to Table 2.2. Mode splits are based on a combination of existing travel habits at comparable sites, plus anticipated travel habits based on the school catchments and the project's transport provisions. A more detailed explanation of how these targets were calculated in included in Section 4.2 of the TAIA report.

Table 2.1: Forecast Travel Mode Splits and Volumes – Primary School

Values may not add exactly to the totals shown due to rounding

	Students		Staff	
Travel mode	**Mode split**	**Volume**	**Mode split**	**Volume**
Walk	50%	500	5%	3
Bicycle / scooter	10%	100	5%	3
Bus	<1%	0	10%	7
Car (passenger)	40%	400	15%	10
Car (driver)	0%	0	65%	44
Total	**100%**	**1,000**	**100%**	**68**

Table 2.2: Forecast Travel Mode Splits and Volumes – High School

Values may not add exactly to the totals shown due to rounding

	Students		Staff	
Travel mode	**Mode split**	**Volume**	**Mode split**	**Volume**
Walk	25%	500	5%	8
Bicycle / scooter	5%	100	5%	8
Bus	50%	1,000	10%	15
Car (passenger)	20%	400	15%	23
Car (driver)	0%	0	65%	98
Total	**100%**	**2,000**	**100%**	**151**

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3.0 Policies and Procedures

The overall expectations of this STP are to:

- Increase active and public transport use to school
- Reduce rates of driving alone and kiss & ride to school
- Meet sustainability and Green Star requirements
- Manage risks

To work towards and achieve these expectations, the following policies and procedures are to be implemented at MPHS and MPS:

- **Multi-modal transport access is prioritised**
  - The project provides a total of 7 zebra crossings on the surrounding street network which will each provide pedestrian priority over vehicle traffic.
  - The project provides a dedicated bay for bus services operated by TfNSW.
- **Staggered start and finish times are provided**
  - To manage travel demands in the precinct, morning and afternoon bell times should be staggered between the primary school and high school.
  - Staggered bell times may also be considered for the supported education learning units (SELU) (subject to future assessment).
- **Multiple kiss & ride locations are provided**
  - To spread travel demands, kiss & ride facilities for MPHS are provided on Kaluta Avenue whilst facilities for MPS are provided on Swallowtail Street.
  - It is acknowledged that some families may choose to undertake kiss & ride activity in other local streets, which cannot readily be controlled.
- **On-site car parking is restricted**
  - Staff car parking is provided 65% of staff members (for the full capacity of the schools) which will encourage the remaining staff to find alternative methods of transport.
  - Staff are also to be encouraged to carpool to utilise the available parking spaces; an indicative 15% of staff carpooling would result in a total of 80% of staff (at the full capacity of the schools) being able to travel by private vehicle if required.
- **On-street car parking should not impact neighbours**
  - For any excess staff that still choose to drive, our staff should not impact our local community. Staff will be advised to park in locations that do not impact residents, such as along Galah Street or Pepperberry Parade.

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4.0 School Transport Operations

4.1 Site Transport Access

The overall site transport access points and provisions are illustrated in Figure 4.1.

