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Transport and Accessibility Impact Assessment

Hawkesbury Centre of Excellence

State Significant Development No. 15001460

Prepared for School Infrastructure NSW c/o Richard Crookes Construction

Revision 5.1

29 October 2021

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Executive Summary

This Transport and Accessibility Impact Assessment (TAIA) assesses the traffic and transport impacts and design elements of the proposed Hawkesbury Centre of Excellence (CoE) located within the Western Sydney University (WSU) campus in Richmond. The CoE is expected to provide capacity for up to a 325 students and 20 full-time employees including farm assistants, administration staff, teachers and up to 5 itinerant staff member, on-site accommodation facilities for up to 62 visiting students and teaching professionals from regional and rural NSW, and educational program and occasional school-related events visitors.

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

- **Pedestrians**
    - Minimal demand expected; provide connectivity to bus services and to local network
- **Cyclists**
    - Minimal demand expected; provide on-site storage
- **Public transport**
    - Strong demand expected by bus and rail; bus connectivity to train stations required due to long walking distance
    - On-site bus bay to be constructed along Vines Drive within WSU campus
- **Freight & deliveries**
    - Agricultural vehicles accommodated within the site for specialty purposes
- **Kiss & ride**
    - Minimal demand expected; on-site provision for car and bus access to be operated at separate times
- **Car parking**
    - Reasonable demand expected; on-site provision within the CoE for general usage, and shared parking with WSU for peak usage

This overall strategy has been proposed to, and discussed with, both Council and Transport for NSW (TfNSW) during ongoing liaison through a Transport Working Group (TWG) for the project. The TWG has met a number of times since March 2021, and the project has refined the transport strategy during that period in response to feedback received.

Due to the unique nature of the CoE, comprising a specialist non-catchment school and serving external visitors from Sydney and NSW schools, pedestrian and cyclist mode share is anticipated to be low. Nevertheless, new pedestrian facilities are proposed within the WSU campus to provide access to the external road network, and new facilities to cross Londonderry Road to northbound bus services and the Hobartville area via a signalised pedestrian crossing at Londonderry Road. On-site bicycle storage would be provided in accordance with the NSW Department of Education's *Educational Facilities Standards & Guidelines* (EFSG).

Public transport accessibility will be improved through construction of new bus bays on Vines Drive within Western Sydney University campus, as bus services from this interchange to Richmond and Penrith train stations forms a key part of the transport strategy for the site. It has been discussed and agreed with TfNSW during the TWG process that the provision of additional services for the CoE appears feasible for regularly scheduled services, subject to enrolment numbers and scheduling times being confirmed. Future consultation will be required with TfNSW during the life of the project once enrolment grows and demand can be demonstrated.

An on-site vehicle area is provided which will cater for kiss & ride during school peak periods and will be sized to cater for private bus/coach services to the site for program and occasional school-related events visitors (outside peak times). Due to the nature of the non-catchment school, it is not expected that kiss & ride would be the most appealing mode of transport for most users, however the capacity is provided for.

Finally, car parking is considered the lowest priority mode, which is in accordance with state government policy such as the Road User Space Allocation Policy (TfNSW, January 2021) and other guidelines. By considering the combination of train (with connecting bus) and bus/coach services, a low car parking demand is expected

for students and program visitors, however it is anticipated that car will be a highly used mode for school staff and for occasional school-related events visitors. Typical daily car parking demands are accommodated within the CoE car park. Peak demands such as occasional school-related events would be met by utilizing available parking within the WSU campus, which is shown to have good current availability and would occur during off-peak times for the University.

To safely accommodate the additional transport demands to the site particularly pedestrian movements, a concept design was previously presented in the original EIS submission at the intersection of Vines Drive and Londonderry Road that includes a signalised pedestrian crossing on Londonderry Road, and new bus stops on Londonderry Road south of Vines Drive. However, a new traffic solution is proposed which aligns to TfNSW's request during the EIS Submissions phase to accommodate buses into WSU campus Vines Drive. The new concept design presented in this revised Transport and Accessibility Impact Assessment for the Response to Submissions includes a widening of Vines Drive to facilitate bus movements into the WSU campus, bus layby along Vines Drive and upgrade of Vines Drive-Maintenance Lane (within the WSU campus) intersection to a roundabout.

This concept design would act as an interim solution until the implementation of TfNSW's works for Southee Road and Vines Drive. TfNSW has advised that the works under the current preferred corridor option would not be completed until 2026/27, which is in Stage 2 of a two-stage project. It is recommended that consultation continue following the approval of the Centre of Excellence development to assess the viability of any staged solutions. The proposed works on Vines Drive would not preclude any of TfNSW's proposed works taking place, and would interface with those works when completed.

Following approval of this SSD project, it is anticipated that a Construction Traffic Management Plan and School Transport Plan would be fully developed prior to construction and operation of the CoE respectively. Preliminary versions of these documents have been provided as part of this TAIA. The final documents and other detailed design elements can be finalised as a condition of development consent.

The proposed development is deemed suitable on consideration of the traffic and transport elements of the site and its surrounds, and the transport strategy proposed for its management.

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Revision Register

Rev	Date	Remarks	Prepared By	Reviewed By	Approved By
0	09/04/2021	Draft for comment	N. Borja	M. Babbage	-
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2	03/06/2021	Revised issue for SSDA	N. Borja	M. Babbage	P. Yannoulatos
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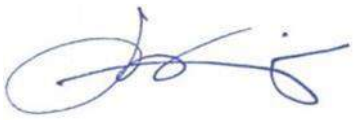		
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in its capacity as trustee for the
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1 Introduction

1.1 Background

School Infrastructure NSW (SINSW) is proposing to construct an agricultural Centre of Excellence with the existing Hawkesbury campus of Western Sydney University (WSU) in Richmond. The development proposes to cater for regular students from Richmond Agricultural College, daily visitors on agricultural programs from other NSW schools, on-site accommodation for visiting students and teaching professionals, and event and occasional school-related events facilities.

Taylor Thomson Whitting (TTW) has been engaged by NBRS Architecture and Richard Crookes Constructions to provide traffic engineering consultancy services for the proposed Hawkesbury Centre of Excellence development. This transport and accessibility impact assessment (TAIA) has been prepared in support of a state significant development application (SSD-15001460) for the proposal 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.

1.2 Scope

This TAIA has been developed to assess and address the traffic and transport impacts of the proposed development. This report covers the following areas:

- Site access
- Car parking
- Public and active transport
- Pick-up and drop-off
- Service vehicles and loading
- Traffic generation
- Travel mode analysis

A School Transport Plan has been prepared and included as part of this document. These plans are considered preliminary in nature for the purposes of the SSDA and would be finalised post-approval as a condition of consent (or consolidated in the School Transport Plan).

1.3 Guidelines and References

This report has been prepared in the context of and with knowledge of a variety of relevant documents, standards, and guidelines:

- Australian Standards, including but not limited to:
  - AS2890 – Parking facilities
- Austroads Guidelines, including but not limited to:
  - Guide to Road Design
  - Guide to Road Safety
  - Guide to Traffic Management
- RMS Guides to Traffic Generating Developments, including:
  - Roads and Maritime Service Trip Generating Surveys – Schools – Analysis Report (GTA, 25 August 2014)
- Road User Space Allocation Policy (TfNSW, January 2021)

Additional documentation reviewed from relevant local jurisdictions includes:

- Hawkesbury Development Control Plan 2002 (DCP 2002)
- Hawkesbury Local Environmental Plan 2012 (LEP 2012)
- Educational Facilities Standards & Guidelines (EFSG)

1.4 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, Hawkesbury City Council (Council) and Transport for NSW (TfNSW) as relevant. Consultation events and outcomes occurred as follows:

- **16 March 2021**
  - The meeting included representatives from Council and TfNSW.
  - The project was introduced to the Transport Working Group, and the overall strategic concept transport options.
  - Key feedback included queries about the site operation, student transport strategy, and discussions of proposed traffic studies.
  - The project team noted that the Richmond Bridge duplication project was awaiting finalisation of a Preferred Option Report due in "early 2021", noting that one of the corridor options was along Londonderry Road outside the WSU site. TfNSW advised that this was still under investigation with no preferred option.
- **13 April 2021**
  - The meeting included representatives from Council and TfNSW.
  - Detailed information was provided outlining the operational modes for the site.
  - A revised transport strategy was presented and discussed. A concept proposal for a left-out restriction at Vines Drive was presented and discussed, and further detail was requested. Operation of public and/or school bus services was discussed, and overall seemed to be a workable solution.
  - Key feedback included data requirements for provision of bus services (enrolment and scheduling), clarification of public bus servicing requirements (e.g. road width), and closing out of most travel mode strategies (private bus, car, kiss & ride, pedestrians, and cyclists).
- **26 April 2021**
  - Formal written advice was received from Council.
  - The primary advice was in relation to Southee Road and Vines Drive, expressing concern on a right-turn ban from Southee Road and recommending a realignment of Vines Drive to meet Southee Road.
  - Additional comments were provided relating to school operations, WSU enrolment levels and associated traffic/parking demands, and traffic study details.
- **27 April 2021**
  - The meeting included representatives from Council and TfNSW.
  - A response to Council's overall comments from 26 April was provided, with additional response information to be provided directly or in this EIS. A response to Council's specific comments on the Vines Drive realignment was provided, noting that the proposed design response addresses each of Council's comments.
  - A developed concept design for the Vines Drive left-out intersection (including dedicated right-turn lane and bus bays) was presented and discussed. It was clarified that no right-turn ban at Southee Road is proposed.
  - Key feedback included a request for more detailed design drawings and recommending that a Road Safety Audit be undertaken. Council reiterated their recommendation that a realignment of Vines Drive would be preferred. We maintain that all concerns are addressed by the EIS concept proposal.
- **17 June 2021**
  - The meeting included representatives from Council and TfNSW.
  - TfNSW introduced and presented their preferred corridor and concept design for Richmond Bridge duplication project which had been recently announced.
  - TfNSW advised that the intersection upgrades for Londonderry Road / Vines Drive are currently planned for 2026. The project team noted that the opening date of the Centre of Excellence is the start of 2023.
- **24 June 2021**
  - The meeting included representatives from Council and TfNSW.

  - TfNSW noted that the SSDA application would need to propose an interim design for the intersection, as funding for the bridge duplication alignment/design is not yet available. Timeline of the projects also does not align.
  - The project team noted that due to the scale of the two projects, the SSDA would provide traffic modelling for the development (and a reasonable forecast timeline) only and would not undertake modelling for the bridge duplication project changes.
- **8 July 2021**
  - The meeting included representatives from TfNSW.
  - The project team presented a concept proposal for a signalised T-intersection at Vines Drive. TfNSW noted that the approval and construction process for traffic signals may take up to 18 months.
  - The meeting attendees discussed that there may be further consultation and discussion around project timelines, staging, cost sharing, and reduction of abortive works.
- **27 July 2021**
  - The meeting included representatives from Council and TfNSW.
  - A revised transport strategy was presented and discussed. A concept proposal was presented and discussed. The concept proposal includes maintaining the existing Londonderry Road – Vines Drive giveway intersection, a signalised pedestrian crossing at Londonderry Road south of Vines Drive.
  - TfNSW advised that due to the nature of the road corridor, a raised zebra crossing would be unlikely to be feasible / acceptable in this

Following exhibition of the Environmental Impact Statement (see Section 1.6) and the relevant submissions from Council and TfNSW, an additional meeting was held with Transport for New South Wales.

- **14 October 2021**
  - The meeting included Transport for NSW.
  - The concept proposal presented and discussed includes maintaining the existing Londonderry Road-Vines Drive giveway intersection, widening of Vines Drive and buses to access the Western Sydney University Campus with bus layby provision along Vines Drive and roundabout at Vines Drive-Maintenance Lane.
  - TfNSW has expressed no objections to the concept proposal presented.

Full details and minutes of the relevant agency consultation is attached in **Appendix A** of this document.

1.5 Response to SEARs

Under application number SSD 15001460 we have been provided with Secretary's Environmental Assessment Requirements (SEARs). These requirements were issued on the 19 March 2021 following consultation with the relevant agencies. The key issues relevant to a Transport and Accessibility Impact Assessment include those shown in Table 1.1 and have been addressed in various sections of this report as referenced.

Table 1.1: Response to SEARs

	Key items	Comments and references
4	**Transport and Accessibility** **Include a transport and accessibility impact assessment, which includes, but not limited to the following:**	
4.1	**Analysis of the existing (and proposed/ future) transport network, including:**	
	• Road hierarchy.	*Section 2.2 – Road Network*
	• Pedestrian, cycle and public transport infrastructure.	*Section 2.3 – Public Transport* *Section 2.4 – Active Transport*
	• Details of current daily and peak hour vehicle movements based on traffic surveys and / or existing traffic studies relevant to the locality	*Section 2.7 – Network Performance*

	Key items	Comments and references
	• Existing transport operation for 1hr before and after (existing or proposed) bell times such as span of service, frequency for public transport and school buses, pedestrian phasing for signals.	*Section 2.3 - Public Transport*
	• Existing performance levels of nearby intersection utilising appropriate traffic modelling methods (such as SIDRA network modelling).	*Section 2.8 – Intersection Analysis*
4.2	**Details of the proposed development, including:**	
	• A map of the proposed access which identifies public roads, bus routes, footpaths and cycleways.	*Section 3.1 – Overall Works* *Section 3.2 – Transport Context*
	• Pedestrian site access and vehicular access arrangements, including for service and emergency vehicles and loading/unloading, including swept path analysis (complying with Australian Standards) demonstrating the largest design vehicle entering and leaving the site and moving in each direction through intersections along the proposed transport routes.	*Section 3.4 – Site Access*
	• Car parking, bicycle parking and end-of-trip facilities	*Section 3.8 – Car Parking* *Section 4.6 - Cyclist Facilities*
	• Bicycle parking and end-of-trip facilities, including number of spaces and compliance with the appropriate codes and standards.	*Section 4.6 – Cyclist Facilities*
	• Drop-off /pick-zone(s) and bus bay(s)	*Section 3.7 – Pick-up and Drop-off* *Section 3.6 – Bus Zones*
	• Pedestrian or road infrastructure improvements or safety measures.	*Section 3.9 – Infrastructure and Safety Improvements*
4.3	**Analysis of the impacts due to the operation of the proposed development, including:**	
	• Proposed model split for all users of the development including vehicle, pedestrian, cyclist, public transport and other sustainable travel modes.	*Section 4.1 – Travel Mode*
	• Where necessary, the need/associated funding for upgrading or road improvement works (such as the alignment of the Londonderry Road and Southee Road/Vines drive intersection) at nearby intersections to ensure traffic safety.	*Section 3.9 – Infrastructure and Safety Improvements*
	• examination and modelling (but not limited to) of the following intersections: ✓ Londonderry Road at Vines Drive and Southee Road. ✓ Lennox and Paget Street. ✓ Blacktown Road at Bourke Street and Campus Drive	*Section 4.3 - Future Traffic Condition*
	• Estimated total daily and peak hour vehicular trip generation.	*Section 3.2 – School Operation*

	Key items	Comments and references
	• A clear explanation and justification of the: ✓ Assumed growth rate applied. ✓ Volume and distribution of proposed trips to be generated.	*Section 4.1 – Travel Mode* *Section 4.2 – Trip Distribution*
4.4	**Type and frequency of vehicles accessing the site.**	
	• Details of performance of nearby intersections with the additional traffic generated by the development by the development both at the commencement of operation and in a 10-year time period (using SIDRA network modelling).	*Section 4.3 – Future Traffic Condition*
	• Cumulative traffic impacts from any surrounding approved development(s).	*Section 6.2.4 – Cumulative Impacts*
	• Adequacy of pedestrian, bicycle and public transport infrastructure to accommodate the development.	*Section 4.4 – Public Transport* *Section 4.5 – Pedestrian Infrastructure* *Section 4.6 – Cyclist Infrastructure* *Section 4.9 – Bus Zones*
	• Adequacy of car and motorcycle parking and bicycle parking provisions for the site and the wider Western Sydney University campus when assessed against the relevant car / bicycle parking codes and standards.	*Section 4.6 – Cyclist Infrastructure* *Section 4.7 – Car Parking*
	• Adequacy of the drop-off / pick-up zone(s) and bus bays(s), including assessment of any related queuing during peak-hour access.	*Section 4.8 – Pick-up and Drop-off*
	• Adequacy of the existing / proposed pedestrian infrastructure to enable convenient and safe access to and from the site for all users.	*Section 4.5 – Pedestrians*
4.5	**Measures to ameliorate any adverse traffic and transport impacts due to the development based on the above analysis, including:**	
	• Travel demand management programs to increase sustainable transport (such as a Green Travel Plan / School Plan)	*Section 5 – School Transport Plan*
	• Arrangements for the Travel Coordinator roles.	*Section 5 – School Transport Plan*
	• Governance arrangements or relationships with state and local government transport providers to update roads safety.	*Section 5 – School Transport Plan*
	• Infrastructure improvements, including details of timing and method of delivery.	*Section 3.9 – Infrastructure and Safety Improvements*
4.6	**A preliminary school transport plan detailing an operational traffic and access management plan for the site, pedestrian entries, the drop-off / pick-up zone(s) and bus bay(s).**	
		Section 5 – School Transport Plan
4.7	**Analysis of the impacts of the traffic generation during construction of the proposed development, including:**	
	• Construction vehicle routes, types and volumes.	*Section 6.2.2 – Truck Routes*

	Key items	Comments and references
	• Construction program (duration and milestones).	*Section 6 – Construction Program*
	• On-site car parking and access arrangements for construction, emergency and construction worker vehicle.	*Section 6.1.1 – Access Arrangements* *Section 6.1.2 – Worker Parking*
	• Cumulative impacts associated with other construction activities in the locality (if any).	*Section 6.2.4 – Cumulative Impacts*
	• Road safety at identified intersections near the site due to conflicts between construction vehicles and existing traffic in the locality.	*Section 6.3 – Road Safety*
	• Measures to mitigation impacts, including to ensure the safety of pedestrian and cyclist during construction.	*Section 6.3 – Road Safety*
4.8	**A preliminary Construction Traffic and Pedestrian Management Plan.**	
		Section 6 – Construction Traffic and Pedestrian Management Plan
6.7	**Relevant Policies and Guidelines:** • Guide to Traffic Generating Developments (Roads and Maritimes Services, 2002) • EIS Guidelines – Road and Related Facilities (Department of Urban Affairs and Planning (DUAP), 1996) • Cycling Aspects of Austroads Guides • NSW Planning Guidelines for Walking and Cycling (Department of infrastructure, planning and Natural Resources (DIPNR), 2004) • Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments (Austroads, 2020) • Australian Standard 2890.3 Parking facilities, Part 3: Bicycle Parking (AS 2890.3).	*Section 1.3 – Design Guidelines* *This transport and accessibility impact assessment has been prepared in the context of the relevant planning policies as listed.*

1.6 Response to Submissions

The Environmental Impact Statement (EIS) was publicly exhibited between 18 August 2021 to 14 September 2021 on the Department of Planning website, for submissions by members of the public and government agencies.

Table 1.2: Response to Submissions

Submission Author	Key items	Comments and references
Hawkesbury City Council	**<u>Traffic</u>** As part of the previous request for Secretary's Environmental Assessment Requirements (SEARs) Council expressed a view that the intersections of Londonderry Road/Southee Road and Londonderry Road/Vines Drive needed to be realigned to create a crossroad by redirecting Vines Drive to line up with Southee Road. However, since that time Council has been	*A meeting held on 14 October with TfNSW to present and discuss the new concept strategy.*

	provided with additional information from Transport for NSW with respect to the Richmond Bridge Duplication Project. Based on the timing for the delivery of this project it is assumed that any works to the Londonderry Road/Vines Drive intersection in association with the Hawkesbury Centre of Excellence will be temporary in nature. Transport For NSW should be consulted to ensure that any works in this location will not impact upon the future delivery of works associated with the Richmond Bridge Duplication Project. Any works within the road reserve will require an approval under the Roads Act 1993. A performance, damage and defects bond would also be required to cover any restoration required to roads resulting from deterioration caused by construction traffic.	
	Parking The parking assessment included within Section 4.7 of the Traffic and Accessibility Report does not address maximum potential student numbers within Western Sydney University. Therefore, the argument that the shortfall in parking provided for the proposal may be accommodated within existing parking facilities within the university does not appear to be adequately justified.	*Parking shortfall (at DCP rates) during typical usage is negligible at only 4 spaces which could be easily accommodated in university parking. Anticipated actual demand is lower and would be accommodated on-site.* *Peak usage of the CoE (e.g. for school-related events) would occur in off-peak times for the university (such as weekends or evenings).* *The total parking capacity on the WSU campus is 1,516 spaces, which is substantially higher than even the highest demands expected for the CoE (73 spaces in highest scenarios).* *Refer Section 4.7.2 – Car Parking Provision*
	Private Bus Service A bus service will be required for the Richmond Agricultural College to provide transportation between the Centre of Excellence, Richmond High School and Richmond/East Richmond Train Stations. A bus parking and manoeuvring area should therefore be provided within the property to accommodate any school buses.	*Centre of Excellence site will accommodate parking for up to two minibuses and associated manoeuvring located in the Staff Car Park off Maintenance Lane.* *Larger buses would have sufficient stopping and manoeuvring space on the completed Vines Drive layout, however would not park at the site.*

		Section 3.7 – Pick-up and Drop-off *Section 3.6 – Bus Zones*
	<u>Active Transport</u> It is understood that students of Richmond Agricultural College will attend both the Centre of Excellence and Richmond High School, and that both agricultural specialist and selective streams will be provided by Richmond Agricultural College. Given that a component of the Richmond Agricultural College students will be local and that there will be a link between the Centre of Excellence and Richmond High School, it is considered that safe pedestrian and cyclist connectivity between the schools, public transport network and local residential areas is important. The supplied Traffic and Accessibility Report provides details on the existing footpath and cycleway network but it does not make any recommendations regarding pedestrian and cycle infrastructure upgrades to provide safe connectivity between the schools or public transport and local pedestrian routes. The pedestrian network between the Centre of Excellence and Richmond High School should be detailed and the need for any infrastructure upgrades examined. In particular the Traffic and Accessibility Report should consider the feasibility of a shared path or cycleway along the length of Londonderry Road adjoining the university.	*Demand for pedestrian movement between the two sites is expected to be low. Students would be timetabled for one school or the other each day. Minibus services may be operated by the School from time to time. A shared path or cycleway along Londonderry Road is not considered to be consistent with the scale of the proposal and the expected pedestrian/cyclist demand to be generated. Due to lack of school catchment, most students will be travelling long distances and local pedestrian movements are expected to be minimal.*
Transport for NSW	**Proposed Signalised Pedestrian Crossing** **Comment** Section 4.5 of the Transport and Accessibility Impact Assessment (TAIA) states that the proposed signalised pedestrian crossing at Londonderry Road will meet the traffic signal warrant with consideration given to the proposed crossing primarily used by school children who walk between the school and northbound bus stop on Londonderry Road. However, the Figure 2.21 of the TAIA shows that Londonderry Road currently has the peak traffic volumes of 464 northbound vehicles/289 southbound vehicles in AM peak hour and 345 northbound vehicles/435 Southbound vehicles in PM peak hour, which does not meet the traffic signal warrant of "vehicular flow exceeds 600 vehicles/hour in EACH direction". In addition, it is understood that the Western Sydney University is currently operating shuttle bus services with 30 minutes frequency during peak periods with a stop at Vines Drive. Therefore, the shuttle bus service could be more attractive to students which provides a shorter walking distance to the proposed development from the bus stop on Vines Drive. Therefore, the demand of 300 pedestrian crossing Londonderry Road in TAIA seems over-estimated. **<u>Recommendation</u>**	*Proposed signalised pedestrian crossing deleted.*