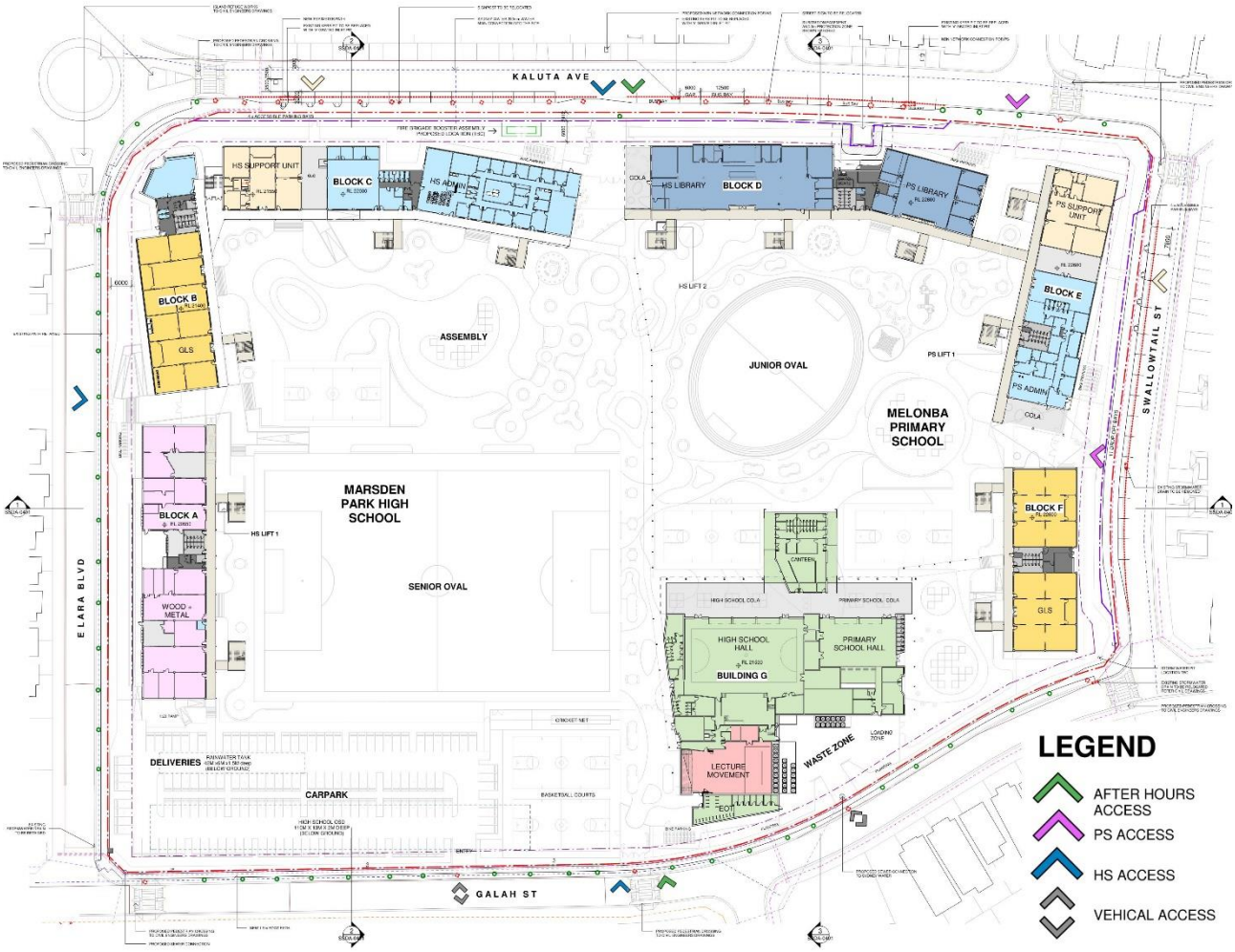


Figure 4.1: Proposed Site Plan
Source: NBRS Architecture, dated 11/08/22

4.2 Active Transport

Active transport modes include walking and cycling and other non-motorised means of transport. For the purposes of this Plan, active transport also considers pedestrian movements to and from vehicles at the pick-up and drop-off areas and movements to Elara Boulevard bus stops. These movements result in some level of conflict and crossover and therefore require safe management. For this reason, active transport is a higher priority mode than all other non-emergency movements.

Given the main pedestrian gates will be located across the three frontages at Elara Boulevard, Kaluta Avenue, and Swallowtail Street, one staff member is suggested to be appointed near each entry gate to manage and supervise the pedestrians' activity during the high school's peak travel periods.

Various organisations and groups develop programs and events to encourage active transport. For example, Bicycle Network coordinates a Ride2Work and Ride2School Day each year. These events provide a good

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opportunity for organisations to encourage staff and students to participate in cycling. Additionally, these initiatives create awareness and are useful for influencing the school community's travel behaviours. The school should investigate avenues to promote this event and encourage staff participation. An additional suggestion is to introduce incentives such as competitions or rewards.

Bicycle training workshops can also be a component of these programs to enable users to become familiar with bicycle maintenance, recommended cycling routes and general bicycle and road safety. Rideability is an example of a cycling education service that delivers workshops in schools with an emphasis on road safety and cycling skills.

Other health events encouraging active transport include Bike Week, Walk Safely to School Day and Health and Wellness Fairs. These initiatives expose staff and students to the many benefits of choosing active transport.

Annually hosting these events provides the community with a continual reminder and is therefore more likely to influence their behaviour.

4.3 Public Transport

The bus stops along Kaluta Avenue will operate as the main bus stops servicing the school.

The mixed frequency of the existing public bus services may discourage staff and students from using public transport, and more regular services or dedicated school services may be required. The increased demand for public transport may influence the service provider to create additional services. Travellers are more likely to utilise the bus system if services are frequent and reliable with short waiting times. This is a long-term action that the organisation should explore with the relevant service operator if deemed appropriate. This scheme has been discussed with Transport for NSW during preparation of the EIS.

For a comparison site at Cumberland High School, on average 60% of students are using bus services for arrival and departure. route. Such demand for public transport services by MPHS students in the future may impact and encourage the service provider to create additional services.

4.4 Service and Loading

Service and loading functions are a key component of the operation of the school. However, given the importance of other travel mode types, particularly the risk of other movements becoming unsafe or congested, service vehicles are considered the lowest priority transport type for the school site. Heavy rigid vehicles are the largest expected vehicle used for waste collection purposes, while medium rigid vehicles are expected for more regular services or deliveries.

For the MPHS delivery bay, service vehicles will enter the staff car park in a forward direction via Galah Street and utilise the car park circulating roadway to egress the site in a forward direction. Trucks staying on-site for any period of time are to park in the nominated waiting area, to avoid impacts to car park circulation. The final arrangements for internal movement of delivery and service vehicles will be finalised in the detailed design stage.

For the MPHS and MPS main waste collection and loading zone, service vehicles will enter the site via Galah Street.

All delivery and service trucks are to be fitted with reversing alarms, and should be fitted with cameras, to assist truck drivers in performing reverse manoeuvres and avoid any conflict with other vehicles such as parked cars. Given that deliveries are generally occurring outside of school hours, there is a minimal chance for any such conflict to occur. However, some deliveries may be required to occur during school hours. As a minimum safety requirement, delivery and service vehicles should be fitted with the above recommended safety features.

Wherever practical, all deliveries should be scheduled at least 15 minutes apart to avoid any conflicts and allow a buffer for unexpected delays. Additionally, deliveries are recommended to be scheduled outside of

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school peak hours either before 8:00am or after 4:00pm, or in the middle of the day between 9:30am and 2:30pm.

Other considerations for the scheduling of deliveries include:

- Consider having personnel available to marshal vehicles through the site for access to the main loading areas (to manage conflict and movements across the external pedestrian footpath)
- Nominated external personnel (if available) to be recorded and provided with induction information if necessary
- Relevant staff in departments or classrooms adjacent to loading areas to be advised of any scheduled activities which may be noisy or disruptive to classes.
- Once deliveries are completed, a record of deliveries is to be kept, to assist with future planning or any incidents which may occur.
- Vehicle size to be determined, and necessary traffic control measures to be considered if necessary and planned for within the scheduling system.
- Vehicle requirements (e.g. reversing alarms) are to be made clear to construction or delivery contractors.

4.5 Drop-off and Pick-up (Kiss & Ride)

Drop-off and pick-up facilities at schools can attract high volumes of private vehicles, with demands being generated in short periods of time in the morning and afternoon, creating risks of congestion in the road network.

To efficiently and safely manage the kiss & ride zones, the following management system is suggested:

- Staff member(s) to be stationed along the kiss & ride zone to assist students where required and to encourage sensible user behaviours. School staff are not traffic controllers or rangers, and are not expected to fill these roles, but can assist in the orderly operation of the facilities. As high school students are typically more independent, we would suggest that 1-2 staff may be appropriate at Kaluta Avenue, while 2 staff would likely be suitable at Swallowtail Street.
- Families to be provided with a label to identify their vehicle. This could be in the form of the family surname, or a unique identifying number. Labels should be readily mounted to be visible in the windscreen of the vehicle, such as underneath the sun visor or mirror.
- Kiss & ride zones to be divided with identifying markers, such as coloured cones. Markers should easy for staff to install and remove during each daily pick-up period.
- Staff member to be stationed near the entry point / arrival point to the kiss & ride zone to identify vehicles on or before arrival and relay this information to staff and students waiting to be collected. Students should be directed to the marked zone that their vehicle will arrive at (based on that vehicle's position in the queue). This will allow students to be in place before (or shortly after) their vehicle arrives, resulting in faster turnover.
- Any vehicle that occupies a kiss & ride space without a child boarding (i.e. child is delayed) should be directed to leave the kiss & ride zone and re-circulate back to the site, rather than occupying a space that other vehicles could be using.

A good reference site for this type of operation is Parramatta East Public School. The operation of the zone, including a 3-digit numbering system and the coloured location markers, is shown in Figure 4.2.

Good management of the kiss & ride facility is most important during the afternoon pick-up period. Typically, drop-off activity in the morning is more spread out and has a faster turnover rate, requiring less management.