	TfNSW does not support the proposed signalised pedestrian crossing on Londonderry Road under the Roads Act, 1993, as the traffic signal warrant is not met. The application should be modified with an alternative pedestrian crossing facility at this location, should a Vines Road drop off not be supported by the Western Sydney University. A pedestrian refuge island could be considered subject to further review of traffic and road safety information.	
Transport for NSW	**Future Bus Facility** **Comment** The estimated demand in the TAIA for bus movements, including bus connections to and from Richmond and Penrith train stations, is approximately 300 students. This will result in the demand of approximately 6 additional bus services during each peak period. The current public bus operation apparently is unable to cater for the proposed patronage demand. However, the TAIA does not provide mitigation measures to address this bus service shortfall. **Recommendation** It is requested that the applicant provide further details of measures to mitigate the bus service shortfall. If additional short-route public bus services between the Richmond Station and the proposed school are required to cater the school's patronage during peak periods, these short-route public bus services should be terminated at the stop located as close as possible to the school entrance. This will significantly reduce the pedestrian demand crossing Londonderry Road. A bus turnaround facility should be provided on Vines Drive, as the result of the need of additional short-route bus services specifically for the proposed development.	*An indented bus bay is now proposed along Vines Drive and a concept has been presented to TfNSW. The bus bay could accommodate 3-4 buses, which would facilitate terminating services close to the school entrance as requested by TfNSW. During consultation with TfNSW, the project team was advised that no further information was required at this stage to inform future service planning.* *Section 3.9 – Infrastructure and Safety Improvements* *Section 3.7 – Pick-up and Drop-off* *Section 3.6 – Bus Zones* *Appendix F – Proposed Concept Design of Vines Drive*
Transport for NSW	**Construction Vehicle Access** **Comment** There is discrepancy regarding the construction vehicle haulage route information provide within the TAIA and the Construction Management Plan. **Recommendation** It is requested that the applicant updated the Environment Impact Assessment with consistent information. If access from Londonderry Road is proposed for construction vehicles, concurrence is required from TfNSW under Section 138 of Roads Act 1993, as Londonderry Road is a classified Road. Concept design plans of the proposed temporary Londonderry Road access are to be submitted to TfNSW for approval. The redundant access, when construction is completed, shall be removed and replaced to match existing. A sight distance assessment should be undertaken and submitted to TfNSW for review.	*Construction access will be from Vines Drive. Therefore, concept plans are required. This TAIA contains corrected information.* *Section 6.2.2 – Truck Routes*

Transport for NSW	**School Travel Plan** **Comment** Transport for NSW (TfNSW) has reviewed the school travel plan (STP). TfNSW also has a number of recommendations to improve the STP and the proposed initiatives to encourage sustainable transport to the site, including greater collaboration with the WSU campus in developing and implementing the STP to realise mutual benefits. TfNSW would welcome further discussions with the proponent regarding these matters to ensure their delivery and can be contacted directly at development.sco@transport.nsw.gov.au **Recommendations** Prior to occupancy, the proponent is to provide a STP for TfNSW's consideration that: • Provides an audit of the public and active transport in the vicinity of the site and potential recommendations, including the permeability of the UWS campus and the links between the two sites. For example, from the documentation provided it is currently unclear if there would be a pedestrian crossing on Vine St; Figure 5.1 appears incomplete. • Notes how the nearby bus stops will be upgraded to facilitate public transport use. • Provides details of the access and permeability of the site for active transport, including the location and number end of trip facilities, including total number of secure bike parking spaces, casual bike parking, provision of e-bike charging points, numbers of showers and lockers, and including this information in the TAG; • Ensures that bike parking is sheltered, accessible and convenient, with passive surveillance for casual parking; • Identifies what provisions there are for motor bike parking and EV parking; • Considers additional incentives for staff to use active and public transport such as: o Pre-loaded opal cards during orientation o Providing panniers or backpacks for staff committed to active travel o Salary sacrifice options for purchases of bikes or other micro-mobility o options o Wayfinding at the school for End of Trip facilities o Bike maintenance equipment for use onsite & bike lights for emergency loans (and also making these available for students) • Considers pool bikes for visitors and other appropriate uses, and provides extra parking to cater for these bicycles.	*The proponent has no issues with the recommended condition of consent. Ongoing consultation would occur with TfNSW following approval of the SSDA.* *It should be noted that the potential incentives and initiatives listed in the condition would be indicative only, and the project would be responsible for developing a final list of initiatives prior to occupancy, which may or may not include those suggested by TfNSW.*

	• Considers whether an additional stop for the WSU shuttle bus (or use of existing stop of Vine St) would be an option for use by staff, students and visitors of the would work.
	• Considers additional incentives for students to use active and public transport such as:
	  ○ Promotes combining train and bicycle in travel to the site, with information on how to carry your bicycle on the train, including the recommended route from the station.
	  ○ Establishing a bicycle user group in collaboration with WSU and potentially organising bicycle maintenance sessions and other activities, such as excursions by bicycles to places of interest such as other nearby locations with innovative agricultural practices
	  ○ More frequent events celebrating active transport
	• Includes a comprehensive communications plan and Travel Access Guide (TAG)	

Transport for NSW	**Proposed Weekend Conference Use** **Comment** It is understood that the proposed school facility will be used by occasional weekend conference events on weekends. However, there is no further analysis undertaken to assess the impact of traffic generated by the proposed weekend conference events on the surrounding road network. **Recommendations** It is requested that the applicant provides a traffic impact assessment for the weekend conference events.	*Additional traffic modelling has been undertaken for weekend conference usage.* *Section 4.3 – Future Traffic Condition*
Department of Planning, Industry & Environment	**Traffic, Transport and Access** The EIS proposes a signalised intersection at Londonderry Road and Vines Drive. Transport for NSW (TfNSW) states that a signalised intersection at this location would not be supported and that alternative crossing facilities should be proposed. The RtS must address the comments made following further consultation with TfNSW and consider an alternative pedestrian crossing facility, where required, to ensure safe and efficient movement of users, particularly considering the expected use of nearby bus stops by students of the school. • The RtS must include an updated Traffic Impact Assessment (TIA) that reflects the non-signalisation of the intersection of Londonderry Road and Vines Drive if it is not supported by TfNSW. This must include (but not limited to) traffic modelling, trip distribution assumptions and associated management and mitigation measures.	*Proposed signalised Londonderry Road and Vines Drive intersection deleted.* *Refer to* *Section 4.1 – Travel Mode* *Section 4.2 – Trip Distribution* *Section 4.3 – Future Traffic Condition*

	• The RtS must include an updated TIA that considers potential traffic impacts as a result of weekend conference events on the surrounding road network and include management and mitigation measures where required.	*Section 4.3 – Future Traffic Condition*
	• The RtS must include measures to ensure that further shifts towards the cycling mode share for users of the site can be achieved. Given the distance from Richmond Station and the provision of bicycle racks on site, the Department considers that a mode share higher than 0% for cycling could be feasible and should be further promoted.	*Section 5.1.2 - Mode Share Target*
	• The RtS must further detail measures to mitigate the identified bus service shortfall during peak period demand, including consultation with relevant bus service providers and/or investigating short trip bus shuttle options. A summary of consultation with bus providers must be included in the RtS.	*The revised concept for an on-site bus bay was presented to TfNSW (refer Section 3.9 for consultation details and Appendix F – Proposed Concept Design of Vines Drive). During consultation with TfNSW, the project team was advised that no further information was required at this stage to inform future service planning.*
	• The RtS must be supported by a road safety audit report, prepared by an appropriately qualified traffic or transport engineer and must include (but not limited to) the operation of the following areas: o the operation of the drop-off/pick-up and car park facilities during all stages of development. o potential safety risks and hazards caused by the operation of the drop-off/pick-up and car park facilities for other users on Vines Drive and Maintenance Lane. o footpath sightlines. o adequacy of the surrounding network to enable buses and other vehicles to pass simultaneously.	*See Appendix E – Road Safety Audit*
	• The RtS must provide an updated assessment on the proposed pedestrian footpath network servicing the walking catchment of the development and identify appropriate upgrades on the southern side of Vines Drive to provide direct access from the Londonderry Road bus facilities and on Maintenance Lane.	*Due to lack of school catchment, most students will be travelling long distances and local pedestrian movements are expected to be minimal.* *Additionally, demand for pedestrian movement between CoE and Richmond High School is expected to be low. Students would be timetabled for one school or the other each day. Minibus*

		services may be operated by the School from time to time. *No upgrade requirements outside the site have been identified at this time. Pedestrian improvements are provided within the WSU campus in the form of footpaths and pedestrian crossings for internal movements and/or access to buses.*
Penrith Council	The following comments are provided for the Department's consideration in the assessment of the development proposal:- • The proposed site will support the use of existing public bus and rail infrastructure however, additional consideration should be given to planning of appropriate and readily available transport services for students, professionals and visitors accessing the facility. High priority should be placed on transport routes from Richmond High School including how these routes connect to the proposed development and other services.	*Further consultation has taken place with TfNSW. Revised design includes an on-site bus bay along Vines Drive to facilitate bus service. Bus routes and servicing details would be developed by TfNSW and the local operator through the life of the development. It is anticipated that students would travel directly to the CoE site, rather than from RHS.* *See Appendix F – Proposed Concept Design of Vines Drive*
	• The proposal should ensure there is clear way finding signage, well-lit and direct routes for people walking and cycling to transport stops, clear crossing points, adequate lighting and surveillance for night time use.	*Footpath to the Vines Drive bus bay and other internal footpath connections will be provided. Wayfinding to be developed in consultation with WSU.*
	• It has been mentioned in the proposal that cycling requirements are low, however consideration should be given to promoting opportunities for people to cycle and walk around the site as transport options, but also to encourage principles of healthy lifestyle.	*On-site bicycle storage to be provided, and usage to be encouraged as part of School Transport Plan.*
Public Submission (Nathan and Michelle Rose)	**<u>Comment</u>** • We are supportive of the proposed development. • The Hobartville / Richmond section of Londonderry Road is currently a main road and will feed traffic onto / absorb traffic from the Hawkesbury Centre of Excellence. • The Hobartville / Richmond section of Londonderry Road includes single and multi-dwelling housing on the western side of the road	*The demand for pedestrian movement between CoE and Richmond High School is expected to be low. Students would be timetabled for one school or the other each day. Minibus services may be*

	with Western Sydney University on the eastern side of the road. • In addition to the road traffic, there is also a high-volume of foot traffic (i.e. people walking) from the many university students and residents who use the Londonderry Road as a pedestrian route into Richmond town centre, we expect this to foot traffic to increase given the development of the Hawkesbury Centre of Excellence. The current situation is very unsafe as students often walk on the road and without a footpath I fear that younger school students will be at a even greater risk of injury or death from collision with traffic. • The Hobartville / Richmond section of Londonderry Road has drainage issues and often localised flooding on either side of the road following heavy rain. **<u>Recommendation</u>** • As part of the SSD Centre of Excellence in Agricultural Education development, we would like to make the following suggestions for improvements to the Hobartville/Richmond section of Londonderry Road: o Installation of kerb and gutter. o Installation of footpath. o Installation of drainage.	*operated by the School from time to time.* *No upgrade requirements outside the site have been identified at this time.* *Drainage issues have been identified in the Road Safety Audit and shall be addressed in the Vines Drive modification including kerb and gutter installation.* *See Appendix E – Road Safety Audit*

2 Existing Transport Network

2.1 The Site

Hawkesbury Centre of Excellence is located Part Lot 2 DP1051798, Vines Drive Richmond within the Hawkesbury campus of Western Sydney University (WSU) at 2 College Street, Richmond, leased to Department of Education (DoE) on a long-term basis. The site is situated within Hawkesbury City Council.

The site is mainly an undeveloped site. Directly to the northeast of the site is the P47 car park, an at-grade asphalt car park with capacity for around 142 vehicles. The microbiology building is also located immediately north of the car park. The campus provides courses in environmental health, forensic science, nursing, medical science, natural science (environmental, agricultural, horticultural), and secondary school science teaching.

Figure 2.1 shows the site location and environs.

Figure 2.1: Site location

2.1.1 Site Location

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

Figure 2.2: Local road network
Image source: Nearmap (dated January 2021)

2.1.2 Site Access

There are currently no formalised vehicular access points to the site development area as it is a greenfield site.

The development site has frontage to Vines Drive and Maintenance Lane which are owned and maintained WSU roads. Vines Drive allows for two-way traffic and has a 5.8-metre wide road carriageway and a footpath on the opposite side of the road. Maintenance Lane has a 5-metre carriageway and has no footpaths. Parking is not permitted on Vines Drive due to its narrow width.

More broadly, the WSU campus can be accessed via three access points into the Campus from the public road network as shown in Figure 2.2;

- Vines Drive at Londonderry Drive
- College Drive at Bourke Street
- Campus Drive at Blacktown Road

2.1.3 Land Use

The land is zoned under SP1 Special Activities zoning (Education, Agriculture, Research Station) and is currently used for educational agricultural purposes under the provisions of Hawkesbury LEP 2012. Figure 2.3 illustrates the various land use zones in the surrounding area, as specified in the LEP.

Figure 2.3: Land use map
Image source: Hawkesbury LEP 2012

2.2 Road Network

The location of the site within the immediate surrounding road network is shown in Figure 2.4. This map includes details about the types of controls at the relevant intersections.

Figure 2.4: Nearby intersection controls
Image source: Nearmap (dated January 2021)

2.2.1 Internal Road Network

Vines Drive

Vines Drive is an owned and maintained WSU road in the north of the site, which provides a single travel lane in each direction, with a general speed limit of 40 km/hr, and no parking on both sides of the road as shown in Figure 2.5.

Figure 2.5: Vines Drive

Campus Drive

Campus Drive in the east of the site serves as entrance point for emergency services and provides a single travel lane in each direction, with a general speed limit of 40 km/hr.

Maintenance Lane

Maintenance Lane provides a single travel lane in each direction.

College Drive

College Drive in the northwest of the site serves as entrance point via Bourke Street and provides a single travel lane in each direction, with a general speed limit of 40 km/hr.

2.2.2 State Road Network

The site is located close to the NSW state road network. Blacktown Road is approximately 1.8 kilometres and Londonderry Road approximately 650 metres from the site. Blacktown Road provide access to the M7 Motorway (via Richmond Road) at Dean Park.

Figure 2.6 illustrates the state roads in vicinity of the site.

While the lease boundary for the Centre of Excellence site sits fully within the WSU campus and has no public road frontages, the WSU campus itself has frontages and access to both Londonderry Road and Blacktown Road on the state road network.

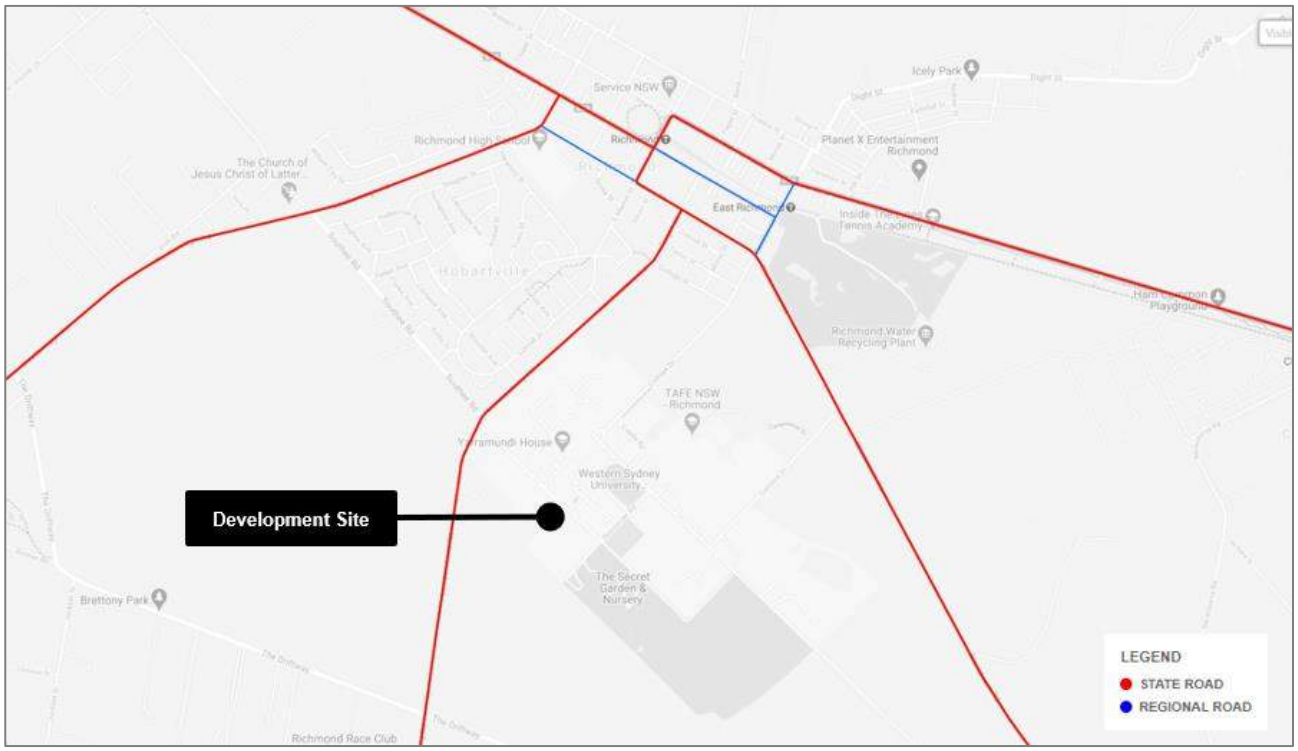


Figure 2.6: State Roads in Vicinity of the Site
Image source: Transport for NSW

Londonderry Road

Londonderry Road runs along the western boundary of the WSU Campus. There are single travel lanes in each direction, with a general speed limit of 60 km/hr. In addition, there is a shoulder lane on each direction.

The nearest bus stop is approximately 625 metres from the School located along Londonderry Road as shown in Figure 2.7

Figure 2.7: Londonderry Road

Blacktown Road

Blacktown Road is a state road with a single travel lane in each direction. It has a sign-posted speed limit of 80km/hr.

2.3 Public Transport

2.3.1 Public Buses

Public transport available within the vicinity of the site is primarily bus services. Public bus services operate along Londonderry Road and Blacktown Road. Bus route 677 services Londonderry Road at a bus stop around 600 metres from the site, while route 675 services College Street around 1.4 kilometres from the site. All bus services in the area are operated by Busways and have a low daily frequency. The availability of local bus services is shown in Figure 2.8 below.

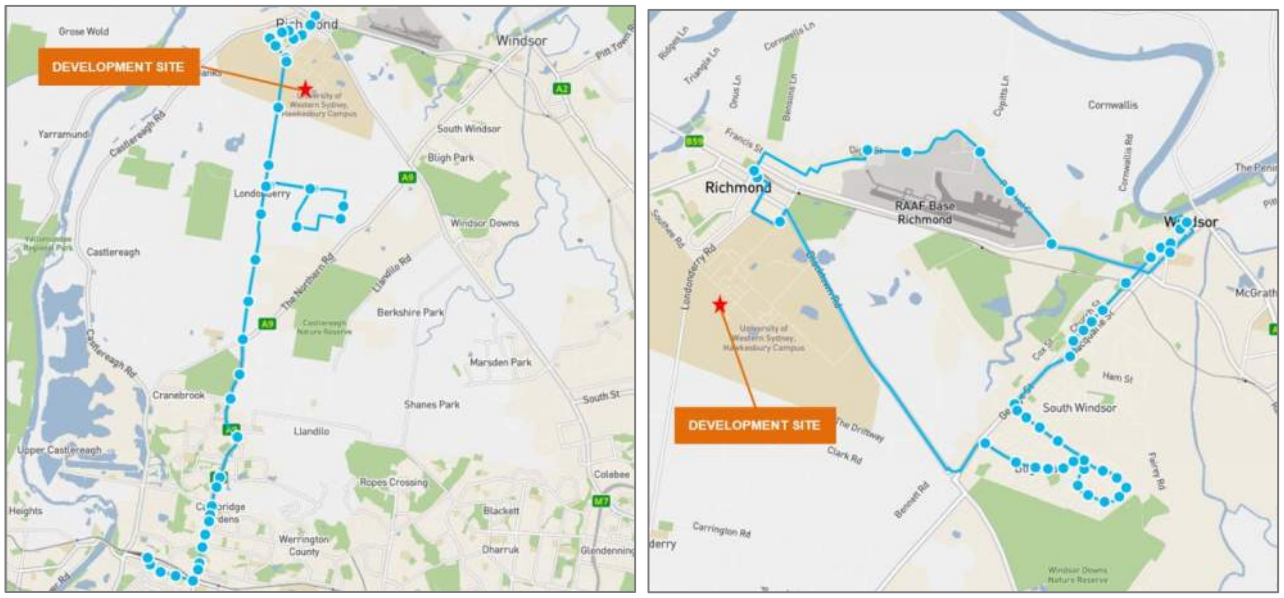


Figure 2.8: Public bus routes
Image source: Transport for NSW

Table 2.1: Public bus frequencies
Data source: Sydney Buses

Route	Destinations	Bus Stop Location	Daily Services		
			8:00am - 9:00am	3:00pm - 4:00pm	Available Trip before and after peaks
677	Penrith to Richmond via Londonderry	Londonderry Road opposite Vines Drive, Richmond	1 service (8:48 am)	No service available	7:41 am 9:47 am 1:47 pm 4:09 pm
677	Richmond to Penrith via Londonderry	Londonderry Road and Vines Drive, Richmond	1 service (8:15 am)	No service available	7:24 am 10:10 am 2:10 pm 4:10 pm
675c	Windsor to Richmond via RAAF Base & Bligh Park	Bourke Street opposite Teviot Street	1 service (8:43 am)	1 service (3:43 pm)	7:53 am 9:13 am

2.3.2 Trains

The nearest train stations to the site are East Richmond (2.0km) and Richmond (2.5km). Walking distances are approximately 24 minutes and 30 minutes, respectively. Route 677 connects Richmond Station to Londonderry Road and could be used as a transfer to the site.

There are no major plans published for additional transport infrastructure in the area.

Train services are shown in Figure 2.9.

Figure 2.9: Sydney Trains network connections

2.3.3 School Buses

No existing school bus routes operate within the University campus. *Busways* operates school services to several local schools in the area, including Richmond High School, Richmond North Public School and Richmond Public School. In addition to servicing residential areas, these services typically provide a connection between each school and local amenities such as Richmond Station.

2.3.4 WSU Shuttle Buses

Western Sydney University shuttle buses travel to and from campus via Richmond Market Place and East Richmond railway station as shown in Figure 2.10. The shuttle stops at Richmond Marketplace and East Richmond Station and within the campus at Fairy Circle, Residential College, The Stables, and the Library as shown in Figure 2.11.