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Figure 4.2: Kiss & Ride Management System at Parramatta East Public School

4.6 Car Parking

Travel by car for the purposes of car parking is considered a low-priority transport mode. While the demand volumes for car parking are high for this site location, the safety and sustainability of private vehicle travel result in this being a low priority mode. Nevertheless, to ensure safe operation of the site it is critical to manage the car parking in an efficient way, for example to allow staff to access the facility in a timely manner.

The provided off-street staff car park is only accessible via Galah Street. The car park is for the exclusive use of staff members. The car park is to be controlled with sliding gates at the entrance. This will require staff to have a parking pass in order to gain access to the car park.

A strategy to encourage staff to carpool involves a pairing system that notifies staff members of other staff who live in nearby areas or along their travel route. Initiating this system might involve a meeting to provide an opportunity for staff members to discuss carpooling options, including coordination of staff by local area. Off-the-shelf alternatives such as the Liftango app may also be an option for staff to utilise.

It is expected that the total demand for parking may exceed the on-site provision, however the proposed works provide significant improvements relative to the existing conditions of both schools.

Parking is provided for 65% of staff (at the ultimate capacity of the schools). Therefore, it is recommended that all on-site spaces are to be allocated to individual staff members. This will ensure orderly operation of the car park and to remove the need for any redundant circulation or traffic flows around the area (such as staff failing to find an on-site parking space and needing to re-circulate).

Staff committed to carpooling should be allocated priority parking spaces in a desirable area of the staff car park. This may act as an incentive for others to investigate carpooling opportunities. Priority spaces could also come with other benefits such as a prime location with good accessibility as a further encouragement. This is also expected to be a desirable option for staff given the constrained capacity on the site.

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5.0 Communication Plan

Safe and efficient management of the site will require all users to have a thorough understanding of operations and their responsibilities. Two key parts of this will be staff communications and student/parent communications. Communication strategies may include:

- Staff reminders / staff intranet information
- All regular contractors and delivery personnel to be advised of management strategies and requirements
- Staff road safety training seminars
- Student and parent newsletters
- Transport details on school website
- Direct advice to students/parents as required (e.g. responding to unsafe activities during pick-up times)
- Classroom education or extra-curricular transport safety activities (e.g. road safety or cycling courses) for younger students

5.1 Channels

5.1.1 New Starter Kits

To ensure new travellers have information regarding all their travel options, a Transport Access Guide should be provided. This brochure can easily be included as part of an induction or orientation package. This is especially important for travellers new to the area and who may be completely unfamiliar with the transport options.

5.1.2 Periodic Reminders

One method to enable periodic information sharing is to include a sustainable travel section within a school newsletter. The content may include details about new travel initiatives, mode share progress updates, upcoming events or changes, as well as reminding travellers about the importance of sustainable travel. It should also allow for feedback or questions regarding any travel-related concerns.

5.1.3 School Website

The school website is to be utilised to provide up-to-date transport information, and to provide a central source of information for students and parents. External visitors would also have access to the website.

5.2 Messages

Key points of information and typical messages to the school community could include:

- Transport goals, safety requirements, and parent expectations
- On-site bicycle storage areas and end-of-trip facilities
- School Student Transport Scheme (SSTS) and School Term Bus Pass availability
- Changes to local public transport routes (as they occur)
- Changes to local pedestrian and cyclist facilities (as the occur)
- Out of School Hours (OOSH) service start and end times
- Opal card reminders (to ensure students tap on and off even if public transport is free)
- Any available memberships or discounts
- How to contact the Travel Coordinator or governance committee

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5.3 Transport Access Guide

The aim of a Transport Access Guide is to present staff and students with information about the available safe and sustainable transport options in the local area. This action involves presenting this information in a simple and understandable manner through an educational brochure. Staff and students are more likely to change their travel behaviour after being made aware of the public and active transport options and how to safely and easily utilise these alternatives.

Recommendations for the brochure content includes bus routes (for staff travel, or for onward journeys for parents) and how to access these from the site. It should also include information about end-of-trip facilities and safe routes to surrounding neighbourhoods for staff and students able to participate in active transport.

Transport Access Guides can be distributed to staff, students and parents and can be developed in-house or by an external consultant. The brochure should also be accessible online through the school's website for visitors and ease of access.

A Transport Access Guide (or Travel Access Guide) should be developed according to the School Infrastructure template shown in Figure 5.1 and Figure 5.2.

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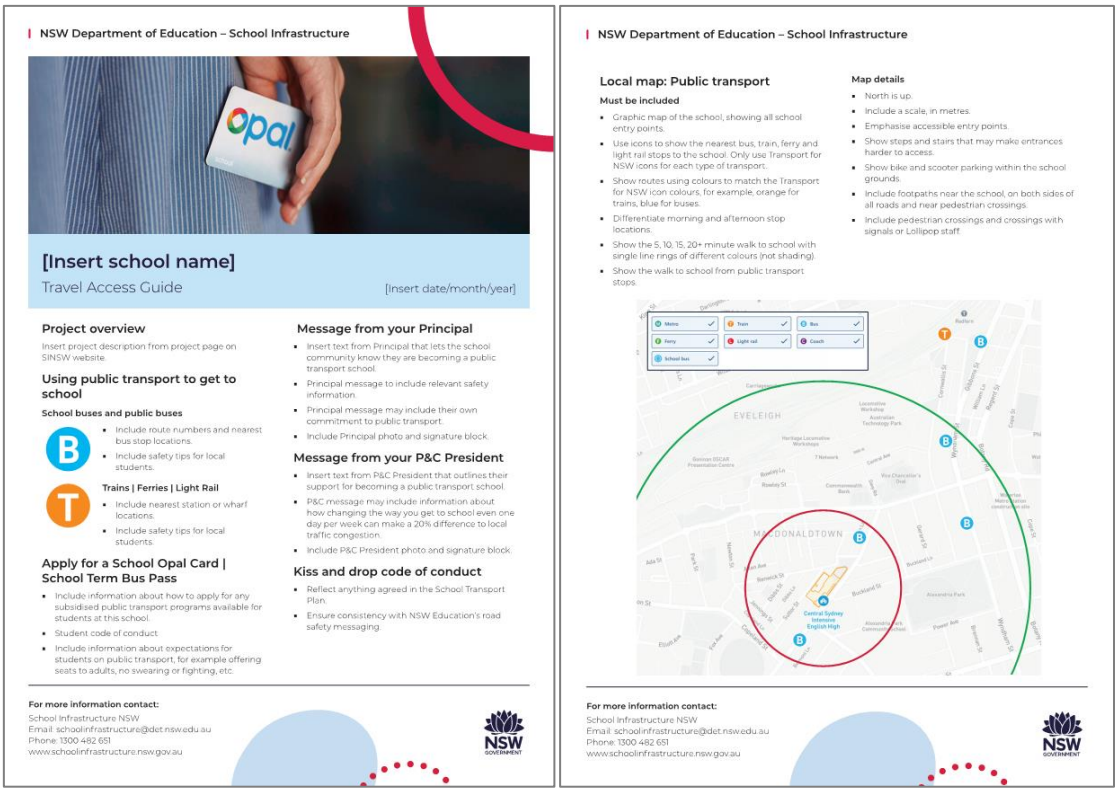