Services have an average frequency of 30 minutes with operating hours as follows:

- Bus 1: 7:00am to 10:40pm weekdays
- Bus 2 (morning): 7:50am to 11:10am weekdays
- Bus 2 (afternoon): 2:10pm to 6:10pm weekdays

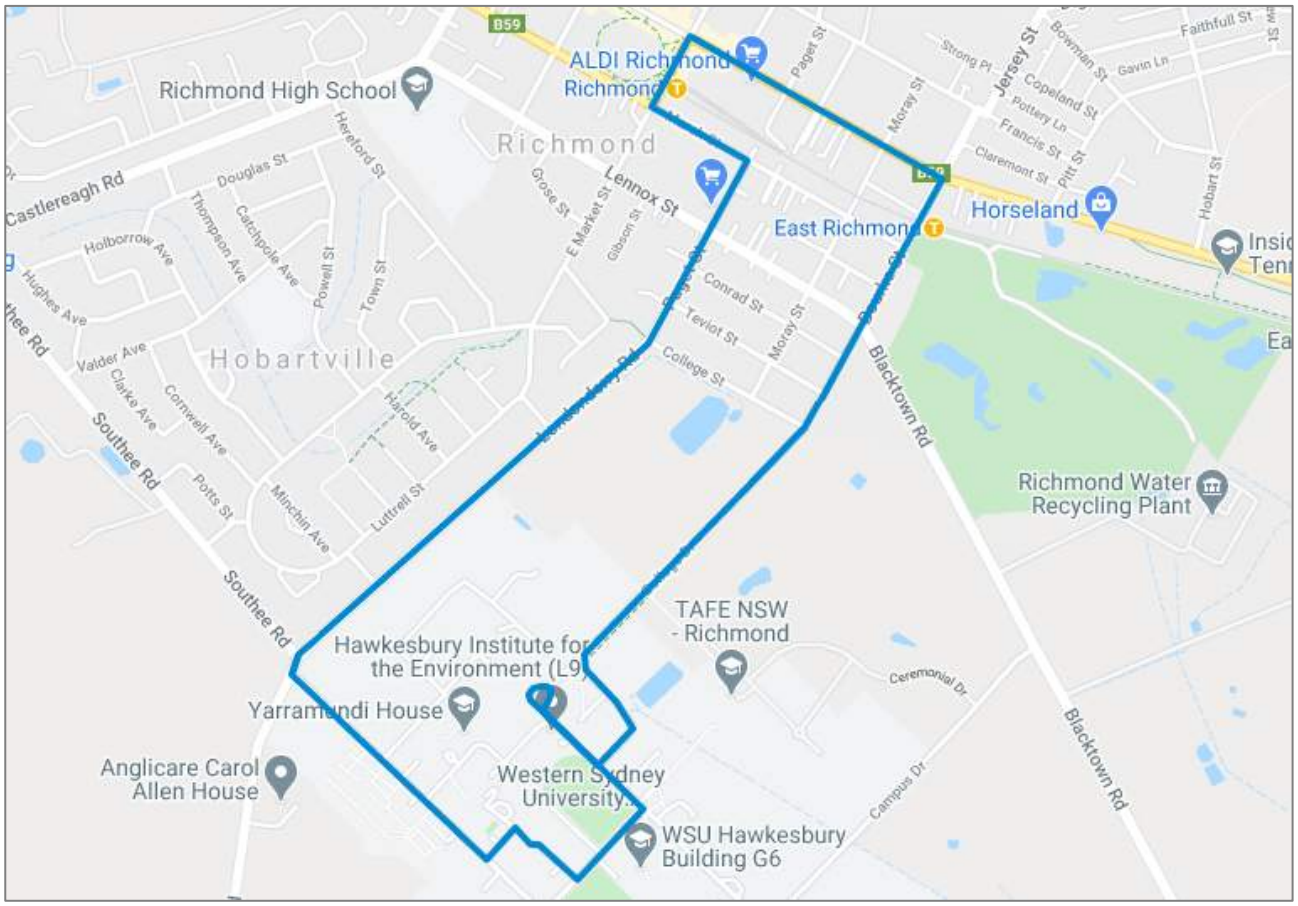


Figure 2.10: WSU shuttle bus route

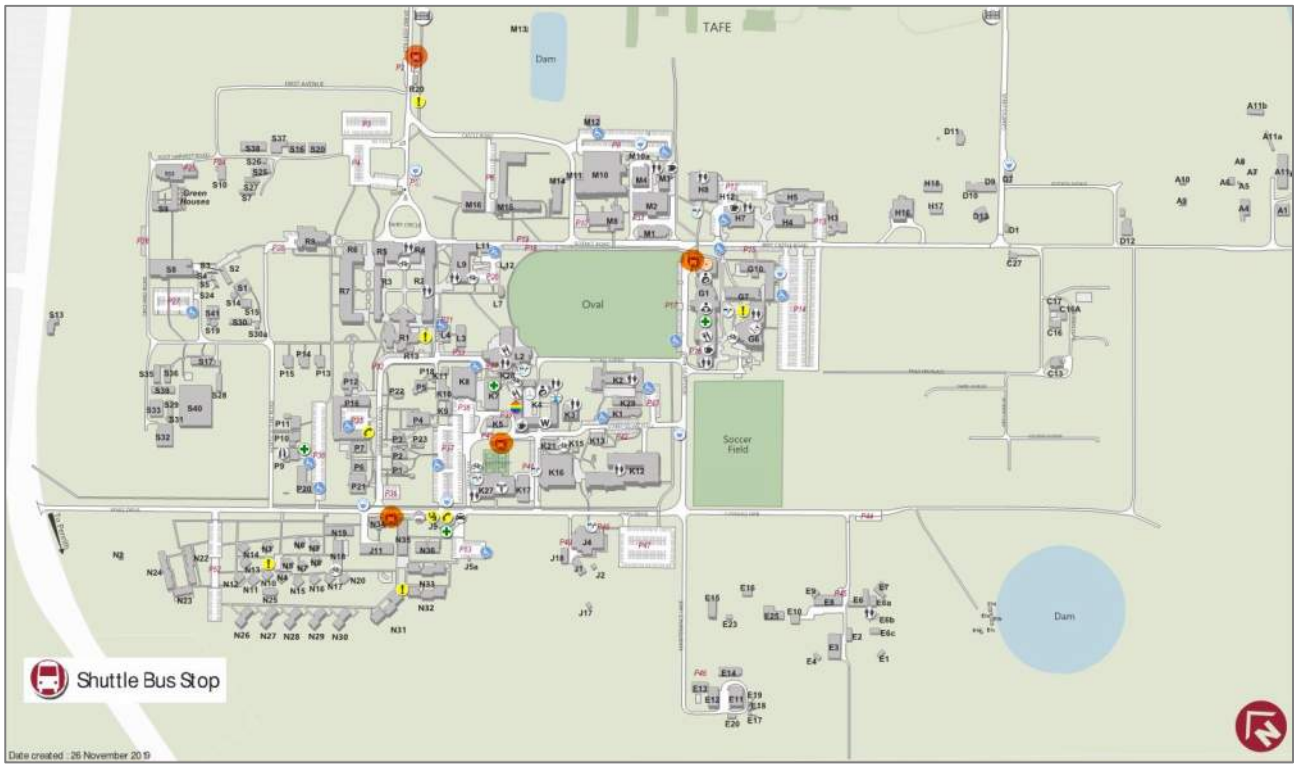


Figure 2.11: WSU shuttle bus stops

2.4 Active Transport

2.4.1 Pedestrian Infrastructure

A map of the existing pedestrian infrastructure in the local area can be seen in Figure 2.12.

There are limited pedestrian footpaths available outside the Western Sydney University. It is noted within the Western Sydney University has fair internal footpaths available for pedestrians. Footpaths are not provided on either side of Londonderry Drive and Southee Road. These roads are a component in a likely used pedestrian route to the school for students and staff wishing to walk to the school from the west.

The map also indicates the zebra crossings locations in the area. There is a zebra crossing on the east and west side of the school, and a raised zebra crossing to the north-west.

Figure 2.12: Pedestrian Infrastructure within Local Road Network

2.4.2 Cyclist Infrastructure

Figure 2.13 shows the local cycling routes near the site. There is generally good provision of cyclist connections in the region, with a marked on-street bike lane in each direction on Blacktown Road outside the WSU campus site.

Figure 2.13: Cycling Map in the Local Road Network
Data source: Cycleway Finder (dated December 2019)

2.5 Car Parking

The entire Western Sydney University campus is a restricted parking area. Parking on-campus requires a valid parking permit, with a number of different permits available for staff and students. The campus contains up to 53 labelled parking areas, however only 38 of these are considered open parking areas (when excluding individual driveways and loading zones). These comprise the following:

- 31 general vehicle parking areas containing a total of 1,516 parking spaces
  - Includes a variety of permit areas and accessible parking
- 5 motorbike parking areas containing a total of 34 motorbike parking spaces
- 2 police parking areas containing a total of 46 parking spaces
  - Associated with the NSW Police Leadership Centre

2.5.1 P47 Car Park

For the purposes of this transport impact assessment, particular consideration is given to the P47 car park, which is adjacent to the site. As discussed with WSU, P47 car park may cater for some parking demand in occasional high-occupancy usage of the proposed Centre of Excellence (see Section 4). The capacity of this car park is around 142 spaces.

Site observation indicated that users parking at P47 were generally attending either of two adjacent buildings (J4 Microbiology or K12 Chemistry and Biochemistry).

An analysis of available Nearmap imagery has been undertaken to review historical demand for parking in the P47 car park. Analysis was also separately considered for weekdays within school and university teaching periods, to exclude any periods of low demand. Average weekday vehicle demand across the data was 27 vehicles, with an availability of 115 spaces. Table 2.2 details the full set of data analysed.

The historical data is generally consistent with data recorded on-site, with average peak occupancy of 33 vehicles in the P47 car park during site surveys.

Table 2.2: Historical occupancy data at P47 car park

Source: Nearmap imagery

Date	Occupied	Vacancy
Thursday, 25 March 2021	7	135
Tuesday, 12 January 2021	7	135
Thursday, 3 September 2020	5	137
Friday, 3 July 2020	1	141
Friday, 3 April 2020	1	141
Tuesday, 17 December 2019	5	137
Sunday, 20 October 2019	2	140
Saturday, 20 July 2019	2	140
Saturday, 6 April 2019	2	140
Saturday, 8 December 2018	2	140
Monday, 10 September 2018	11	131
Monday, 30 July 2018	16	126
Sunday, 6 May 2018	2	140
Sunday, 1 April 2018	2	140
Saturday, 20 January 2018	2	140
Friday, 22 September 2017	19	123
Sunday, 9 July 2017	2	140
Sunday, 6 November 2016	2	140
Sunday, 2 October 2016	2	140
Monday, 18 July 2016	43	99
Friday, 6 May 2016	36	106
Wednesday, 24 February 2016	107	35
Sunday, 6 December 2015	2	140
Tuesday, 30 December 2014	2	140
Monday, 1 September 2014	16	126
Tuesday, 17 June 2014	7	135

Monday, 6 January 2014	8	134
Thursday, 19 December 2013	21	121
Sunday, 22 September 2013	1	141
Friday, 16 August 2013	44	98
Friday, 9 August 2013	32	110
Wednesday, 3 July 2013	5	137
Saturday, 18 May 2013	2	140
Tuesday, 23 April 2013	22	120
Thursday, 7 February 2013	18	124
Tuesday, 18 December 2012	4	138
Wednesday, 24 October 2012	57	85
Saturday, 13 October 2012	14	128
Monday, 24 September 2012	16	126
Saturday, 8 September 2012	2	140
Sunday, 26 August 2012	0	142
Thursday, 2 August 2012	20	122
Wednesday, 9 May 2012	69	73
Thursday, 23 February 2012	9	133
Monday, 16 May 2011	69	73
Tuesday, 21 September 2010	14	128
Friday, 6 August 2010	44	98
Thursday, 13 May 2010	60	82
Wednesday, 14 April 2010	61	81
Monday, 15 March 2010	49	93
Weekday average occupancy	**26.62**	**115.38**
Weekday minimum occupancy	**1**	**35**
Weekday median occupancy	**17**	**125**
Weekday maximum occupancy	**107**	**141**

In addition to the overall historical occupancy data at the P47 car park, Figure 2.14 compares weekend and weekday occupancy at the car park.

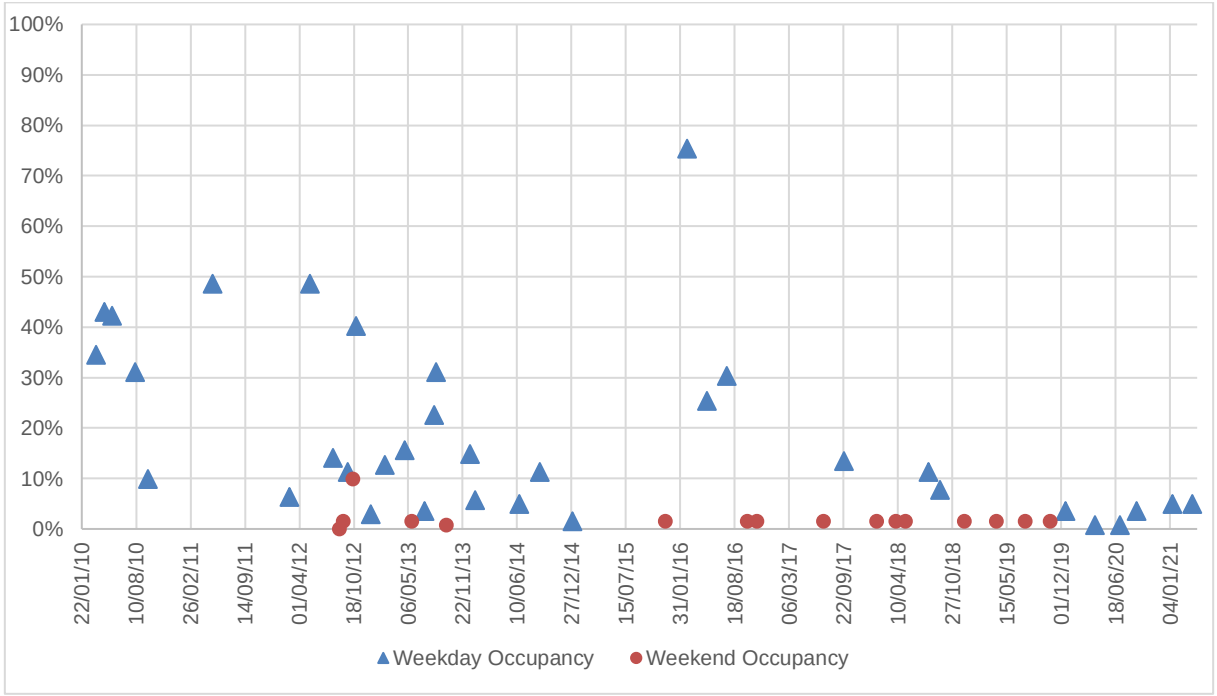


Figure 2.14: P47 parking occupancy result

As illustrated in Figure 2.14, weekday occupancy is consistently higher than weekend occupancy, as expected. Weekend usage is generally observed to be for storage of WSU campus shuttle buses only. Average usage of the P47 car park peaks at typically 30-50%, with a single observed maximum occupancy of around 75%. The usage from around 2014 onwards generally shows a reduction relative to earlier years. Additionally, the recent occupancy trend shows lower usage compared to the overall campus occupancy assessed in the 2017 site-wide detailed survey (refer Section 2.5.2).

2.5.2 Overall Campus Parking

A detailed parking occupancy study of the entire campus was undertaken on Thursday 5th and Tuesday 10th October, 2017. All 38 distinct parking zones were observed each hour to record the vehicle occupancy at the time. The two data sets show a high level of consistency, with total vehicle demand across the day being within 1.0% difference (i.e. 6,561 vs. 6,628 total vehicles recorded).

The peak vehicle demands occurred at 11am on the Thursday, and 12pm on the Tuesday. For the purposes of this assessment, the peak occupancy recorded at either 11am or 12pm on either the Thursday or Tuesday is considered. Note that this does not necessarily record the highest overall occupancy in each zone, but provides a conservative total more than 15% higher than any individual hourly occupancy[1].

When considering the peak occupancy across data sets, a total of 1,044 vehicles are located on the campus (general vehicle parking only, excludes police and motorbike), from a capacity of 1,516 spaces. 472 parking spaces are therefore vacant across the campus and total occupancy is calculated at 69%. Peak occupancy of the P47 car park was 46 vehicles during the survey peak periods (11am and 12pm), from a capacity of 142 spaces.

Figure 2.15 illustrates the number and distribution of these available spaces and demonstrates the walking distance from the P47 car park to main areas of vacancy across the campus.

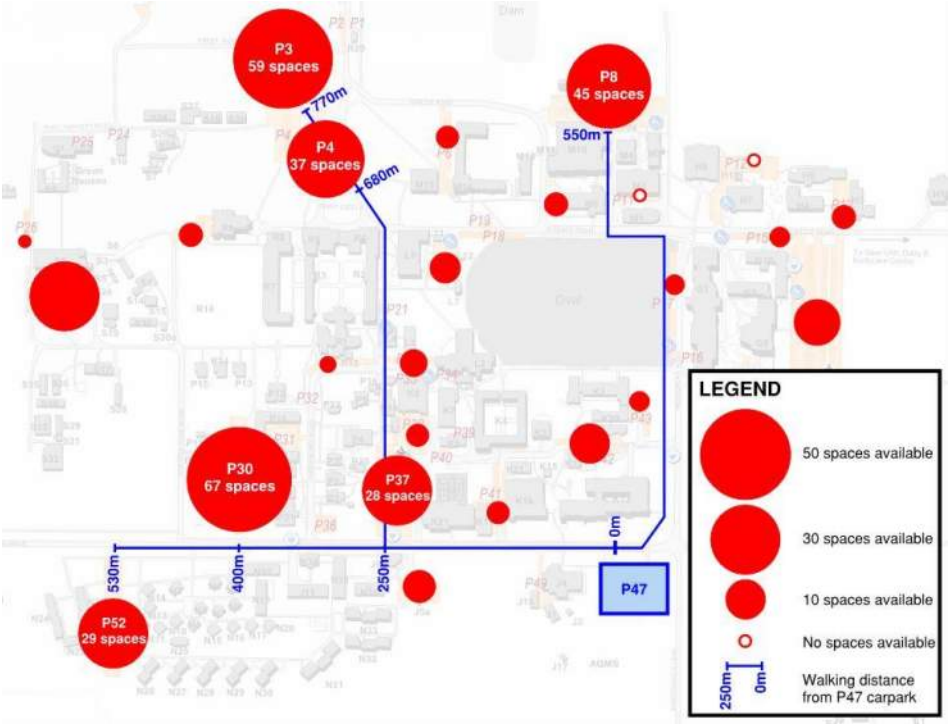


Figure 2.15: Campus parking availability at peak occupancy
Background image source: WSU Hawkesbury campus parking map (dated 4th May 2016)

Note that this does not consider the distribution of certain parking permit restrictions across the campus, which may result in differing availability of parking.

[1] Highest vehicle occupancy recorded was 896 vehicles at 11am on Thursday 5th October. Sum of peak 11am/12pm values gives total of 1,044 vehicles, or a 17% over-estimate. Higher values for individual zones may have occurred at a different time of day.

2.5.3 On-Street Parking

On-street parking in the vicinity of the WSU Campus is generally unrestricted. Figure 2.16 shows the parking restrictions surrounding the site.

No parking is permitted on Vines Drive or along most of the roads within the WSU campus.

Figure 2.16: On-street parking restrictions

2.6 Travel Mode

The findings presented in this section are the result of an online travel survey designed by TTW that was distributed to students and staff at Richmond High School. While the activities of the proposed Centre of Excellence will be significantly different to the existing high school, the statistics from this survey are nevertheless informative for assessing the future school population and current travel habits in the local area.

2.6.1 Richmond High School Transport Use

Online travel questionnaires have been issued for staff and students to accurately determine existing transport usage.

A summary of staff responses indicated the following:

- Staff travel is almost exclusively by single-occupancy car, with a 98% mode share.
- The peak travel period for staff is more condensed in the morning than the afternoon, with 60% of morning movements and 33% of afternoon movements occurring in the busiest 30-minute periods.
- Common themes in responses include:
    - A lack of bus services or challenges with low frequency services,
    - Safety concerns being a deterrent for cycling, and
    - Common reasons for car usage include travel time, convenience, and travel for errands or activities before and after school.

This School Transport Plan aims to address known concerns and proposes actions which are targeted to the site and its users.

Table 2.3 provides the detailed travel mode results of the online survey. The survey requested separate information on morning and afternoon travel, however results across the two periods did not differ by significant amounts. Morning and afternoon results were identical for staff. For students, the afternoon period is more likely than the mornings to show a walk-only result, with reductions across other modes.

As multiple mode responses are permitted in the online survey (to provide better information on mixed or combination transport usage), a hierarchy method has been applied to distil this to a single mode per respondent. The hierarchy has been applied as per the Australian Bureau of Statistics (ABS) Mode of Travel to Work 15-mode classification (MTW15P). The single mode is taken as whichever of the multiple modes is highest on the following list:

1. Train
2. Bus
3. Ferry
4. Tram
5. Taxi
6. Car, as driver
7. Car, as passenger
8. Truck
9. Motorbike/scooter
10. Bicycle
11. Other Mode
12. Walked only
13. Worked at home
14. Did not go to work
15. Mode not stated

Table 2.3: Transport targets – base case
Note: Staff and student volumes based on total capacity of school.

	Staff mode share		Student mode share	
Travel mode	**AM**	**PM**	**AM**	**PM**
Train	0%	0%	3%	3%
Bus	0%	0%	34%	32%
Car driver	98%	98%	14%	12%
Car passenger	0%	0%	33%	32%
Bicycle	0%	0%	1%	1%
Walk	2%	2%	15%	21%
Total	**100%**	**100%**	**100%**	**100%**

2.6.2 Journey to Work Data

As an additional point of reference, 2016 Journey to Work (JTW) data[2] provides an estimate of employee travel modes into and out of the local areas defined by Statistical Area Level 2 (SA2) zones. The site is located within SA2 zone 'Richmond – Clarendon' (refer to Figure 2.17).

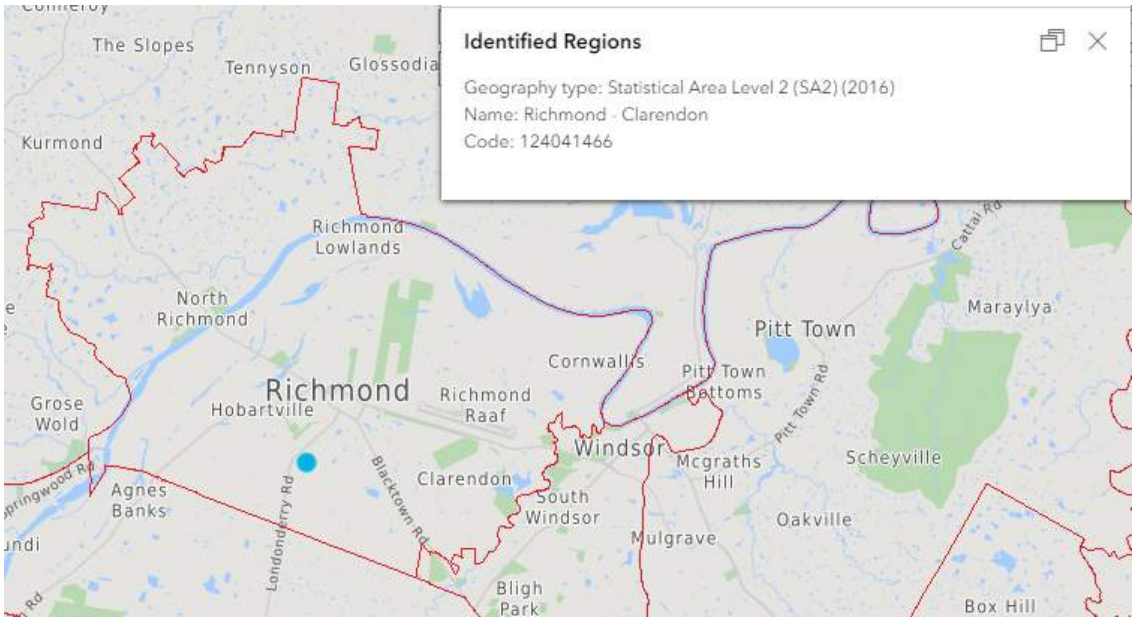


Figure 2.17: SA2 zone extents
Source: ABS

[2] Bureau of Transport Statistics public dataset derived from 2016 Census of Population and Housing

An assessment of travel mode share (from ABS Census TableBuilder data set 'MTW15P Method of Travel to Work') is shown in Table 2.4 below. MTW15P categorisation of travel modes (as listed in the left column) is used for a clearer and simpler assessment of 15 key travel modes through allocation a primary mode when multiple modes have been used in one trip.

A summary of key mode categories is also provided in Table 2.5.

Table 2.4: Journey to Work Data

	Mode share (%)	
Travel mode (MTW15P)	**Place of Work (persons working in SA2 one)**	**Usual Residence (persons living in SA2 zone)**
Train	2%	7%
Bus	1%	1%
Ferry	0%	0%
Taxi	0%	0%
Tram	0%	0%
Car as driver	85%	79%
Car as passenger	6%	5%
Truck	1%	2%
Motorbike	1%	1%
Bicycle	1%	1%
Other mode	1%	4%
Walked only	4%	1%
Total[3]	**100%**	**100%**

Table 2.5: Journey to Work Summary

	Mode share (%)	
Mode summary	**Place of Work (persons working in SA2 one)**	**Usual Residence (persons living in SA2 zone)**
Private vehicle (car, taxi, truck, motorbike)	92%	87%
Public transport (train, bus, ferry)	2%	8%
Active transport (bicycle, walking)	5%	5%
Total[4]	**99%**	**99%**

For further analysis of the school development, the most relevant data is the Place of Work (POW) data, which represents mode of travel for persons accessing the local area (rather than leaving to other areas). References to Journey to Work data in the remainder of this report are in reference to the POW data, rather than Usual Residence (UR).

[3] Mode share table excludes responses for "worked at home", "did not go to work", and "mode not stated".
[4] Mode summary table excludes "other mode" as unidentified data.

2.7 Network Performance

2.7.1 Data Collection

To determine the existing traffic generation of the site and surrounding traffic conditions, intersection movement counts, and mid-block tube counts were completed at various location in the vicinity of site. Analysis and modelling have been undertaken with these results to assess the existing traffic conditions in the surrounding area.

Mid-block traffic counts were completed at:

- Vines Drive
- Londonderry Road

Intersection traffic counts were completed at the following intersections:

- Londonderry Road – Southee Road
- Londonderry Road – Vines Drive
- Lennox Street – Paget Street
- Lennox Street – Bourke Street – Blacktown Road
- Blacktown Road – Campus Drive

The location of intersection surveys and mid-block tube counts are shown in Figure 2.18.

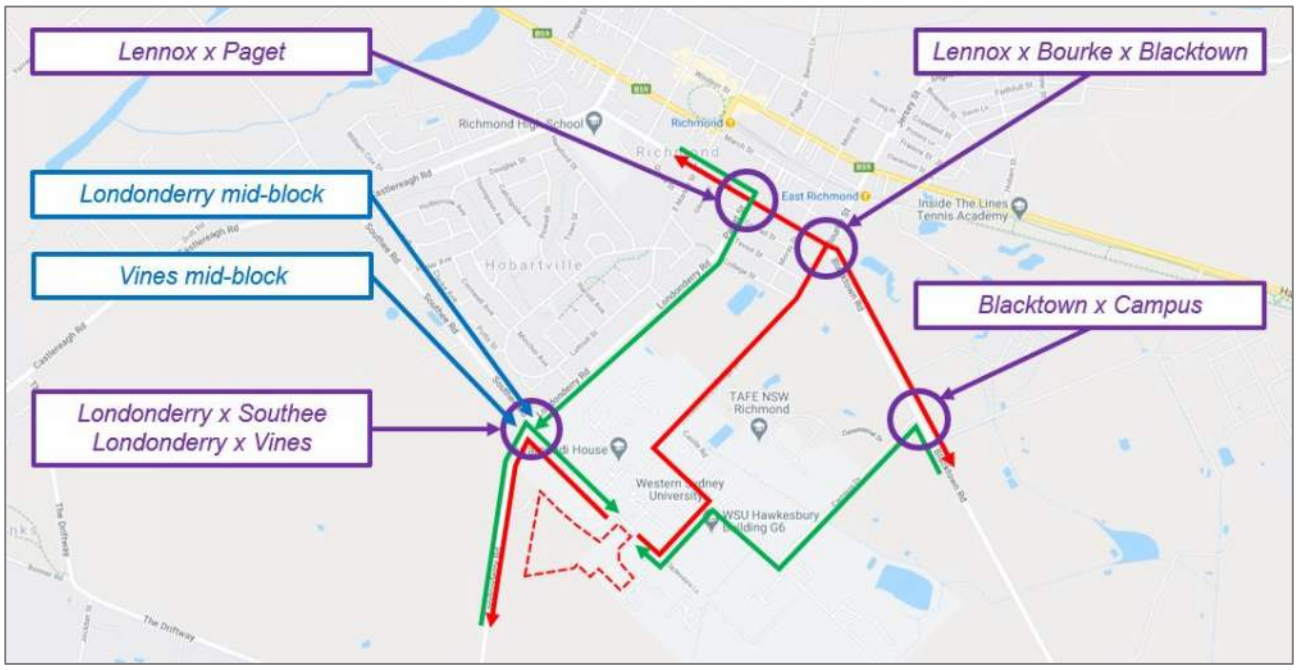


Figure 2.18: Location of traffic data collection

2.7.2 Mid-block Traffic Volumes Summaries

For seven days between Thursday 4th to 10th May 2021, a 24-hour mid-block tube count was installed to collect traffic volume data on Vines Drive (east of Londonderry Road) and Londonderry Road (north of Southee Road). Counts were undertaken during the NSW school term and during semester time for Western Sydney University, to record background traffic during typical times of school operation. Recorded data is attached in **Appendix C** of this report.

The recorded traffic counts demonstrated that traffic flows were reasonably consistent throughout the day. Figure 2.19 demonstrates the behaviour of traffic flows across each weekday, with minimal daily variation from the average. It is noted that a large volume of traffic accessed the site on the Monday evening, resulting in total daily traffic 36% higher than average. Traffic on Friday was generally lower than the remainder of the week, 30% below average. Volumes on weekends were very low as is expected for a university campus.

The tube count data shows an even distribution between eastbound and westbound traffic, indicating that traffic largely enters and exits the site via the same route. In general, Vines Drive carries traffic volumes well within capacity for a two-way two-lane road.

A full summary of daily traffic volumes and vehicle speeds is provided in Figure 2.19 and Figure 2.20.

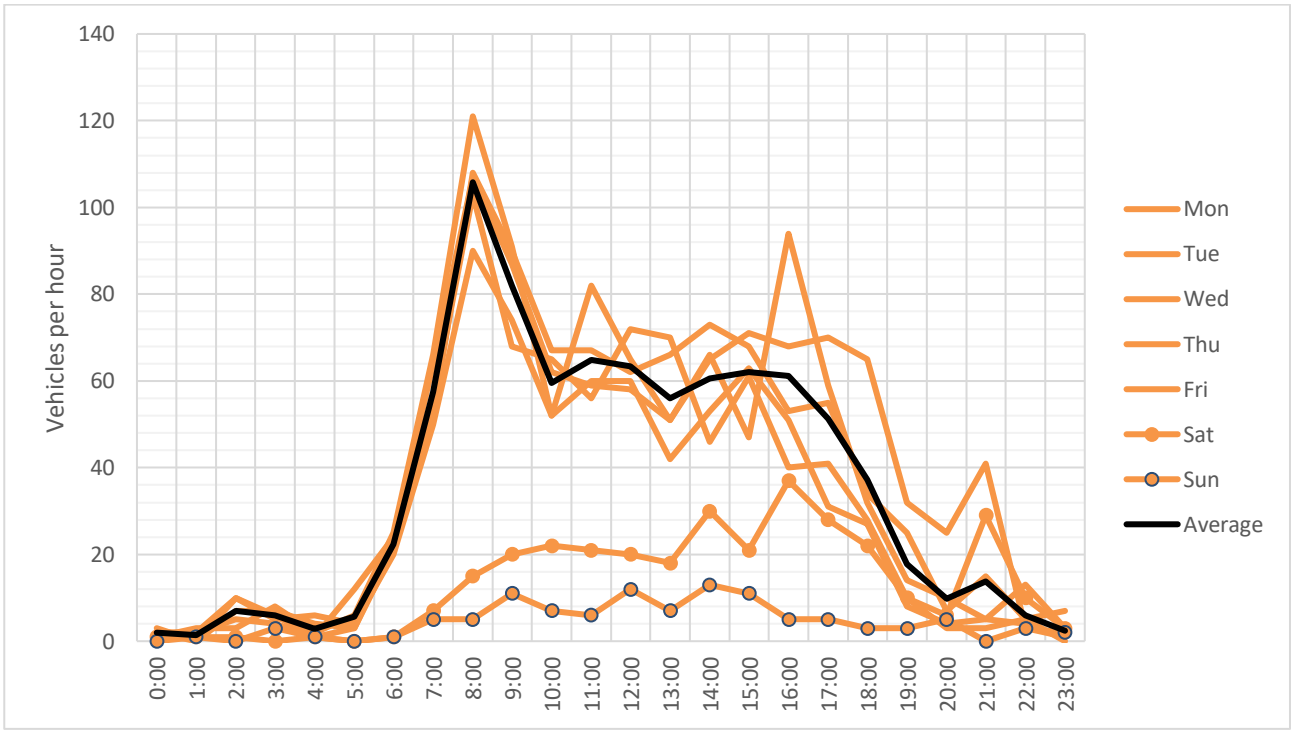


Figure 2.19: Seven-day traffic volumes on Vines Drive
Data source: Traffic counts undertaken Tuesday 4th May – 10th May 2021

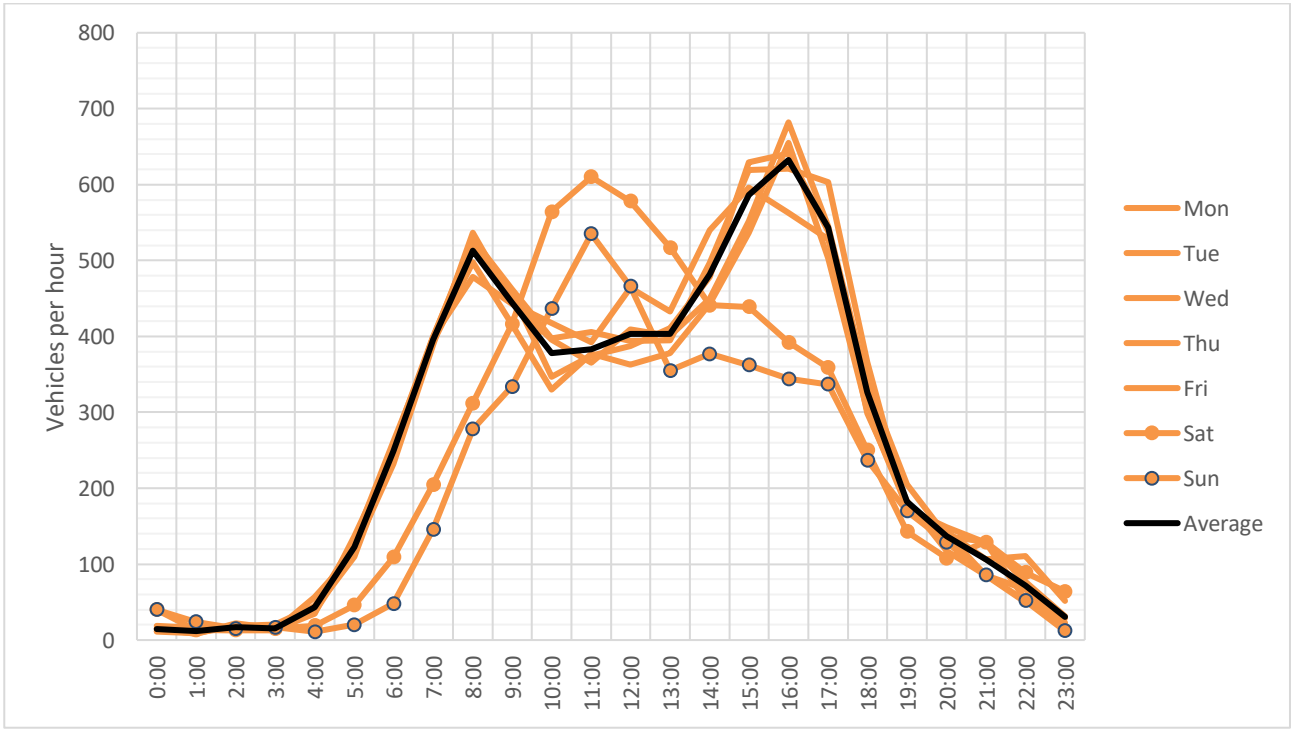


Figure 2.20: Seven-day traffic volumes on Londonderry Road
Data source: Traffic counts undertaken Tuesday 4th May – 10th May 2021

2.7.3 Intersection Traffic Movements

Intersection traffic counts recording vehicle volumes, turning manoeuvres, and pedestrian movements, were undertaken on Thursday 6th May from 6:00am to 10:00 am and 2:00pm to 6:00pm. Recorded data is attached in **Appendix C** of this report.

SIDRA intersection modelling has been completed for the selected intersections under existing conditions and is attached in **Appendix D** of this report. All existing intersections operate at a good Level of Service, with a detailed comparison provided in Section 4.3 with regards to pre- and post-development conditions.

Given that traffic flow is generally consistent on a daily basis (as discussed above), it is expected that these modelling results are a good representation of background traffic behaviour.

Peak hour traffic volumes on the nominated study intersections are summarised in Figure 2.21 and Figure 2.22, with full survey results included in **Appendix C**.

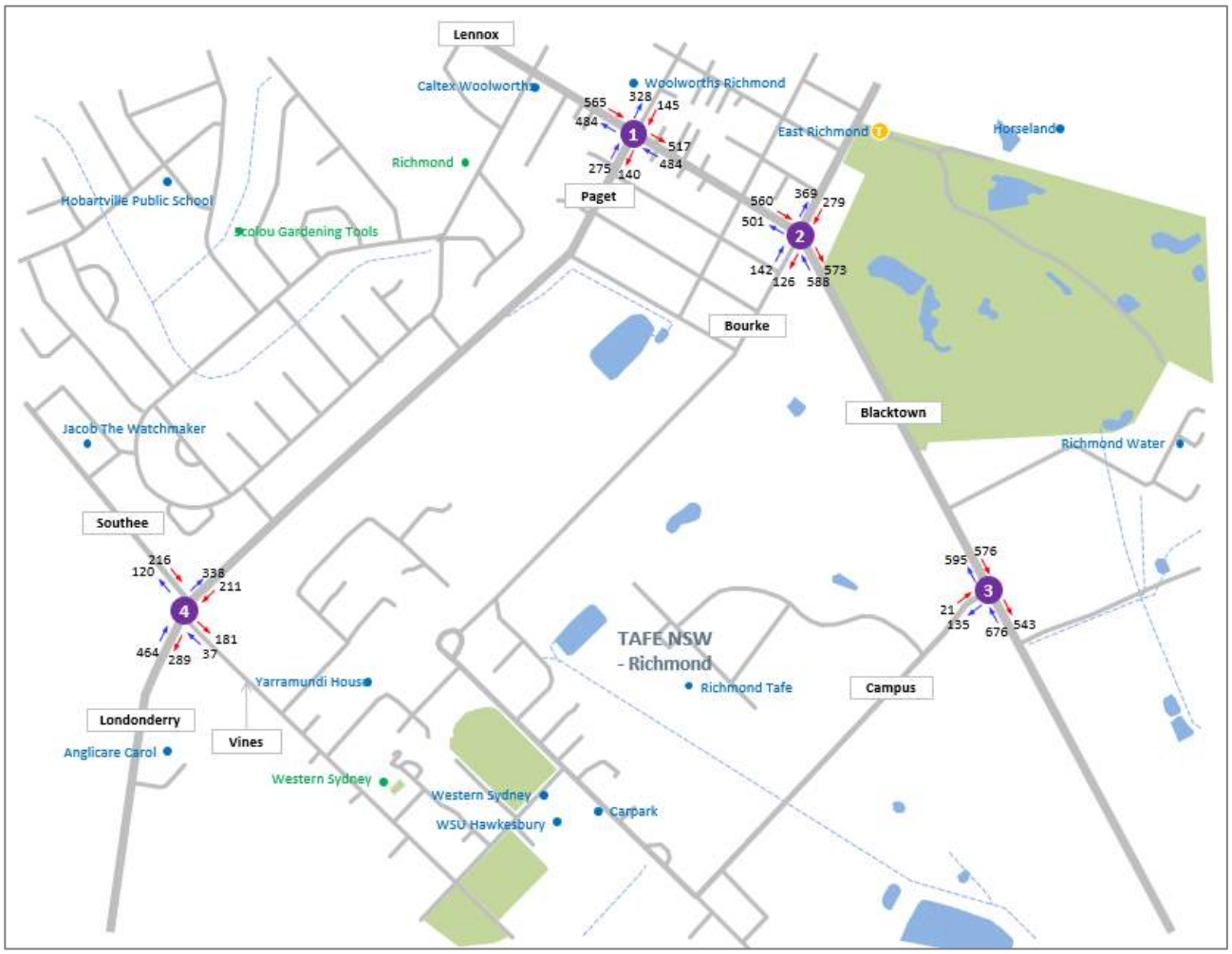


Figure 2.21: Trip Volume Summaries during AM peak (08:15am – 09:15am)

Figure 2.22: Trip Volume Summaries during PM peak (03:45pm – 04:45pm)

The projected background weekend traffic volumes were calculated based on the average weekend and Saturday volume comparison from the traffic volume along Vines Drive and Londonderry Road.

2.8 Intersection Analysis

2.8.1 Intersection Modelling

SIDRA intersection modelling has been completed for the selected study intersections under existing conditions. Table 2.6 and Table 2.7 show the summary of the existing weekday and weekend operation of the intersection respectively, with full results presented in **Appendix D**.

Table 2.6: Summary of Existing Conditions Intersection Modelling
Data for signalised intersections is intersection total
Data for unsignalised intersections is manoeuvre with worst delay

Intersection / Peak	2021 - Existing Operation Without Development			
	Average Delay (sec)	DoS	95% Queue Length (m)	LOS
Londonderry Rd / Vines Dr (AM)	11.8	0.071	1.8	**A**
Londonderry Rd / Vines Dr (PM)	10.7	0.161	4.1	**A**
Londonderry Rd / Southee Rd (AM)	9.2	0.301	8.8	**A**
Londonderry Rd / Southee Rd (PM)	10.1	0.179	4.4	**A**

Intersection / Peak	2021 - Existing Operation Without Development			
	Average Delay (sec)	DoS	95% Queue Length (m)	LOS
Lennox St / Paget St (AM)	11	0.604	33.2	**A**
Lennox St / Paget St (PM)	11.9	0.709	44.8	**A**
Blacktown Rd / Bourke St (AM)	18	0.443	74.3	**B**
Blacktown Rd / Bourke St (PM)	21.2	0.594	103.9	**B**
Campus Dr / Blacktown Rd (AM)	34.5	0.119	2.6	**C**
Campus Dr / Blacktown Rd (PM)	33.1	0.359	9.7	**C**

Table 2.7: Summary of modelling results for 2021 without development on existing layout - Weekend
Data for signalised intersections is intersection total
Data for unsignalised intersections is manoeuvre with worst delay

Intersection / Peak	2021 - Existing Operation Without Development (Weekend)			
	Average Delay (sec)	DoS	95% Queue Length (m)	LOS
Londonderry Rd / Vines Dr (AM)	7.1	0.01	0.2	**A**
Londonderry Rd / Vines Dr (PM)	7.7	0.052	1.3	**A**

2.8.2 Intersection Performance

Based on the results outlined in Table 2.6, the nominated study intersections operate at a satisfactorily level of service during both the AM and PM peak conditions. All intersections show a Degree of Saturation (DoS) well below the typical accepted limit of 0.85, with a maximum of 0.709.

2.9 Crash History

Transport for NSW provides a history of recorded crash data for the period between 2015 and 2019. This data is reviewed to better understand the existing levels of safe road operation at and around the site, and the potential implications of any increases to traffic volumes.

Figure 2.23 presents the crash and casualty statistics map from TfNSW.

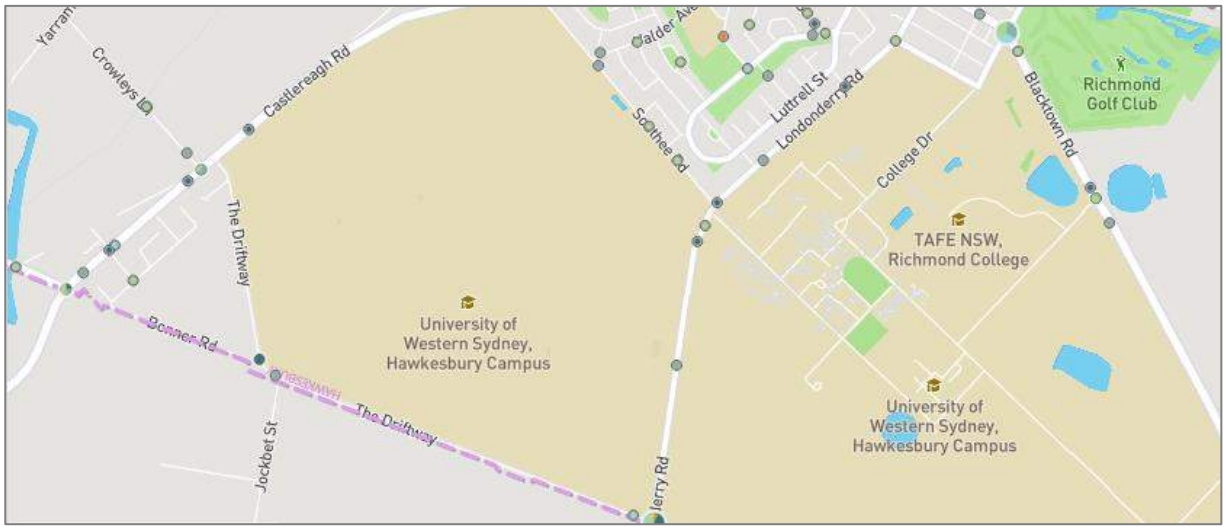


Figure 2.23: Crash and Casualty Statistics

Image Source: https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats

The data shows some serious and moderate injury incidents at surrounding streets. Non-casualty to serious injury incidents were recorded at the Londonderry Road and Blacktown Road.

Traffic impacts in this area should be carefully considered and treated for future developments.

2.10 External Projects

2.10.1 Richmond Bridge Duplication Project

Transport for NSW is planning to build a bridge over the Hawkesbury River between The Richmond and North Richmond area and upgrade major intersections with aim to increase capacity over the Hawkesbury River, reduce congestion between centres, improve travel times and improve connectivity for public and active transport. The overall Richmond Bridge Duplication Preferred option works are shown in Figure 2.24.