Figure 5.1: Travel Access Guide Public Transport Template

Source: School Infrastructure NSW

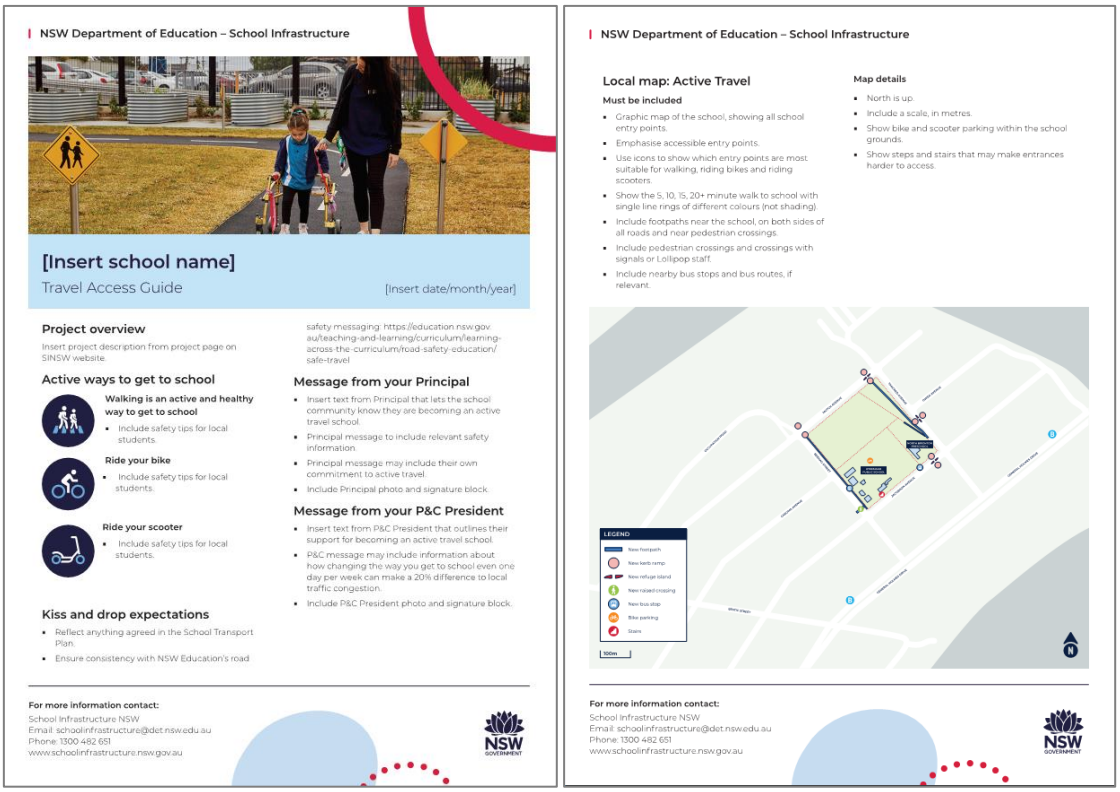


Figure 5.2: Travel Access Guide Active Transport Template

Source: School Infrastructure NSW

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6.0 Data Collection

A key component of STP success is program evaluation and ongoing improvement. This section includes consideration of how the schools and their communities will be able to adaptively respond to meet the STP goals over time.

6.1 Data Collection

The schools will collect the following data:

- Transport catchment
    - GIS analysis of the school catchment boundaries and current student locations should be undertaken whenever this STP is reviewed, using depersonalised student location data.
    - The school catchments should be assessed against the latest available public transport data available from TfNSW and the latest pedestrian and cyclist networks.
- Staff and student travel demand
    - Annual questionnaires should be undertaken to accurately determine travel habits and transport usage.
- Transport audits and travel data
    - From time to time, counts should be undertaken at the bus zone to review demand for individual bus services and to observe general operations. Feedback should be provided to TfNSW if necessary.
    - From time to time, counts and measurements should be undertaken at both kiss & ride zones (Swallowtail Street and Kaluta Avenue). Measurements should include average set-down times and total duration of operations. Observations should include any issues with queuing or problem points in the system.
    - From time to time, spot checks of staff car park capacity should be undertaken, to gain an understanding of trends in travel behaviour.
    - Whenever this STP is reviewed, pedestrian movement counts should be undertaken at all entry/exit points into the site, to accurately determine the spread of demand across the site and the local precinct.
- Transport events and initiatives
    - Where the schools host any transport events or initiatives (for example, a Ride 2 School Day), attendance rates at these events should be recorded. Data should differentiate between primary school students, high school students, and parents, if appropriate.
    - Where these events involve or are relevant to external authorities such as Council or TfNSW, consider consulting with these authorities about the types of data to be collected, or share data with them once collected.
- Digital communication strategies
    - Where available, data should be recorded on any available digital communication such as hit rates for travel articles on the school website, click-through of links provided through email or the school apps, or downloads of the Travel Access Guide.
    - Any digital communications that relate to specific events (for example, a Ride 2 School Day) should also include data collection that can correlate digital engagement to event attendance.

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6.2 Program Evaluation

The data collected as outlined in Section 6.1 shall be used to evaluate the STP performance as follows:

- Progress on mode share targets
    - The outcomes of annual questionnaires should be reviewed against the travel targets put forward in the most current revision of the STP at the time.
    - Where mode splits fall short of sustainability targets, initiatives and communications should be increased in these areas. Targets could be shifted to other sustainable travel modes if appropriate (for example, low uptake of cycling could be better addressed with higher public transport targets).
    - Where mode splits have been achieved beyond sustainability targets, these targets could be made more ambitious and some resources may be able to be re-directed to other areas.
- Bus network and operations
    - Usage of the bus zone, in particular the usage and demand for different bus routes, should be closely analysed with information provided to TfNSW for review. Services in high demand should be bolstered with additional services. Services with low demand may be able to be re-routed or adjusted to better suit the overall population.
- Car park occupancy and on-street parking spill over
    - Usage of the MPHS/MPS car park should be closely monitored, in order to understand demand for on-site car parking as the population of the school grows towards its full capacity.
    - Any usage of on-street parking should be monitored and reviewed with consideration of the locations being used. If residential areas are being impacted, the STP should be improved (and communications increased) to reduce potential parking impacts.
- Engagement with school transport articles and links
    - Varying types of articles and links should be reviewed for engagement and success. For example, “bite-sized” pieces of information might have more engagement with particular audiences or content, and longer form “articles” may have success in different areas.