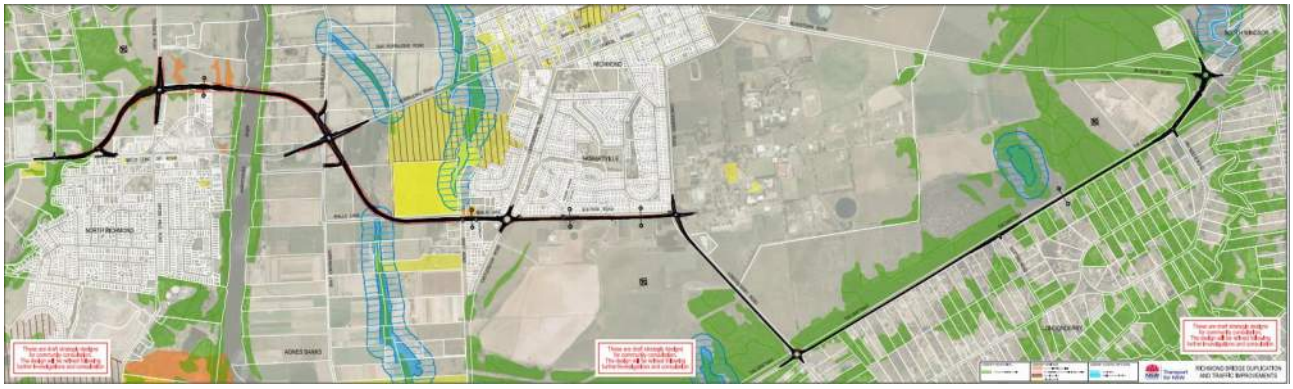


Figure 2.24: Richmond Bridge Duplication Preferred Option Plan Map

Image Source: https://roads-waterways.transport.nsw.gov.au/projects/01documents/richmond-area-projects/richmond-bridge-preferred-option-plan-map.pdf

The preferred option includes an upgrade of Londonderry Road-Vines Drive-Southee Road intersection to signalised intersection with a new road parallel to Southee Road between Castlereagh Road and Londonderry Road to separate local and through traffic as shown in Figure 2.25. The intersection upgrade is included in Stage 2 of the project that is expected to be completed in year 2026/2027.

Figure 2.25: Proposed new Southee Road – Vines Drive – Londonderry Road Intersection

Image Source: https://roads-waterways.transport.nsw.gov.au/projects/01documents/richmond-area-projects/richmond-bridge-preferred-option-plan-map.pdf

3 Proposed Development

3.1 Overall Works

The Hawkesbury Centre of Excellence is proposed with capacity up to a 325 students, 20 full-time employees including farm assistants, administration staff, teachers and up to 5 itinerant staff member, on-site accommodation facilities for up to 62 visiting students and teaching professionals from regional and rural NSW, and educational program and occasional school-related events visitors. The proposed development for the School are:

- Three academic blocks (Block B, C and D).
- Short-term accommodation with capacity for 62 patrons (Block F).
- Dining hall, recreation space and canteen (Block E).
- Administrative building (Block A).
- Support facilities for management and maintenance of site.
- External works to accommodate circulation and covered walkways between buildings.
- Pedestrian walkways.
- Student and staff amenities.
- Covered Outdoor Learning Areas.
- Staff car parking area and mini-bus drop off and pick up area.
- Short-term accommodation car parking area.
- Green House
- Various agricultural plots and associated agricultural workshop.
- Provision of waste facility area.
- Installation of all essential services including stormwater management devices where required.

The proposed site plan is illustrated in Figure 3.1.

Figure 3.1: Proposed site plan
Source: NBRS

3.2 School Operation

The School is expected to operate with the following activities:

- **General daily activity**
  - Richmond Agricultural College (7-12) – 540 students, 60% of time at CoE (remaining 40% of time at Richmond High School)
  - 325 students per day, plus 20 staff
- **Additional activity**
  - Agricultural programs for NSW schools (K-12)
  - 100 program visitors per day (including staff)
- **On-site accommodation**
  - 62 beds for visiting students and teaching professionals
  - Would be part of the 100 program visitors – no additional demand
- **Peak activity**
  - Event/ occasional school-related events facilities for up to 150 pax

Figure 3.2 shows the operational mode of the school. Based on these operations it is anticipated that a maximum of 450 people would be on-site at anytime in the highest demand scenarios.

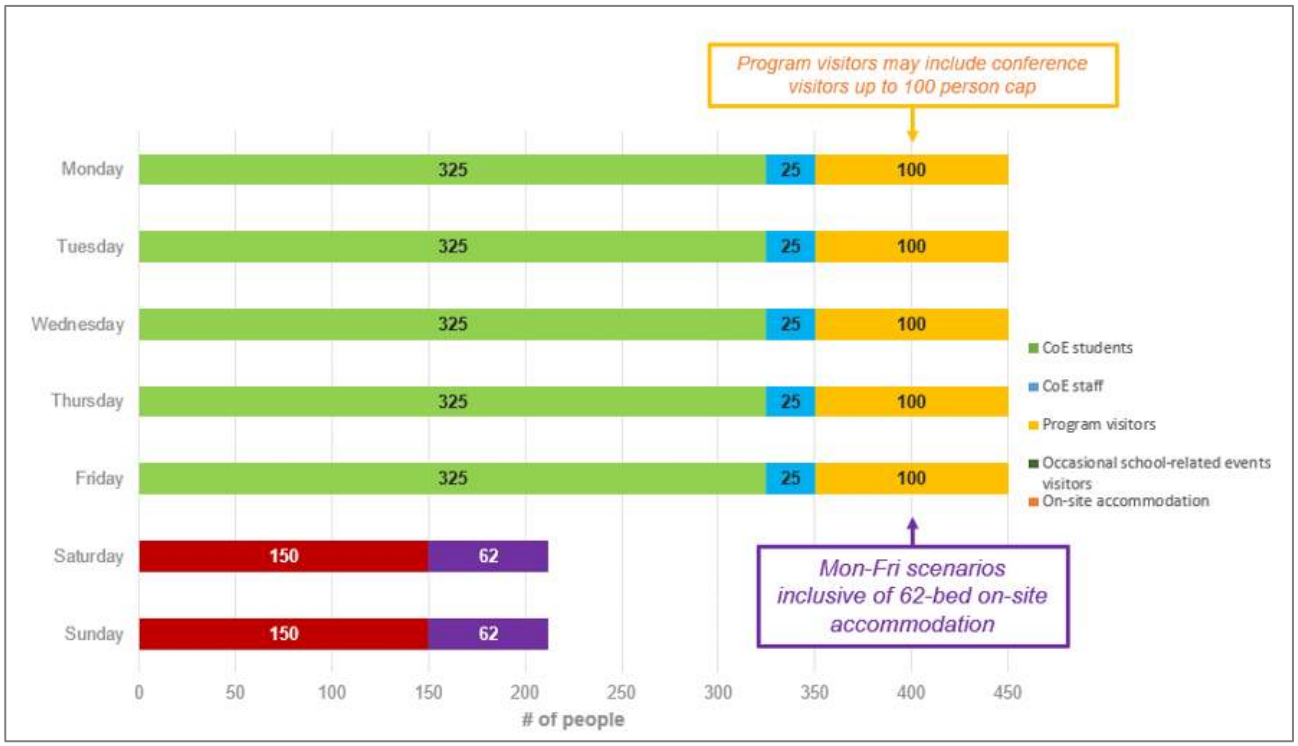


Figure 3.2: Operational Mode

3.3 Transport Context

Pedestrian footpaths, raised and zebra crossings are prevalent within the university and adjacent streets, but missing footpaths on Londonderry Road are of note. There is an existing cycle lane along the length of Blacktown Road. Transport context within the vicinity is shown in Figure 3.3.

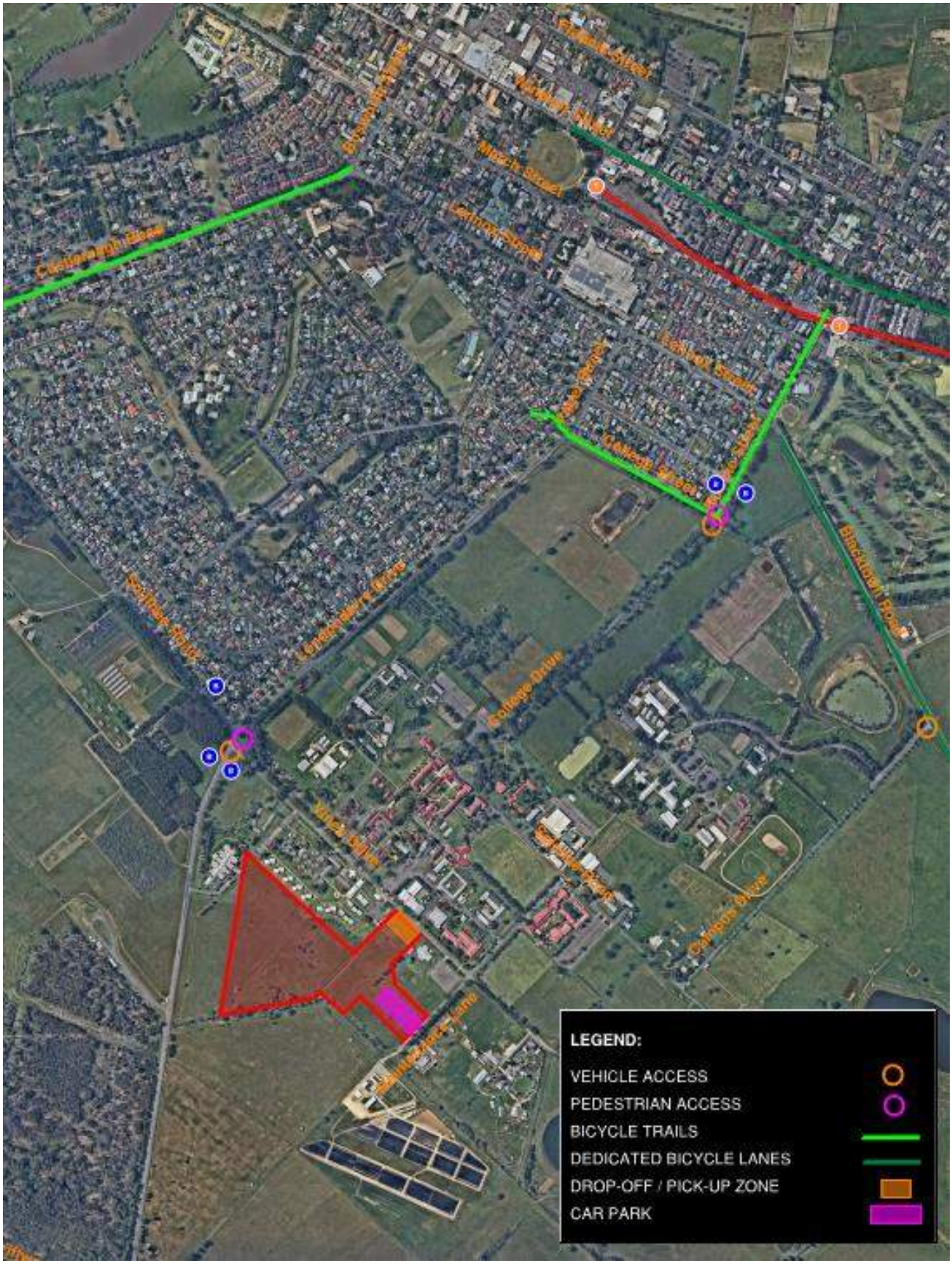


Figure 3.3: Transport Context

3.4 Site Access

3.4.1 Car Park Access

There will be vehicle access points on Vines Drive and along Maintenance Lane, to the drop-off and pick up area and main car park, respectively.

3.4.2 Pedestrian Access

The School site has a footpath provided on the opposite side of Vines Drive.

3.4.3 Emergency Vehicle Access

Emergency vehicles (e.g. police, ambulance, fire) access will remain in same location via the access along Vines Drive or via the Maintenance Lane. Emergency protocols for the school would include on-site staff assisting with emergency access. Any vehicle impeding the emergency vehicle access should be cleared, and any planned vehicle movements should be suspended.

3.4.4 Service and Loading Vehicle Access

A new service driveway is to be constructed along the southern boundary of the site connecting to Maintenance Lane.

The swept paths at the service facility are attached at **Appendix B**.

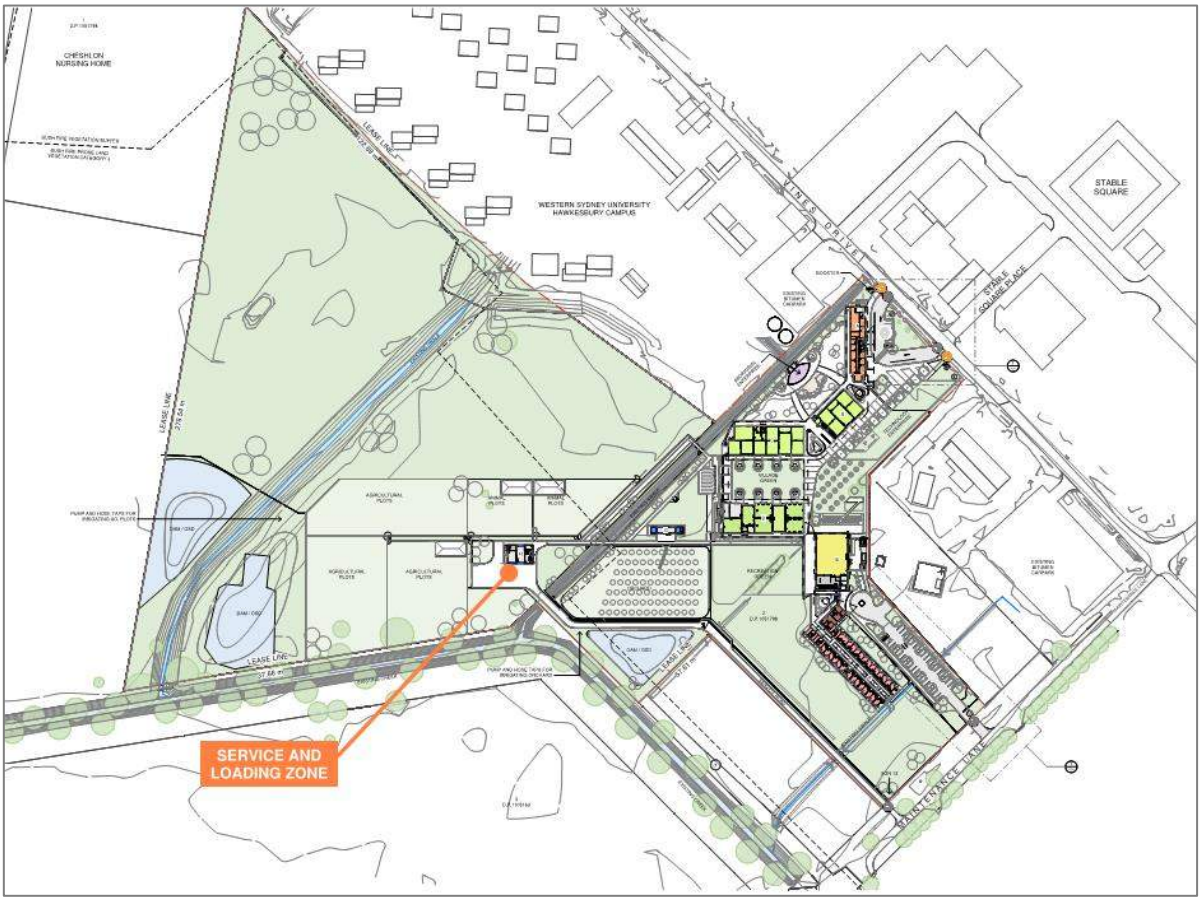


Figure 3.4: Proposed Loading Zone

3.5 Active Transport Facilities

On-site bicycle storage would be provided. Bike parking for 20 bikes will be available in the form of 10 U-rails or similar, in a lockable bike store area.

1 unisex shower / change area is provided for staff in Block A. It is recommended that lockers be installed for staff.

The on-site bicycle storage is located at Block E as shown in Figure 3.5.

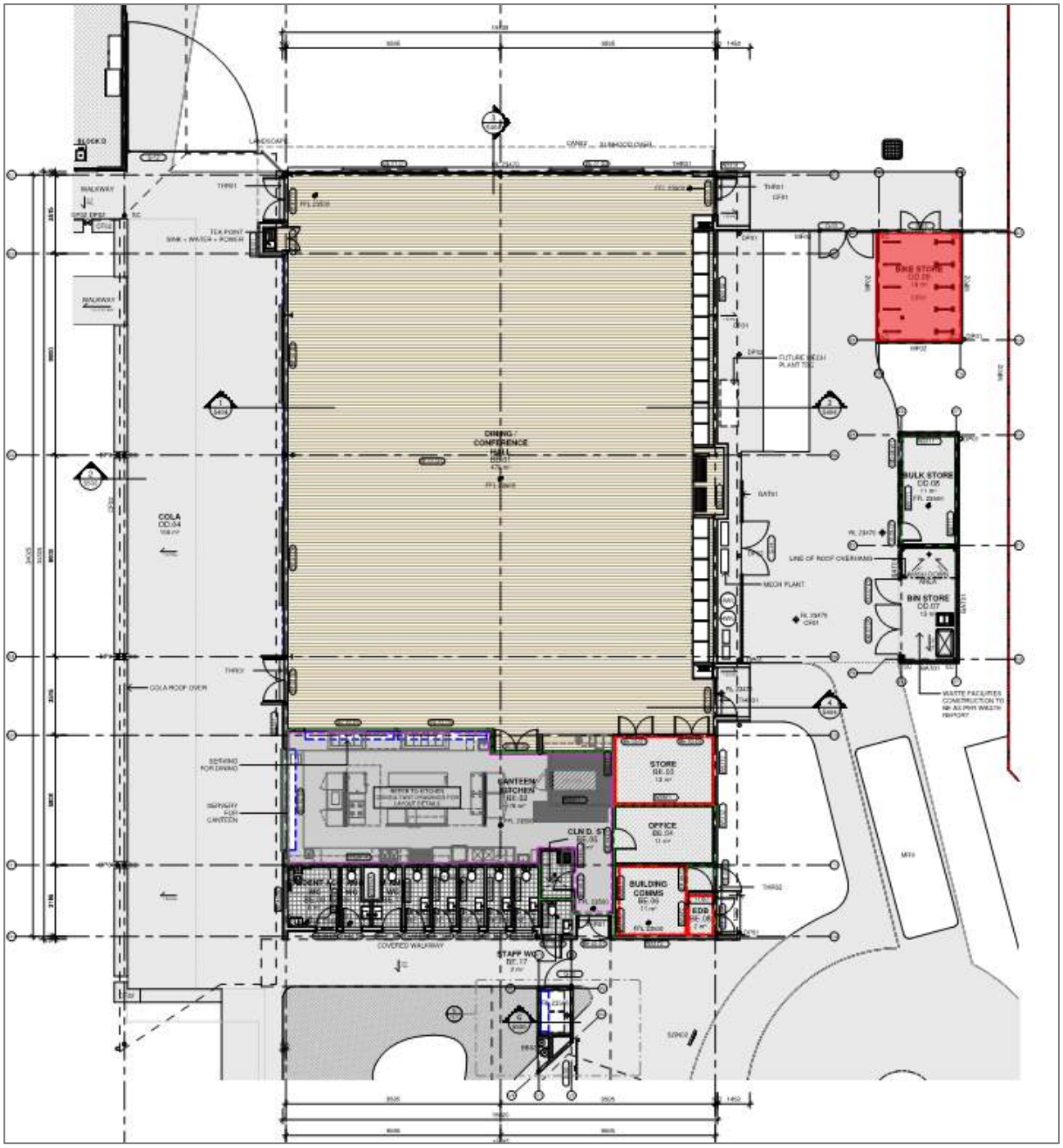


Figure 3.5: Proposed Bicycle Storage

3.6 Bus Zones

Public transport accessibility will be improved through construction of new formalised bus bays on Vines Drive within the WSU campus, as bus services from this interchange to Richmond and Penrith train stations forms a key part of the transport strategy for the site.

The Vines Drive bus bay will operate as the primary bus stop servicing the school. Both publicly operated school bus and public bus services will be using the bus bay. This bay has capacity for up to 3 to 4 buses at one time.

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

The proposed drop-off and pick-up area at the school provides approximately 45 metres or 7 vehicles of straight kerbside space, accessed from Vines Drive and located outside Block A. The entry is located east of the exit, such that vehicles movements to and from Londonderry Road would not overlap.

The adequacy of the proposed kiss & ride area is assessed in Section 4.8.

Drop-off and pick-up of students should not occur along Vines Drive as the road width does not sufficiently provide for parking lanes.

3.8 Car Parking

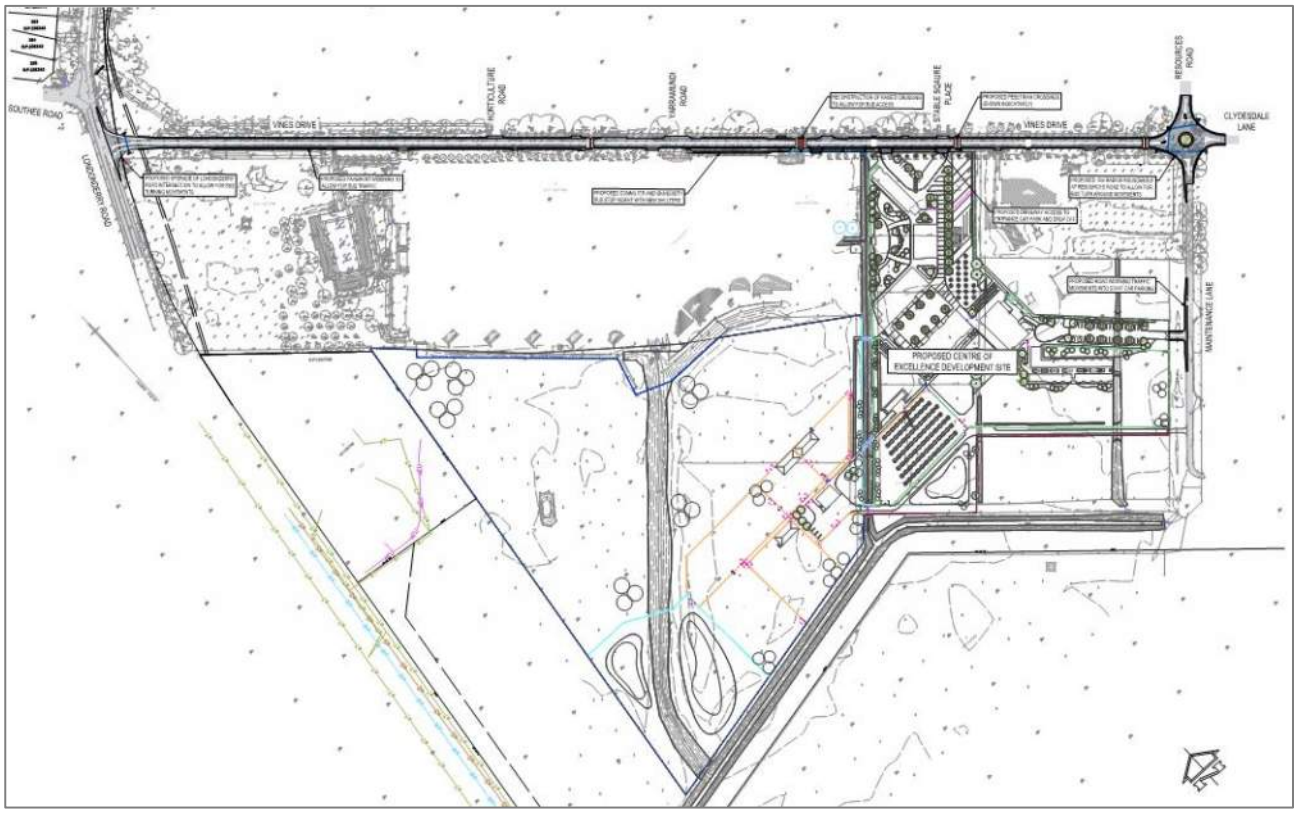
The main car park off Maintenance Lane is proposed with a capacity of 34 parking spaces including 1 accessible parking space. Additionally, 5 visitor parking spaces including 1 accessible parking space are provided outside the main administration block, with access from Vines Drive. Total on-site provision is therefore 39 parking spaces.

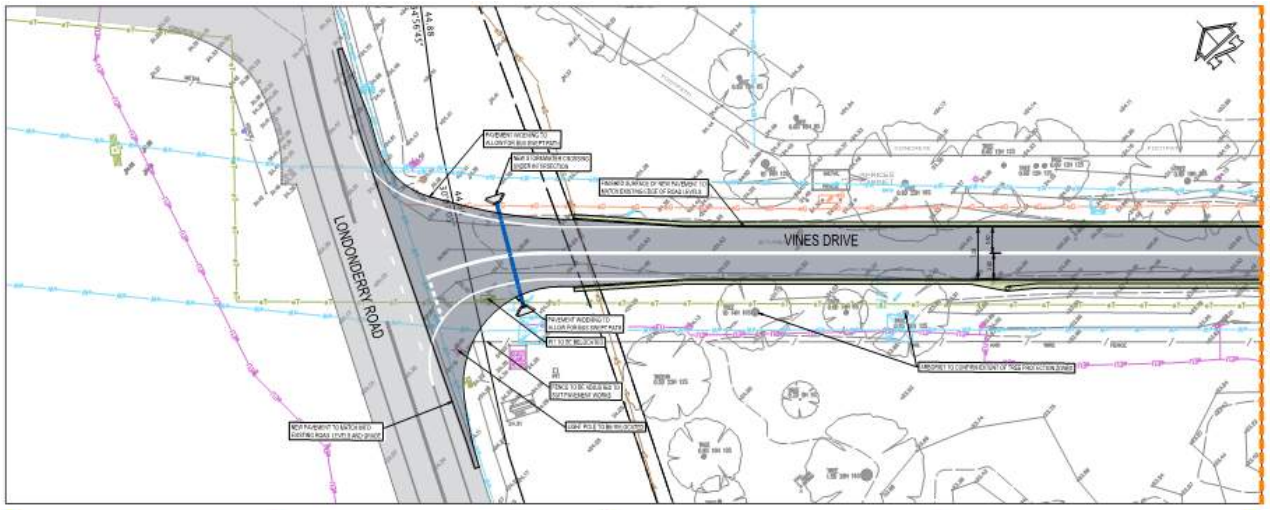
The usage and adequacy of the on-site car parking is further detailed in Section 4.7.

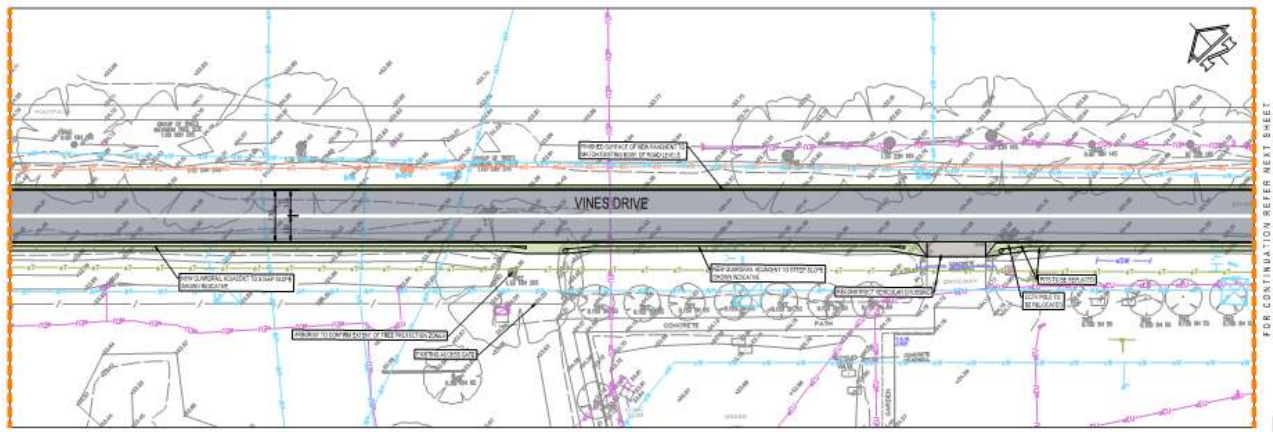
3.9 Infrastructure and Safety Improvements

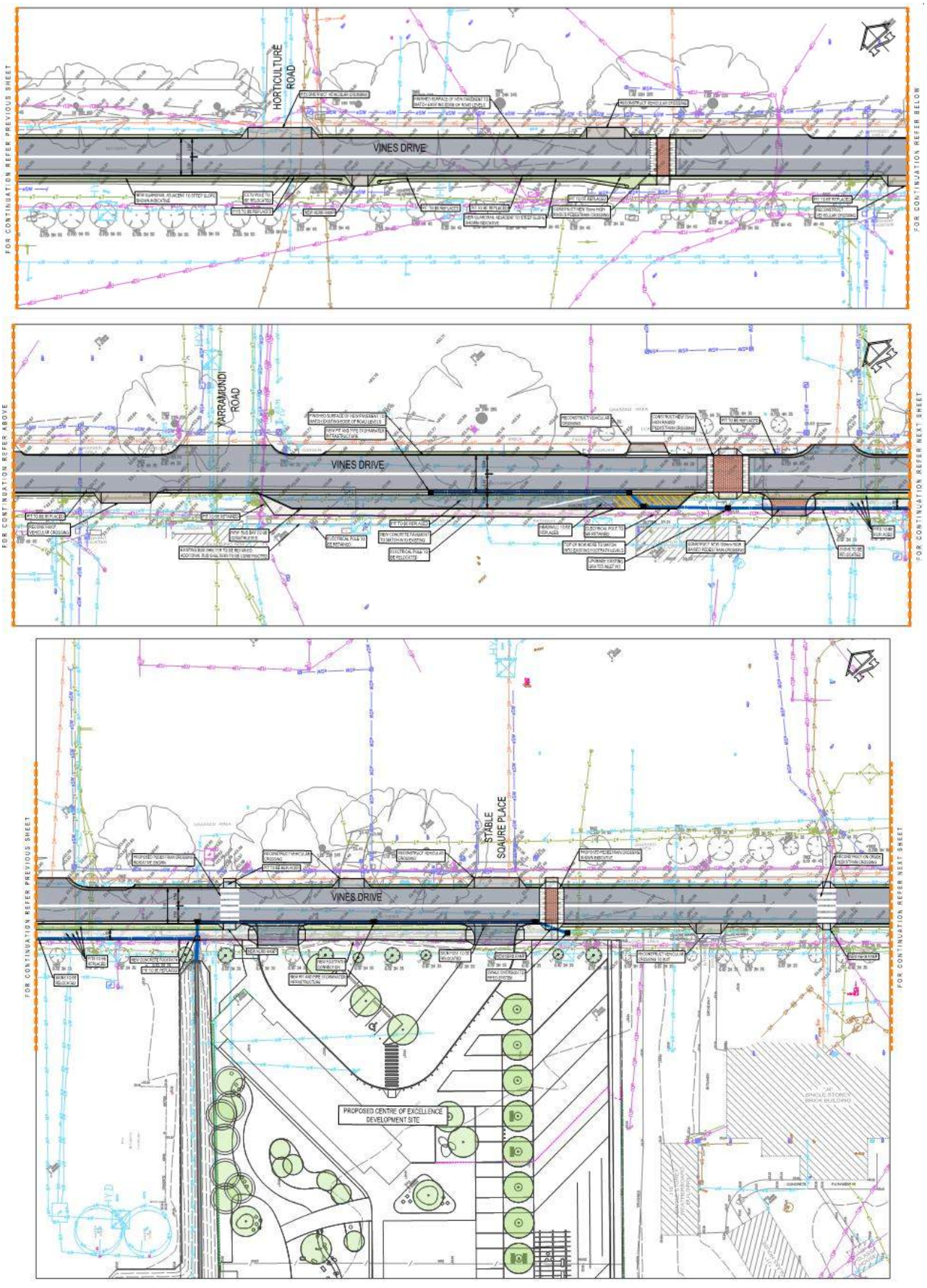
The existing Vines Drive – Londonderry Road intersection is to be maintained as a give-way intersection. However, widening of Vines Drive is proposed to accommodate the buses into WSU campus. The proposed widening of Vines Drive includes upgrade of Vines Drive-Maintenance Lane intersection to roundabout. Long bus bays are proposed in Vines Drive westbound direction near Campus Living Village.

The proposed Vines Drive upgrade concept is illustrated in Figure 3.6 and attached in Appendix F.


SOUTHEE ROAD
LONDONDERRY ROAD
VINES DRIVE
HORTICULTURE ROAD
YARRAMUNDI ROAD
STABLE SQUARE PLACE
RESOURCES ROAD
CLYDESDALE LANE
MAINTENANCE LANE
PROPOSED CENTRE OF EXCELLENCE DEVELOPMENT SITE


LONDONDERRY ROAD
VINES DRIVE
FOR CONTINUATION REFER BELOW


VINES DRIVE
FOR CONTINUATION REFER NEXT SHEET



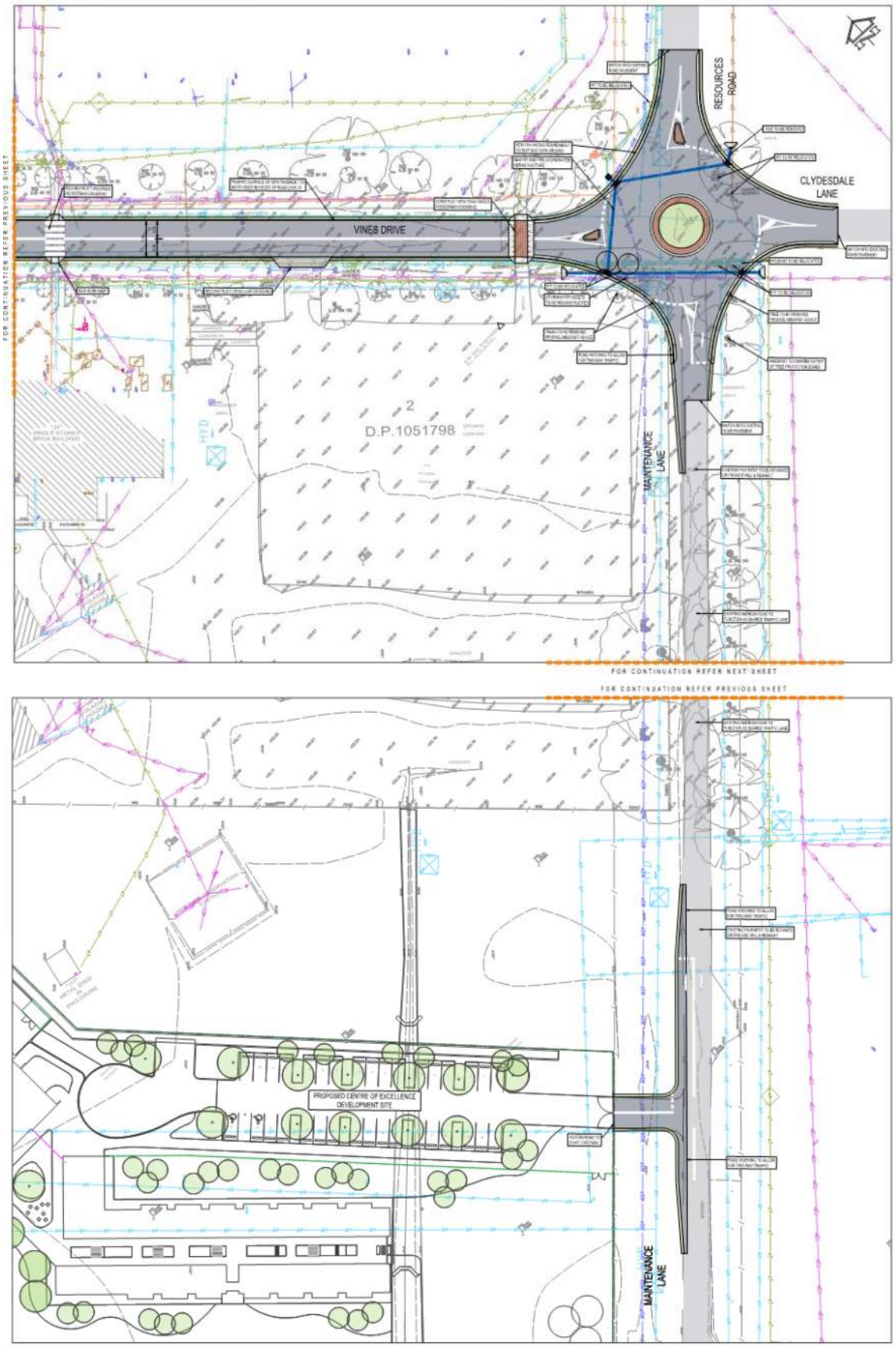


Figure 3.6: Proposed Londonderry Road – Vines Drive
Note: concept design only; subject to detailed design

This concept design would act as an interim solution until the implementation of TfNSW's works for Southee Road and Vines Drive. TfNSW has advised that the works under the current preferred corridor option would not be completed until 2026/27, which is in Stage 2 of a two-stage project. It is recommended that consultation continue following the approval of the Centre of Excellence development to assess the viability of any staged solutions. The proposed works on Vines Drive would not preclude any of TfNSW's proposed works taking place, and would interface with those works when completed.

As requested by the Department of Planning, Industry & Environment, a road safety audit for the proposed works and proposed vehicle/pedestrian operation of the Centre of Excellence has been undertaken. The audit report is attached at Appendix E. Based on the findings of the audit, the concept design has been adjusted where necessary, and will be further developed through the detailed design.

4 Operational Impacts

4.1 Travel Mode

This section contains details about the school's demand for each travel mode including private vehicle, public transport and active transport. This section analyses the current mode share statistics of Centre of Excellence in reference to the recent travel mode survey results and the JTW Mode Share data. This section should be read in conjunction with the preliminary School Transport Plan in Section 5 which analyses mode share demand in consideration of future targets, rather than the current requirements. The Plan contains strategies and management techniques to reduce dependency on private vehicle use and increase public and active transport use.

The current travel demands of Hawkesbury Centre of Excellence are summarised in Table 4.1 and Table 4.2 below. Across the varying operational modes and expected school activities, travel mode also varies.

Table 4.1 Travel mode expectations (%)

Travel Mode	Richmond Ag College Staff	Richmond Ag College Students	Program Visitors	Occasional school-related events visitors
Train	5%	60%	25%	10%
Connecting Bus	*5%*	*60%*	*25%*	*10%*
Bus (public)	-	-	75%	10%
Bus (private)	5%	30%	-	-
Car driver Inc. truck and motorbike	80%	4%	0%	80%
Car Passenger	8%	4%	0%	0%
Bicycle	0%	0%	0%	0%
Walk only	0%	0%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**

** Highest mode share for each operation*

Table 4.2 Travel mode expectations (numbers)

Travel Mode	Richmond Ag College Staff	Richmond Ag College Students	Program Visitors	Occasional school-related events visitors
Train	1	195	25	30
Connecting Bus	*1*	*195*	*25*	*30*
Bus (public)	1	98	-	-
Bus (private)	-	-	75	0
Car driver Inc. truck and motorbike	20	13	0	120
Car Passenger	2	13	0	0
Bicycle	0	0	0	0
Walk only	1	7	0	0
Total	**25**	**325**	**100**	**150**

** Highest mode share for each operation*

4.1.1 Background Traffic and Traffic Growth

To provide an accurate understanding of the future traffic conditions, modelling has been undertaken for the year 2031 assuming 10 years of traffic growth beyond the current 2021 conditions. Forecasts beyond this date are unlikely to provide accurate information due to uncertainties in the future transport scenario of the area that includes long-term transport and road network changes and changing behaviour of school users.

Background traffic growth across the forecast period has been assumed at 1.0% per annum. While this is a typical growth factor used where historical data is unavailable, it is also highly representative of the population growth in the local area. Between 2006 and 2016, the population in the Richmond-Windsor SA3 statistical area grew from 35,366 to 38,163, an annual growth of 0.76%. Population in the greater Outer West and Blue Mountains SA2 statistical area grew from 285,376 to 318,255, an annual growth of 1.10%.

4.2 Trip Distribution

SIDRA intersection modelling has been completed for the selected intersections for projected weekend and weekday future conditions due to background growth and is attached in **Appendix C** of this report. See Section 4.6.5 for a full comparison of pre- and post-development operations.

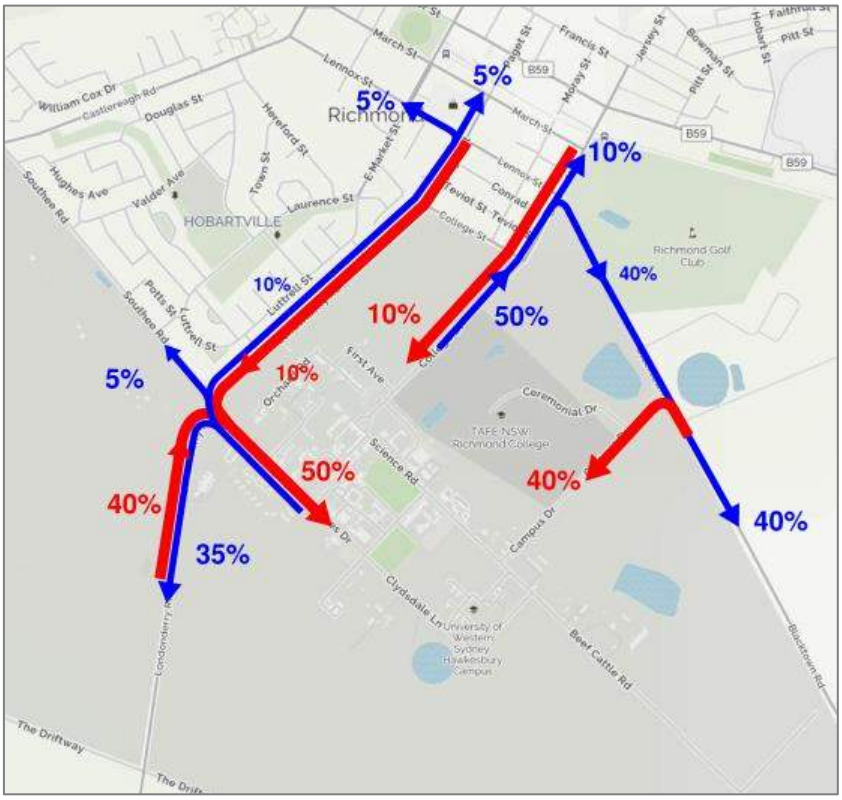


Figure 4.1: Development trip distribution

4.3 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 10-year time period. Assessment of existing conditions (without the development) was addressed in Section 2.8.

4.3.1 Weekday Conditions

The transport strategy for this site requires a large number of pedestrians to be able to travel by bus, either to Richmond or Penrith stations or directly to and from home. Therefore, an upgrade of Vines Drive is proposed as discussed in Section 3.9 in order to accommodate buses and provide a bus bay facility. At the T-intersectino

of Vines Drive and Londonderry Road, geometry would be adjusted to accommodate these bus turning movements, however the T-intersection function would be retained.

No changes are proposed to other intersections around the site.

The performance of nearby intersections with existing background traffic without and with the development traffic generated has been assessed using SIDRA.

The results shown in Table 4.3 - Table 4.6 are the scenarios with Londonderry Road-Vines Drive as the existing giveway intersection without and with development traffic.

Table 4.3: Summary of modelling results for 2021 without development on existing layout - Weekday

Data for signalised intersections is intersection total
Data for unsignalised intersections is manoeuvre with worst delay

Intersection / Peak	2021 - Existing Operation Without Development			
	Average Delay (sec)	DoS	95% Queue Length (m)	LOS
Londonderry Rd / Vines Dr (AM)	11.8	0.071	1.8	**A**
Londonderry Rd / Vines Dr (PM)	10.7	0.161	4.1	**A**
Londonderry Rd / Southee Rd (AM)	9.2	0.301	8.8	**A**
Londonderry Rd / Southee Rd (PM)	10	0.179	4.4	**A**
Lennox St / Paget St (AM)	11	0.604	33.2	**A**
Lennox St / Paget St (PM)	11.9	0.709	44.8	**A**
Blacktown Rd / Bourke St (AM)	18	0.443	74.3	**B**
Blacktown Rd / Bourke St (PM)	21.2	0.594	103.9	**B**
Campus Dr / Blacktown Rd (AM)	34.5	0.119	2.6	**C**
Campus Dr / Blacktown Rd (PM)	33.1	0.359	9.7	**C**

Table 4.4: Summary of modelling results for 2021 with development on existing layout- Weekday

Data for signalised intersections is intersection total
Data for unsignalised intersections is manoeuvre with worst delay

Intersection / Peak	2021 - Existing Operation With Development			
	Average Delay (sec)	DoS	95% Queue Length (m)	LOS
Londonderry Rd / Vines Dr (AM)	10.4	0.07	1.6	**A**
Londonderry Rd / Vines Dr (PM)	10.2	0.174	4.3	**A**
Londonderry Rd / Southee Rd (AM)	9.3	0.303	8.9	**A**
Londonderry Rd / Southee Rd (PM)	10	0.18	4.4	**A**
Lennox St / Paget St (AM)	11	0.604	33.2	**A**
Lennox St / Paget St (PM)	11.9	0.709	44.8	**A**
Blacktown Rd / Bourke St (AM)	18	0.443	74.3	**B**
Blacktown Rd / Bourke St (PM)	21.1	0.58	103.9	**B**
Campus Dr / Blacktown Rd (AM)	34.5	0.119	2.6	**C**
Campus Dr / Blacktown Rd (PM)	34.1	0.368	10	**C**

Table 4.5: Summary of modelling results for 2031 without development on existing layout - Weekday
Data for signalised intersections is intersection total
Data for unsignalised intersections is manoeuvre with worst delay

Intersection / Peak	2031 - Existing Operation Without Development			
	Average Delay (sec)	DoS	95% Queue Length (m)	LOS
Londonderry Rd / Vines Dr (AM)	13.3	0.091	2.3	**A**
Londonderry Rd / Vines Dr (PM)	11.8	0.197	5	**A**
Londonderry Rd / Southee Rd (AM)	10.2	0.357	11.3	**A**
Londonderry Rd / Southee Rd (PM)	10.9	0.216	5.3	**A**
Lennox St / Paget St (AM)	11.4	0.677	39.3	**A**
Lennox St / Paget St (PM)	13.2	0.795	56.7	**A**
Blacktown Rd / Bourke St (AM)	18.2	0.507	87.1	**B**
Blacktown Rd / Bourke St (PM)	23.3	0.724	122	**B**
Campus Dr / Blacktown Rd (AM)	44	0.167	3.5	**D**
Campus Dr / Blacktown Rd (PM)	46.7	0.496	15.7	**D**

Table 4.6: Summary of modelling results for 2031 with development on existing layout - Weekday
Data for signalised intersections is intersection total
Data for unsignalised intersections is manoeuvre with worst delay

Intersection / Peak	2031 - Existing Operation With Development			
	Average Delay (sec)	DoS	95% Queue Length (m)	LOS
Londonderry Rd / Vines Dr (AM)	13.5	0.102	2.5	**A**
Londonderry Rd / Vines Dr (PM)	12	0.22	5.7	**A**
Londonderry Rd / Southee Rd (AM)	10.3	0.359	11.4	**A**
Londonderry Rd / Southee Rd (PM)	11	0.218	5.4	**A**
Lennox St / Paget St (AM)	11.4	0.678	39.3	**A**
Lennox St / Paget St (PM)	13.2	0.796	56.7	**A**
Blacktown Rd / Bourke St (AM)	18.9	0.51	89.7	**B**
Blacktown Rd / Bourke St (PM)	22	0.705	122	**B**
Campus Dr / Blacktown Rd (AM)	44.8	0.171	3.6	**D**
Campus Dr / Blacktown Rd (PM)	48.7	0.511	16.3	**D**

4.3.2 Weekend Conditions

The SIDRA analysis consider the intersection of Londonderry Road-Vines Drive in weekend AM and PM peak periods. These conditions demonstrate the performance of the intersection under existing layout in weekend projected traffic volumes and with expected 100 trips as worst case scenario from the development occasional school events.