6.3 Reporting of Findings

The STP and other associated documentation including the Travel Access Guide should be updated as required. It is recommended that this occur 12 months after opening of the new school, and then every 2 years. The review and reporting could include the following evaluations and outputs to stakeholders may include:

School data	School Infrastructure NSW	Students / parents	State / local government
• Annual update to dashboard • Compare results • Document progress or deficiencies during delivery • Results to communicate • Analyse policies, infrastructure, or programs to revisit	• Annual update to dashboard • Compare results • Document progress or deficiencies during delivery • Results to communicate • Analyse policies, infrastructure, or programs to revisit	• Issue report	• Issue verification • Issue resolution

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7.0 Governance Framework

7.1 Travel Coordinator Roles and Responsibilities

Transport programs must be implemented to achieve travel behaviour change. The school principal and teachers are not travel coordinators, so a dedicated role is required to implement and manage these programs.

A dedicated Travel Coordinator shall:

- Liaise with the School Principal as the nominated transport representative for the school
- Liaise with other internal stakeholders (see below)
- Coordinate communications and publications to staff and students as required
- Directly oversee implementation of transport programs where relevant
- Consult and engage external parties to implement transport programs where relevant
- Liaise with the Contractor prior to the construction phase to review and approve proposed construction traffic and access methodologies
- Liaise with the Contractor during the construction phase to maintain safe operations at and around the site

A dedicated Travel Coordinator is generally required for the duration of construction and the first year post-occupancy. This role is funded by the project during delivery. After this period, arrangements for this role are under discussions between School Infrastructure, the Department of Education, and Transport for NSW.

7.2 Internal School Stakeholders

The list of internal stakeholders to be consulted by the Travel Coordinator includes:

- School Principal
- Other school Executive Staff as relevant
- Road Safety Education Officer
- Asset Management
- Grounds Management
- WHS Representative
- P&C

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7.3 State and Local Government Stakeholders

The list of external stakeholders to be consulted by the Travel Coordinator includes:

- Blacktown City Council
- Transport for NSW
- Busways

In the event of external consultation being required, various state and local stakeholders have provided a nominated contact person, either for addressing concerns and comments or for providing alternative best contacts for a specific issue.

The nominated point of contact at **Blacktown City Council** is as follows:

- Name:
  - To be advised by Council for inclusion in post-approval documentation.
- Role:
  - TBC
- Phone:
  - TBC
- Email:
  - TBC

The nominated point of contact at **Transport for NSW** is as follows:

- Name:
  - To be advised by TfNSW for inclusion in post-approval documentation.
- Role:
  - TBC
- Phone:
  - TBC
- Email:
  - TBC

The nominated point of contact at **Busways** is as follows:

- Name:
  - To be advised by TfNSW / Busways for inclusion in post-approval documentation.
- Role:
  - TBC
- Phone:
  - TBC
- Email:
  - TBC

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Appendix E Background Traffic Growth Calculations

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RICHMOND ROAD INTERSECTIONS							
Intersection	**Link**	**AM PEAK**			**PM PEAK**		
		2021	**2031**	**% increase**	**2021**	**2031**	**% increase**
Elara Blvd / Richmond Rd	**N leg northbound**	917	1129	23%	1374	1432	4%
	N leg southbound	1152	1090	-5%	1004	1187	18%
	S leg northbound	946	1214	28%	1600	1878	17%
	S leg southbound	1705	1615	-5%	1044	1402	34%
	W leg eastbound	603	610	1%	92	317	245%
	W leg westbound	79	169	114%	279	548	96%
Abell Rd / Richmond Rd	**N leg northbound**	946	1214	28%	1600	1878	17%
	N leg southbound	1705	1615	-5%	1044	1402	34%
	S leg northbound	1341	1794	34%	2066	2305	12%
	S leg southbound	2173	2237	3%	1342	1835	37%
	W leg eastbound	86	-	-	56	-	-
	W leg westbound	820	-	-	635	780	23%
	E leg eastbound	693	1124	62%	731	1665	128%
	E leg westbound	695	1578	127%	632	1306	107%