The results shown in Table 4.7 to Table 4.9 provide the modelling outcomes under weekend forecast conditions.

Table 4.7: Summary of modelling results for 2021 with development on existing layout - Weekend
Data for signalised intersections is intersection total
Data for unsignalised intersections is manoeuvre with worst delay

Intersection / Peak	2021 - Existing Operation With Development (Weekend)			
	Average Delay (sec)	DoS	95% Queue Length (m)	LOS
Londonderry Rd / Vines Dr (AM)	7.4	0.033	0.8	**A**
Londonderry Rd / Vines Dr (PM)	7.9	0.077	1.9	**A**

Table 4.8: Summary of modelling results for 2031 without development on existing layout - Weekend
Data for signalised intersections is intersection total
Data for unsignalised intersections is manoeuvre with worst delay

Intersection / Peak	2031 - Existing Operation Without Development (Weekend)			
	Average Delay (sec)	DoS	95% Queue Length (m)	LOS
Londonderry Rd / Vines Dr (AM)	7.4	0.011	0.3	**A**
Londonderry Rd / Vines Dr (PM)	8	0.06	1.5	**A**

Table 4.9: Summary of modelling results for 2031 with development on existing layout - Weekend
Data for signalised intersections is intersection total
Data for unsignalised intersections is manoeuvre with worst delay

Intersection / Peak	2031 - Existing Operation With Development (Weekend)			
	Average Delay (sec)	DoS	95% Queue Length (m)	LOS
Londonderry Rd / Vines Dr (AM)	7.5	0.034	0.8	**A**
Londonderry Rd / Vines Dr (PM)	8.1	0.082	2	**A**

4.4 Public Transport

4.4.1 Bus

The travel survey produced the results shown in Table 4.10 projecting a bus demand of 98 students.

Table 4.10: Bus demand forecasts

User Type	% of Total School using Bus	Number of Users
Students	30%	98
Staff	5%	1

Further details regarding the operation and adequacy of the local bus infrastructure is located in Section 4.9.

4.4.2 Train

Table 4.11 summarises the current and forecasted number of students and staff using train services according to the travel survey.

Table 4.11: Train demand forecasts

User Type	% of Total School using Train connect via bus	Number of Users
Students	60%	195
Staff	5%	1

4.5 Pedestrians

The current and forecasted numbers of pedestrians walking to the school are summarised in Table 4.12. The pedestrian facilities at and around the site including footpaths, pedestrian crossings and access gates, need to support a future demand of students and staff.

Table 4.12: Pedestrian Demand

Travel Mode	Richmond Ag College Staff	Richmond Ag College Students	Program Visitors	Occasional school-related events visitors
Train (connecting by bus)	1	195	25	30
Walk only	1	7	0	0
Bus only	1	98	0	0
Total	**3**	**300**	**25**	**30**

The provision of pedestrian footpaths on the local road network and appropriately placed zebra crossings support a high mode share. The school has five entry points, including two along the main site frontage. These entrances provide access in the northern, southern and western regions of the site. These facilities support the forecast walking demand of 300 students and staff and are expected to sustain the increase in pedestrian numbers as the school grows.

4.6 Cyclists

According to the JTW and Richmond High School mode share data, 1% of students and 0% of workers are estimated to ride a bicycle to the school. However, the travel mode survey revealed that not one student or staff member utilised this travel mode. This is not considered an accurate representation of the future demand and bicycle facilities are still to be included in the design.

20 bike storage spaces are proposed to be provided in a lockable bike store area. This would allow for substantial increases in travel by bike, which would be encouraged through the School Transport Plan.

4.7 Car Parking

4.7.1 Rates and Requirements

Hawkesbury Council's DCP requires that parking be required generally in accordance with the following rates for schools and educational establishments as detailed in Table 4.13.

Table 4.13: DCP parking calculations

Land Use	DCP Rates	Operations	Parking Demand
Schools and Educational Establishment	1 space for each staff, plus	25 staff members (including farm, admin and teaching plus up to 5 itinerant staff between campuses)	25 parking spaces
	Space for delivery vehicles and buses, plus	-	
	1 space per 5 seats or 1 space per 7m^2 of floor area in assembly hall, whichever is greater, plus	150 seats – Dining / School Event Hall	30 parking spaces
	1 space per 3 year 12 students.	55 year 12 students	18 parking spaces
TOTAL			73 parking spaces

4.7.2 Car Parking Provision

It is proposed to provide a total of 39 parking spaces on the site, which is less than the DCP parking calculation.

It should be noted that for the operation of the School, the Dining / School Event Hall would either be used by students and staff already on the site (thereby creating zero demand), or would be used for occasional school-related events and event functions outside school times and weekends at which point the shared usage of WSU parking would apply. Therefore, if this category is removed from the DCP calculations, the resulting calculation would be 43 spaces. The proposed provision is therefore only marginally below the suggested DCP provision. Relative to the overall WSU parking capacity of 1,516 parking spaces, this shortfall to the DCP rate of only 4 spaces is negligible and would not affect the university.

As noted in Section 4.1, it is estimated that approximately 20 staff members and 13-15 students are expected to drive to the site. These volumes, plus some allowance for visitor parking, would be accommodated within the Centre of Excellence car park and would therefore have no reliance on the remainder of the WSU campus. Overflow parking for peak CoE usage (e.g. occasional school-related events) would be on arrangement with WSU, in available parking areas such as the adjacent P47 car park.

Overall, the strategy for provision of parking is consistent with the transport strategy of the development as proposed to the Transport Working Group and achieves the sustainable transport goals of the project and of state planning policies more broadly.

4.7.3 Design Compliance

Car parking will be designed to be compliant with the latest Australian Standard AS2890.1. The car park is generally classified as a Class 2 car park (to cater for visitors and occasional users), comprising 2.5m wide spaces and 5.8m wide parking aisles.

The existing P47 car park, which will act as an overflow car park in high-usage scenarios, would be maintained in its existing condition and layout.

4.7.4 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 conservative rate of 1 space for every 100 car parking spaces or part thereof (1%). Therefore with a capacity of 39 spaces, thedevelopment is required to provide a minimum of 1 accessible parking space.

The proposed design provides 2 accessible spaces, 1 located at the parking area adjacent to Block A and 1 in the staff car park, complying with the BCA.

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

The most significant impacts at any school usually occur around school start and finish times, particularly during the afternoon pick-up period as families arrive in advance and queue to collect their children. All activity typically clears in a period of 15-20 minutes. Morning drop-off is less impacting to traffic, as activity is spread over a longer time (45-60 minutes) and does not require vehicles to queue and wait.

The functional capacity of the kiss & ride zone is assessed as follows:

- Total capacity: 7 vehicles (as detailed in Section 3.7)
- Peak period: 15 minutes (PM)
- Vehicle turnover time: 90 seconds
- Vehicle cycles: 10 per peak period
- **Vehicle flow capacity: 70 vehicles per peak period**

This capacity will be sufficient to cater for the forecast usage levels. It is also noted that the morning peak period is twice as long (allowing double the potential flow, or accommodating longer turnover times), and that kiss & ride demand is generally lower in the afternoon than the morning (resulting in lower total demands).

4.9 Bus Zones

The Vines Drive bus bay will operate as the primary bus stop servicing the school. Both publicly operated school bus and public bus services will be using the bus bay. This bay has capacity for up to 3-4 buses at one time.

The overall estimated demand for bus movements, including bus connections to and from Richmond and Penrith train stations, is approximately 300 persons, which is the equivalent to approximately 6 buses. Therefore, the Vines Drive bus bay would have sufficient capacity to cater for these buses in 2 cycles or less.

5 School Transport Plan

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 Plan contains travel plan objectives for the development, the proposed design features that contribute to meeting these objectives, and management strategies intended to fulfil the outlined objectives.

This preliminary School Transport Plan 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 School Transport Plan and strategies to improve infrastructure. This document is preliminary in nature and is intended to be dynamic and respond to the future operation of the site. It is anticipated that this preliminary STP will be developed into a more comprehensive and final 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.

The Plan provides a review of existing facilities and travel habits and offers estimations and targets for future sustainable travel use. Details of the site's sustainable travel objectives are outlines in this section and includes specific programs, design features and actions proposed to help achieve these goals.

5.1 Transport Goals

5.1.1 Vision and Objectives

The vision and objectives of the preliminary School Transport Plan for the Centre of Excellence are:

- To proactively identify and meet school travel demand safely, efficiently and sustainably
- To deliver transport infrastructure to meet school travel demand
- To decongest the road networks around the school
- To empower children and young people to be safe road and transport users now and into the future

5.1.2 Mode Share Target

The mode share targets for the site are outlined in Table 5.1.

Table 5.1 Travel mode targets

Travel Mode	Richmond Ag College Staff	Richmond Ag College Students	Program Visitors	Occasional school-related events Visitors
Train	5%	60%	25%	10%
Bus (public)	-	-	75%	10%
Bus (private)	5%	30%	-	-
Car driver Inc. truck and motorbike	80%	4%	0%	80%
Car Passenger	7%	3%	0%	0%
Bicycle	1%	1%	0%	0%
Walk only	0%	0%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**

5.2 Policies and Procedures

The transport policies and procedures to be implemented for the Centre of Excellence are:

- Prioritise multi-model transport access
- Access policies for car parking on the CoE and WSU car parks
- Information campaigns to staff, students, and visitors
- Group travel to be coordinated by schools, utilising dedicated transport

5.3 School Transport Operations

5.3.1 Site Transport Access

An overview of transport access to the site is illustrated in Figure 5.1.

Figure 5.1: Site transport access

5.3.2 Day-to-day Operations

Emergency Vehicles

Emergency vehicles are the highest priority vehicle types requiring access to the school. Vines Drive and Maintenance Lane are both nominated emergency vehicle access points, meaning emergency vehicles share access with private vehicles, service and delivery vehicles. Though the CoE and the WSU campus are generally a low speed environment, high speed emergency movements may be required. Emergency vehicle access to the agricultural facilities shall be made available at all times.

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 parked within car parks, vehicles at the pick-up and drop-off area, and Vines Drive bus layby. 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.

The main pedestrian facility requiring management includes the Vines Drive bus bay and any internal movements within the WSU campus which would cross Vines Drive. The management of these areas should be coordinated with WSU and its user groups through the life of the development.

Public Transport

The travel demands for students and staff travelling to the site via bus are expected to be a high portion of total demand, comprising both bus-only travel and bus connection to local train stations. This will increase as the school population increases.

The Vines Drive bus bay will operate as the primary bus stop servicing the school. Both publicly operated school bus and public bus services will be using the bus bay. This bay has capacity for 3 to 4 buses at one time, and careful organisation is important for the smooth operation of this facility. Suggestions for bus bay management techniques are provided in Table 5.2.

Table 5.2: Bus Bay Management Options

Option	Description
1	Allocate zones along the bus bay for different bus numbers so that students can easily locate the appropriate bus. Students would wait in this zone until the bus arrives.
2	Organise students into queues according to their desired bus number within the school site. This allows for students to be removed from the main roadway to encourage student safety. A staff member would then lead the queue of students to the relevant bus at the appropriate time.

The low frequency of the 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 (Busways) if deemed appropriate. This scheme has been explored with Transport for NSW during preparation of the EIS.

Pick-up and Drop-off

Pick-up and drop-off facilities are expected to attract low volumes of private vehicles due to the location and operations of the site and lack of a school catchment. These demands will occur for short periods of time in the morning and afternoon. It is anticipated that minimal congestion should occur, however should be safely managed. If left unattended, this may present a potential risk to pedestrian and vehicle driver safety.

Activities relating to pick-up and drop-off can produce significant safety concerns and impacts on the local traffic condition. Accordingly, PUDO zones require deliberate management to ensure user safety and maintain an acceptable traffic flow. Table 5.3 outlines a technique that may be implemented.

Table 5.3: **Recommended PUDO Zone Management Techniques**

Technique	Description
Staff to be stationed in zone	• Stationing a staff member in the PUDO zone is likely to encourage sensible user behaviours. Any unsafe student behaviour or reckless driver behaviour can be reported to the school principal for further investigation. • Staff members can assist drivers in locating spare parking spaces • Staff members can encourage drivers to pull up to the space furthest along the zone to maximise capacity. • If applicable, a staff member may be stationed at any nearby pedestrian crossing/s to assist with conserving traffic flows and keeping students safe.

The on-site pick-up and drop-off zone would also facilitate private coach movements for program visitors and potential occasional school-related events groups. These groups will need to be coordinated outside morning and afternoon school peak times, to avoid conflict or overlap with cars using the same space. Buses may temporarily block parts of the visitor car park when dropping off or picking up and should move on promptly to other storage locations (or not arrive significantly ahead of schedule) if a particular vehicle is expected to cause blockages.

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 anticipated to be high for this site location, the safety and sustainability of private vehicle travel result in this being a low priority mode. Nevertheless, to ensure 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 the Maintenance Lane. The parking can be accessed from this point via the parking aisles as seen in Figure 5.2.

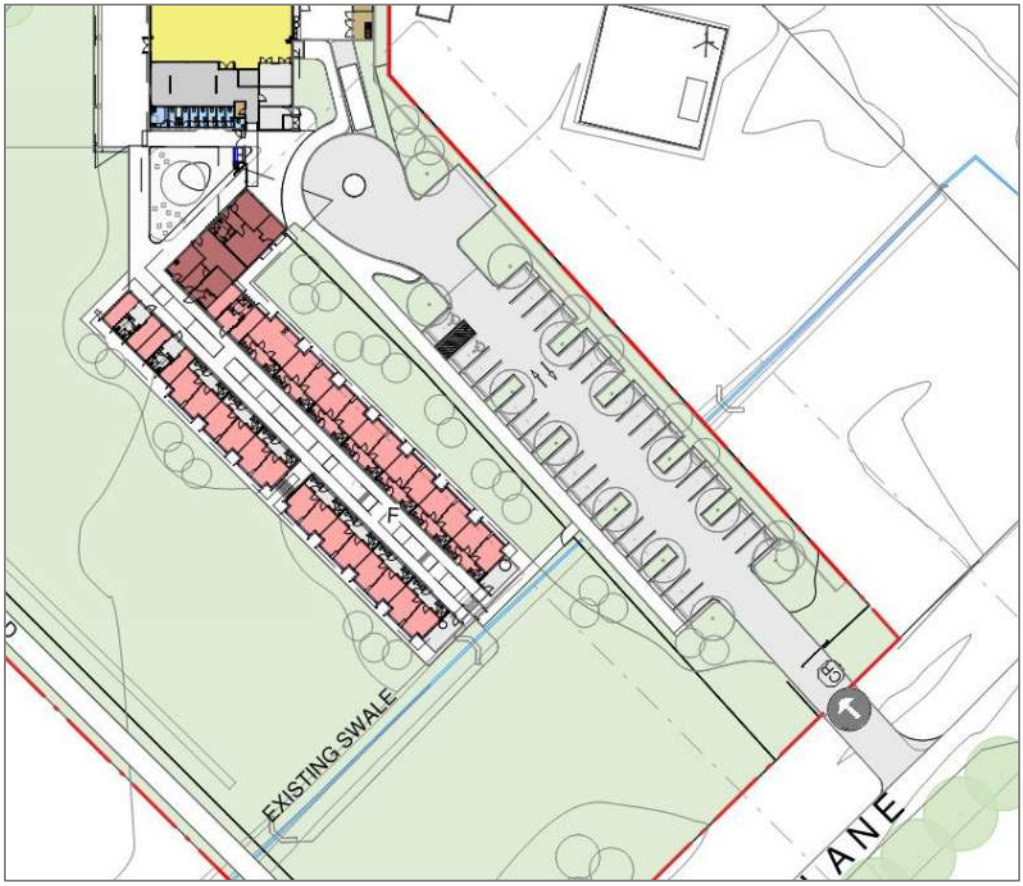


Figure 5.2: Car Parking Access

This car park is for the exclusive use of staff members, and the Maintenance Lane access is to be closed to the public, including parents and carers wishing to pick-up or drop-off students. One suggestion to regulate the car park use is to install boom gates at the entrance. This method requires staff to have a parking pass in order to gain access to the car park.

Overflow parking for peak usage periods (e.g. occasional school-related events) would be on arrangement with WSU, in available parking areas such as the adjacent P47 car park.

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 agricultural purposes, while medium rigid vehicles are expected for services or deliveries. Waste collection occurs southeast and is available via the Maintenance Lane vehicle access.

Delivery and service vehicles will enter the site in a forward direction via the Maintenance Lane access. On completion of unloading or servicing activities, the truck should exit the site from the same access in a forward motion. The final arrangements for internal movement of delivery and service vehicles will be finalised in the detailed design stage.

All delivery and service trucks are advised to be fitted with reversing alarms and cameras to assist truck drivers in performing reverse manoeuvres and avoiding any conflict with other vehicles and pedestrians. Given that deliveries are generally occurring outside of school hours, there is a minimal chance for any such conflict to occur. However, some agricultural deliveries may be required to occur during school hours or may form part of the agricultural curriculum. In any case, 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 school hours either before 8:00am or after 3:20pm. Other considerations for the scheduling of deliveries include:

- Personnel to be available to marshal vehicles through the site for access to the main loading areas (to manage conflict and movements through pedestrian areas)
- 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.

5.3.3 Event Transport Operations

Occasional school-related events and visitor events on the site will be managed on a specific arrangement.

The primary travel mode for general program visitors will be via private coach, to be organised by individual schools as required. The on-site drop-off and pick-up area will be used for this function and is to be coordinated outside morning and afternoon peak school periods.

Occasional school-related events are generally expected to occur on weekends, when public transport availability is reduced, and private car mode share is therefore expected to be high. On-site parking within the University campus will be made available on arrangement between the School and the University.

5.3.4 Transport Programs

Ride 2 School Day and Health Events

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 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.

Carpooling / Liftango

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 region or place of residence.

Off-the-shelf alternatives such as the Liftango app may also be an option for staff to utilise.

Priority Parking

Staff committed to carpooling should be allocated priority parking spaces in a desirable area of the staff car park. Having a designated parking space ensures that users will be able to park on-site. 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.

5.4 Communications 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. Safer Drivers courses), particularly for new drivers

5.4.1 Channels

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.

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.

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.

5.4.2 Messages

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

- Public transport recommendations (such as preferred bus/train arrival times for best connections)
- Site access recommendations (such as the preferred exit route to College Street to avoid delays at Campus Drive)
- Opal card reminders (to ensure students are tapping on and off even if public transport is free under the SSTS)

5.4.3 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 and train routes 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 template is provided in Figure 5.3 and Figure 5.4. This guide gives the type of content and advice to include in a Transport Access Guide for an educational development.

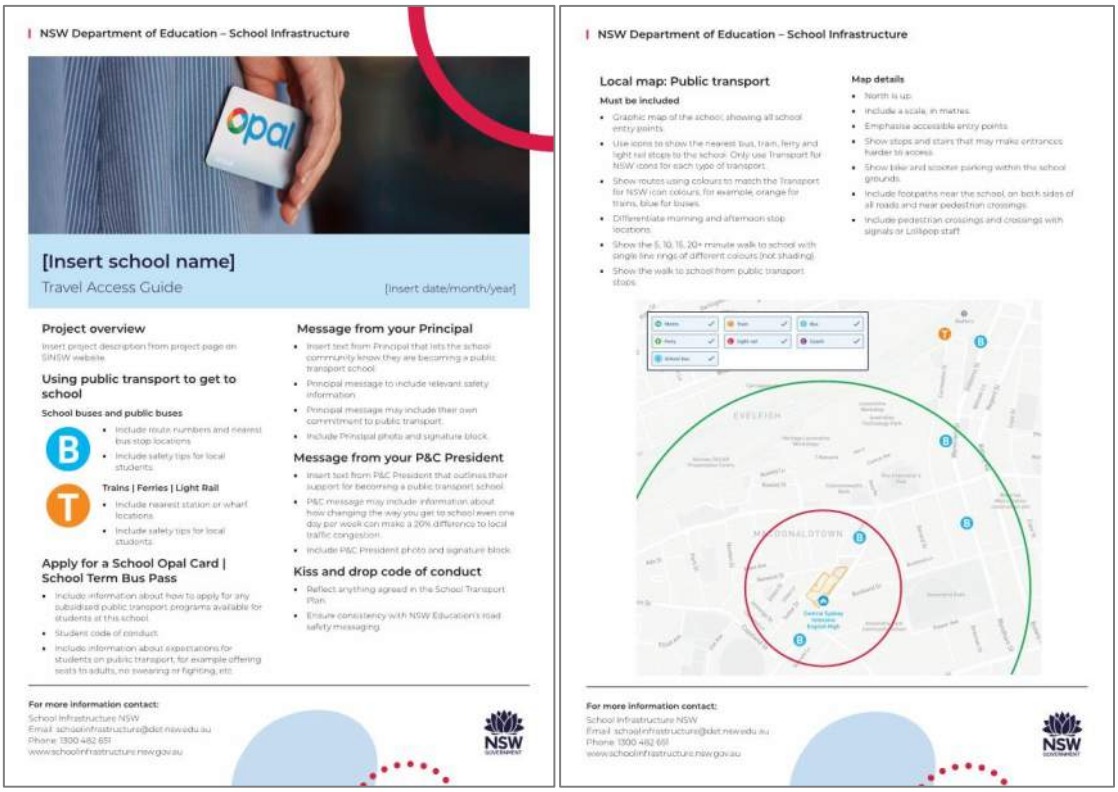


Figure 5.3: Travel Access Guide public transport template
Source: School Infrastructure NSW

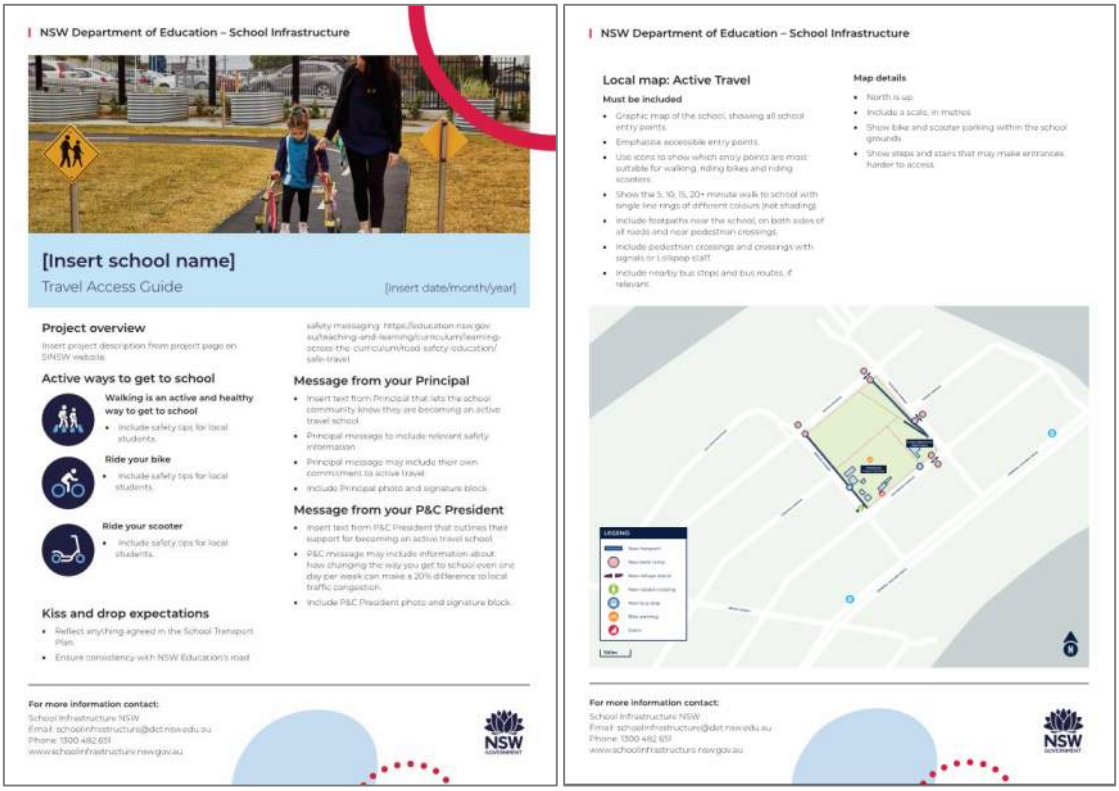


Figure 5.4: Travel Access Guide active transport template
Source: School Infrastructure NSW

5.5 Data Collection and Monitoring

5.5.1 Data Collection

Transport Data Collection

Data collection is required for the ongoing management and reviewing of this Plan. These investigations are intended to evaluate whether a particular operation or system is still successfully functioning and meeting demands. Table 5.4 contains suggestions for the data collection context and the types of data to be collected.