WEST PRECINCT INTERSECTIONS							
Intersection	**Link**	**AM PEAK**			**PM PEAK**		
		2021	**2031**	**% increase**	**2021**	**2031**	**% increase**
Elara Blvd / John Black Dr	**N leg northbound**	-	-	-	-	-	-
	N leg southbound	0	0	0%	0	0	0%
	S leg northbound	5	4	-20%	0	4	-
	S leg southbound	-	-	-	-	-	-
	W leg eastbound	239	255	7%	27	95	252%
	W leg westbound	60	82	37%	79	227	187%
	E leg eastbound	240	256	7%	27	99	267%
	E leg westbound	60	84	40%	84	227	170%
Abell Rd / John Black Dr	**N leg northbound**	-	-	-	-	-	-
	N leg southbound	47	68	45%	17	10	-41%
	W leg eastbound	253	416	64%	37	206	457%
	W leg westbound	119	240	102%	244	559	129%
	E leg eastbound	295	478	62%	48	208	333%
	E leg westbound	108	257	138%	297	614	107%
Elara Blvd / Kaluta Ave	**N leg northbound**	40	50	25%	68	170	150%
	N leg southbound	108	122	13%	11	40	264%
	S leg northbound	0	7	-	0	0	0%
	S leg southbound	0	0	0%	0	14	-
	E leg eastbound	108	129	19%	11	40	264%
	E leg westbound	40	49	23%	68	183	169%
Abell Rd / Kaluta Ave	**N leg northbound**	0	6	-	0	0	-
	N leg southbound	0	0	-	0	2	-
	S leg northbound	-	-	-	-	-	-
	S leg southbound	-	-	-	-	-	-
	W leg eastbound	264	427	62%	39	234	500%
	W leg westbound	108	249	131%	243	579	138%
	E leg eastbound	264	421	59%	39	235	503%
	E leg westbound	109	250	129%	244	578	137%
Abell Rd / Betula Pde	**N leg northbound**	-	-	-	-	-	-
	N leg southbound	-	-	-	-	-	-
	S leg northbound	-	-	-	-	-	-
	S leg southbound	-	-	-	-	-	-
	W leg eastbound	264	421	59%	39	235	503%
	W leg westbound	109	250	129%	244	578	137%
	E leg eastbound	253	416	64%	37	206	457%
	E leg westbound	108	240	122%	244	559	129%

Average		**55%**	**227%**
Average across AM and PM periods	**139%**		

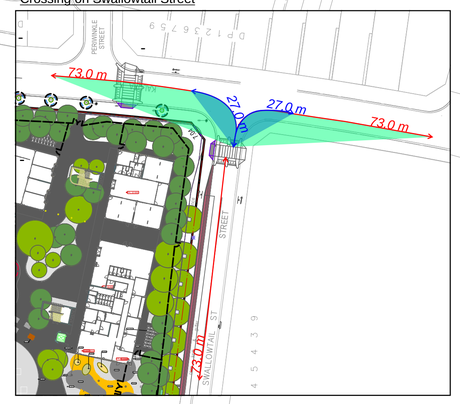
Appendix F Sight Distance Diagrams

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Northern crossing on Kaluta Avenue

Crossing on Swallowtail Street





0 10 20 30 40 50 60 70 80m

1:1000 A1 1:2000 A3

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Rev	Description	Eng	Draft	Date
P1	PRELIMINARY	MB	EC	24/01/23

Architect
NBRS ARCHITECTURE
4 GLEN STREET
MILSONS POINT
NSW 2061

Engineer
TTW Structural Civil Traffic Façade
612 9439 7288 | Level 6, 73 Miller Street, North Sydney, NSW 2060

Project
MARSDEN PARK HIGH SCHOOL & MELONBA PUBLIC SCHOOL

Sheet Subject
SIGHT DISTANCES

Scale : A1 1:1000 | Drawn EC | Authorised MB

Job No 221022 | Drawing No SK09 | Revision P1

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Rev	Description	Eng	Draft	Date
P1	PRELIMINARY	MB	EC	25/01/23

Architect
NBRS ARCHITECTURE
4 GLEN STREET
MILSONS POINT
NSW 2061

Engineer
TTW Structural Civil Traffic Façade
612 9439 7288 | Level 6, 73 Miller Street, North Sydney, NSW 2060

Project
MARSDEN PARK HIGH SCHOOL & MELONBA PUBLIC SCHOOL

Sheet Subject
SIGHT DISTANCES VEHICLE ACCESS POINTS

Scale : A1	Drawn	Authorised
1:1000	EC	MB

Job No	Drawing No	Revision
221022	SK10	P1

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