Table 5.4: Data Collection Summary

Context	Data to be collected
Buses	• Number of public bus users (morning, afternoon and overall) • Number of school bus users (morning, afternoon and overall) • Number of school vs non-school users at nearby bus stops • Observational assessments (e.g. queuing, safety concerns)
PUDO Zone	• Number of users (morning, afternoon and overall) • Set down times • Arrival and departure times • Number of students exiting/entering vehicles • Number of any non-formal pick-up and drop-off occurrences as well as the time and location • Observational assessments (e.g. queuing, illegal stopping, safety concerns)
Car Parking	• Number of daily vacant and occupied spaces • Number of passengers per vehicle • Arrival and departure times
Pedestrian Facilities	• Number of pedestrians entering through gates • Arrival and departure times through school gates • Number of pedestrians using pedestrian crossings • Number of pedestrians jaywalking as well as the time and location
Cyclist Facilities	• Number of daily vacant and occupied bicycle parking spaces • Number of cyclists entering through each site access point • Number of end-of-trip facility users

Incident Recording System

It is recommended that the school should keep and maintain an on-site traffic incident record. This record would contain a description of the incident, including contact details and what actions were taken by the school in response to the incident. It is advised that records of incidents be kept for an extended period of time following the incident occurrence.

The school should be able to provide the traffic incident register to relevant authorities on request.

Complaints Management

It is recommended that the school should keep and maintain a record of all complaints made in relation to any transport or access issues in a complaint register. Suggestions for what the record may include are:

- The date and time of the complaint
- The method by which the complaint was made (e.g. phone or email)
- Any personal details provided by the complainant
- The nature of the complaint
- Any action taken by the school in relation to the complaint including any follow-up communication

It is advised that records of the complaint be kept for an extended period of time after the complaint was made. The school should be able to provide a copy of the complaints register to relevant authorities on request.

5.5.2 Program Evaluation

Once the School Transport Plan is finalised, it is to be maintained by the school and shall be distributed to all the concerned logistic personnel and managers. The school is also responsible for distributing appropriate information to staff and contractors as necessary. A copy of the STP is always to be held on-site and available for review.

This STP should be reviewed regularly and updated as required. It is recommended that an initial review should take place following six months of operation. This review should include detailed observations of the transport operations of the site and adjustments to procedures where necessary.

Following this initial review, a review every two years would likely be an appropriate schedule. To ensure that the ongoing review of this STP is carried out as expected, responsibility for this task should be allocated to the Travel Coordinator or a specific alternative staff member.

5.5.3 Reporting Findings

The School Travel Plan and other associated documentation including the Transport Access Guide should be regularly reviewed and updated as required. It is recommended that an annual review would be an appropriate schedule. The review should include an updated travel mode survey, consultation with staff, students and visitors, and adjustments to initiatives and targets.

Sample 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 • Review school and public transport network and services

5.6 Governance Framework

5.6.1 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.

The 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, subsequent arrangements for this role are under discussions between School Infrastructure, the Department of Education, and Transport for NSW.

5.6.2 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

5.6.3 State and Local Government Stakeholders

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

- Hawkesbury 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 **Hawkesbury 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 Busways for inclusion in post-approval documentation.
- Role:
  - *TBC*
- Phone:
  - *TBC*
- Email:
  - *TBC*

6 Preliminary Construction Traffic and Pedestrian Management Plan

This preliminary Construction Traffic and Pedestrian Management Plan (CTPMP) addresses the proposed construction of the Hawkesbury Centre of Excellence development. It discusses the management of construction vehicles and activities, and an investigation of the local traffic and safety conditions throughout the construction process. A draft CTPMP is required in accordance with the SEARs for this development.

A detailed CTPMP will be prepared by the builder with consideration of all final design selections. This preliminary CTPMP is intended to provide a framework within which a future CTPMP can be developed and implemented, and to demonstrate the potential operation of the construction site.

A CTPMP is developed to satisfy the duties of various work health and safety legislation, regulations and codes of practice including those from SafeWork NSW. Traffic Guidance Scheme (TGS) will also need to be developed in association with a final CTPMP for the future site to demonstrate the traffic control procedures to be implemented. These must be developed in accordance with Transport for NSW and the relevant Australian Standards.

In addition to a detailed CTPMP, the builder shall be responsible for acquiring the necessary certificates, licences, consents, permits, and approvals relevant to the construction on this site.

6.1 Construction Operations

6.1.1 Access Arrangements

Access Point

The majority of works will occur adjacent to Vines Drive, providing good construction access to the site as shown in Figure 2.1.

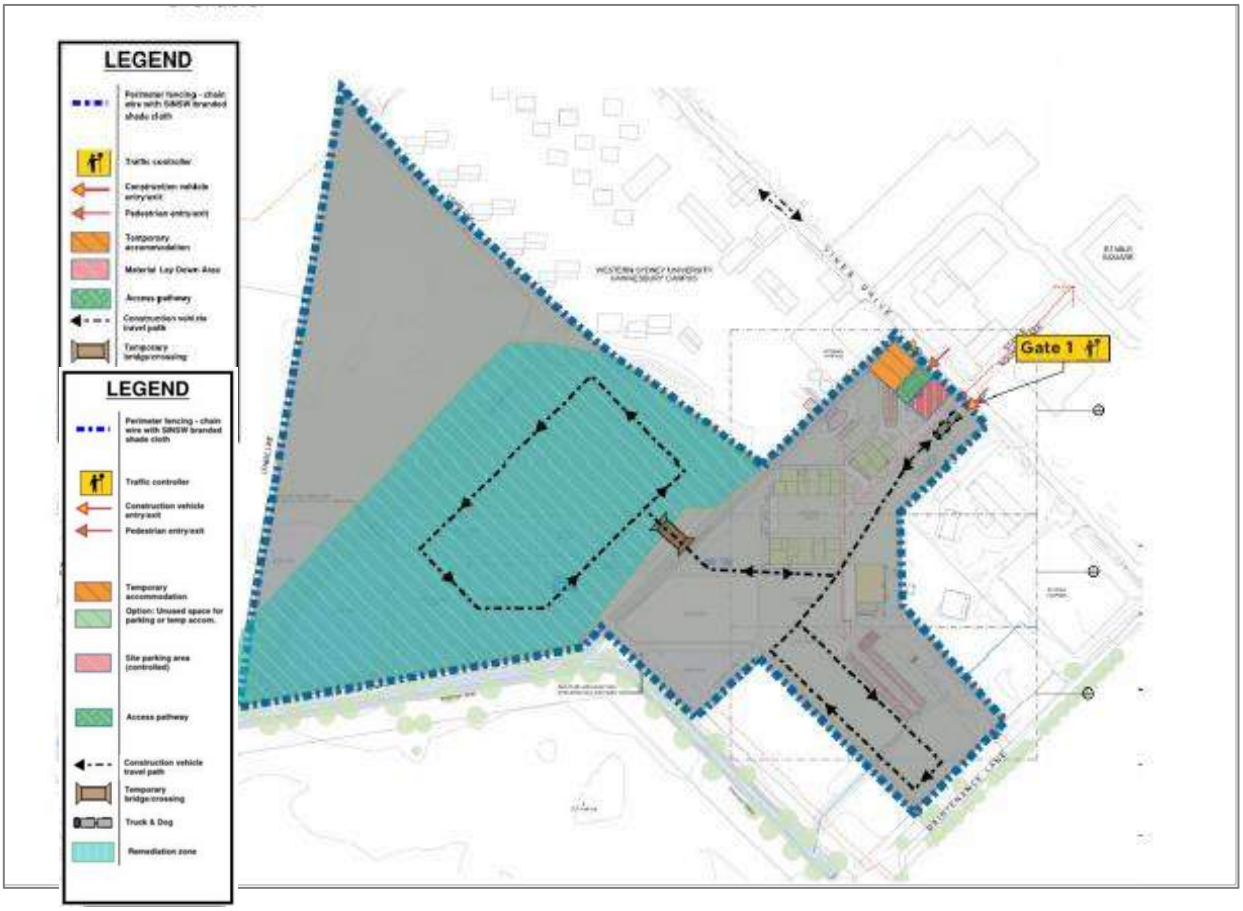


Figure 6.1: Preliminary Site Access Plan

Source: Construction Management Plan Version 3 by Richard Crookes Construction, 19th July 2021

Construction Vehicle Access

The large amount of undeveloped area within the site provides adequate space for vehicles to load and unload within the worksite.

Turning path analysis are provided and are shown in Appendix B.

Emergency Vehicle Access

Emergency vehicles will be able to enter from the existing emergency vehicle access point at the Londonderry Road and access each part of the site uninhibited. They will be able to access neighbouring properties and pass by the site without any issues.

6.1.2 Worker Parking

The provision of on-site parking for construction workers is expected to be available due to the large site area. This parking can be repositioned depending on the construction activities during any given phase. The parking zone will be placed so that there is no disruption to construction vehicle movements or construction activities. The P47 car park area may be nominated to provide parking for construction workers to avoid any impacts to the broader university campus. The car parking for workers is subject to the final Construction Traffic and Pedestrian Management Plan and future discussions with WSU.

Site sheds and material storage areas are expected to be located within the site.

A detailed Construction Management Plan and Construction Traffic Management Plan shall be developed including the requirements and impacts to parking.

6.1.3 Construction Program

Table 6.1 indicates a preliminary phasing outline of each construction stage including estimated vehicle types and volumes, as well as the approximate number of daily workers. These estimations are based on previous projects but are subject to change following the appointment of a contractor.

The data in the table below is to be updated by the builder once appointed and currently represents estimates only.

Table 6.1: Example of Construction Phasing[5]

Stage	Estimated Duration	Largest Vehicle	Vehicles per Day	Workers per Day
Site Establishment	1 month		-	10
Substructure	2 months	Heavy Rigid Vehicle	8	45
Structure	2 months	Heavy Rigid Vehicle Semi-trailer	30 2	80
Roofing & Façade	4 months	Heavy Rigid Vehicle	2	95
Finishes & Services	7 months	Heavy Rigid Vehicle	2	130
Landscaping & Completion	4 months	Heavy Rigid Vehicle	2	80
Works Complete	2 months		-	60

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

- Monday to Friday 7am to 5pm
- Saturday 8am to 1pm
- Sunday and public holidays None

[5] Construction Phasing example from Smalls Road Public School Construction Traffic and Pedestrian Management Sub-Plan Report, 4 December 2018

6.2 Construction Traffic Management

6.2.1 Vehicle Management

Vehicle movements will occur within the prescribed working hours. Delivery and removal trucks are to have a staggered arrival schedule and occur outside general peak hours as well as school peak hours where possible. Avoiding peak hours allows for minimal queueing of construction vehicles on the local roadway and prevents congestion in the neighbouring areas. Any vehicles arriving after the worksite has reached maximum capacity will be expected to reschedule their delivery and depart, although it is anticipated that enough queueing space will be available.

Careful management of heavy construction vehicles exiting the site will ensure traffic safety. The relatively low traffic volumes on Londonderry Road means vehicles are expected to use suitable traffic gaps to exit.

To successfully coordinate and execute these processes, communication between all delivery depots and waste management centres will be maintained.

6.2.2 Construction Vehicle Routes

It is proposed that construction vehicle access to the site take place via Londonderry Road. Construction vehicles will access via Londonderry Road, which is assumed to be modified prior to commencement of works to cater for appropriate heavy vehicle traffic. Given the extensive space available within the construction site, it is anticipated that all vehicles will be able to manoeuvre on-site, entering and exiting in a forward direction and returning along the approach route.

To minimise the disruption to the university operation and users, travel within other parts of the campus shall be restricted only where appropriate.

Recommended regional access routes are described below and illustrated in Figure 6.2.

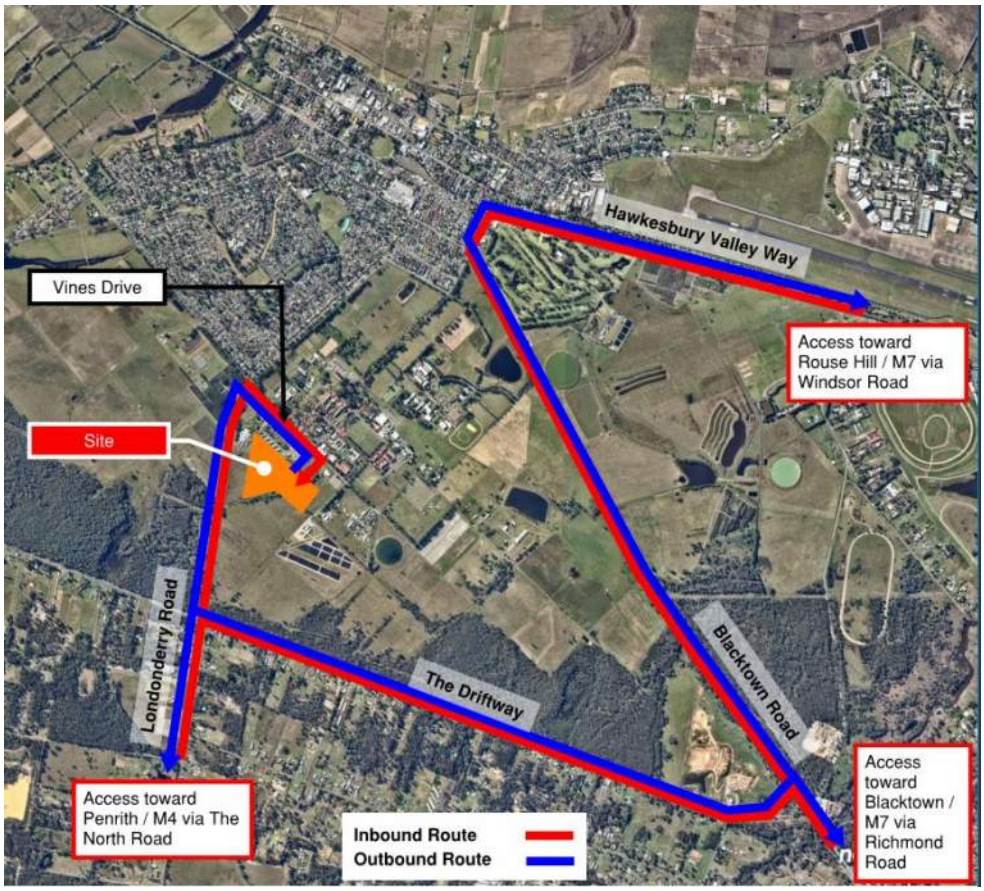


Figure 6.2: Recommended construction vehicle routes

Northeast (note: unsuitable for largest vehicles due to route through Richmond town centre)

- Approach via Hawkesbury Valley Way; then
- Turn left onto Bourke Street;
- Turn left onto Blacktown Road; then
- Exit right onto The Driftway; then
- Turn right onto Londonderry Road; then
- Turn right into Vines Drive and turn left onto the site.
- Return via the same route.

Southeast

- Approach via Richmond Road; then
- Continue onto Blacktown Road; then
- Turn left onto The Driftway; then
- Turn right onto Londonderry Road; then
- Turn right into Vines Drive and turn left onto the site .
- Return via the same route.

South

- Approach via The Northern Road; then
- Continue onto Londonderry Road; then
- Turn right into Vines Drive and turn left onto the site .
- Return via the same route.

6.2.3 Public Transport Impacts

No public transport impacts are expected as the construction will occur within the site. Traffic impacts from the construction works are expected to be limited to the truck routes detailed in this report. These routes are likely to experience only minor impacts due to the presence of additional truck movements. These truck movements are not expected to cause delays on local roads, or create flow-on impacts to other streets.

There shall be no changes to local public transport routes and services as a result of the construction. Access to all adjoining properties both internal and external to the university campus will be maintained throughout the works.

Manoeuvring of heavy vehicles exiting the site is to be managed carefully such that traffic safety is maintained. Due to the relatively quiet nature of the roads surrounding the site, it is expected that vehicles exiting the site will be able to use suitable gaps in traffic (excepting some delays for right-turns out of the Blacktown Road access).

Light vehicle traffic volumes (from construction workers and minor deliveries / equipment) will be less than the operational volumes of the school and shall therefore not cause excessive impacts to the local road network.

6.2.4 Cumulative Impacts

Council has indicated there are no planned works for the local roads or nearby developments.

Further details about nearby construction works will be confirmed in a final CTPMP.

6.3 Road Safety

6.3.1 Construction Vehicle Access Points

Access to the construction site is situated along Vines Road and Maintenance Lane.

6.3.2 Construction Vehicle Routes and Intersections

There are several intersections within the recommended vehicle routes, and possible safety impacts for all road users need to be assessed. Notable intersections near the site have been summarised according to their type in Table 6.2.

Table 6.2: Intersection Summary

Type of Intersection	Relevant Intersection/s
Signalised	Windsor Street / Bourke Street Blacktown Road / Bourke Street / Lennox Street
Unsignalised T-intersection	Londonderry Road / Vines Drive Londonderry Road / Southee Road Blacktown Road / Campus Drive

Signalised intersections have minimal safety concerns as vehicles, cyclists and pedestrians are adequately controlled.

The unsignalised T-intersections contain turning lane for vehicles and the ample sight distances for safe traffic environment.

6.3.3 Construction Traffic Management

All the loading/unloading activities will occur and will be accommodated within the site compound. An on-street works zone is not likely to be required for such activities.

Traffic controllers will be implemented at the site entries as required to ensure safe and efficient movement of vehicles, pedestrians and the safety of workers within site.

All deliveries are to be made within the approved work hours. Truck movements to and from the site will be scheduled outside of network peak hours to reduce impacts to the local road network.

During days of high estimated vehicle movements, communication between the site, concrete batching plant and/or vehicles will be maintained to stagger the arrival of vehicles, for them to be accommodated within the worksite and to minimise traffic disruptions.

This will not impact the surrounding roads as activities will be managed within the site boundary with trucks entering and exiting in forward direction.

A Traffic Control Plan showing appropriate warning signages addressing all the construction stages shall be provided.

6.3.4 Construction Workers Parking

The provision of on-site parking for construction workers is to be available due to the large site area. This parking can be repositioned depending on the construction activities during any given phase. The parking zone will be placed so that there is no disruption to construction vehicle movements or construction activities. The use of P47 car park for workers is subject to WSU approval.

Workers car park will be detailed in the final CTMP.

6.3.5 Pedestrians and Cyclists

During school peak hours, significant pedestrian and cyclists activity is expected as students and staff arrive and depart from the site. As discussed, construction vehicle movements will be scheduled outside of school peak hours to ensure pedestrian safety. There is currently no pedestrian footpath provided along the site frontage at Vines Drive. A footpath is provided along the opposite (northern) side of the road. A number of crossing facilities are located along the road to provide access to specific areas and buildings. Pedestrians will be prohibited from entering or passing through specific areas of the site during construction, enforced by fencing around the perimeter. Signage should be fitted to communicate to students and staff alternate access points and routes within the site. Any changes to external pedestrian routes should also be communicated with signage and detours clearly marked.

6.3.6 Cyclists

No cycle lane is available along Vines Drive or Londonderry Road, and minimal impacts to cyclists are expected as a result of construction.

6.3.7 Communication of Works

Prior to any site works taking place, notification of commencement of the works shall be distributed to the neighbourhood. Notification is to include information or comment. Community notifications will be undertaken as per the Construction Management Plan prepared by the RCC.

Traffic control advance-warning signage in accordance with TfNSW guidelines and Australian Standards is to be in place to notify motorists of roadwork and when traffic controllers are present. Sign size is to be size “A” and is to be monitored throughout the works to ensure they are clearly visible.

As part of the site induction procedures, all contractors will be made aware of this Construction Traffic Management Plan, the relevant Traffic Control Plans, and their responsibility to adhere to these plans.

6.3.8 Public Infrastructure

On infrequent occasions when particularly large vehicles are required to access the site, some mounting or crossing of public kerbs and medians may be necessary. The builder shall repair any damage to this infrastructure if large vehicles are required to mount the devices. Any other road markings damaged as a result of vehicles associated with the construction shall be repaired as a responsibility of the builder.

7 Conclusion

7.1 Transport Strategy

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

- **Pedestrians**
  - Minimal demand expected; provide connectivity to bus services and to local network
- **Cyclists**
  - Minimal demand expected; provide on-site storage
- **Public transport**
  - Strong demand expected by bus and rail; bus connectivity to train stations required due to long walking distance
  - On-site bus bay to be constructed along Vines Drive within WSU campus
- **Freight & deliveries**
  - Agricultural vehicles accommodated within the site for specialty purposes
- **Kiss & ride**
  - Minimal demand expected; on-site provision for car and bus access to be operated at separate times
- **Car parking**
  - Reasonable demand expected; on-site provision within the CoE for general usage, and shared parking with WSU for peak usage

This overall strategy has been proposed to, and discussed with, both Council and Transport for NSW (TfNSW) during ongoing liaison through a Transport Working Group (TWG) for the project. The TWG has met a number of times since March 2021, and the project has refined the transport strategy during that period in response to feedback received. Following the exhibition of the EIS and submissions received from public authorities and members of the public, the strategy and design have been further refined and adjusted.

To safely accommodate the additional transport demands to the site particularly pedestrian movements, a concept design is proposed at Vines Drive . The concept design includes a widening of Vines Drive to accommodate buses into WSU campus, new bus layby on Vines Drive and an internal roundabout at Vines Drive-Maintenance Lane.

It is recommended that the preferred solution for this intersection would be to undertake staged works as part of the TfNSW Richmond Bridge duplication project, however we currently understand that the timeline of that project would not suit the requirements of the CoE, and therefore this interim or alternative solution is provided.

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 CoE. A preliminary Construction Traffic and Pedestrian Management Plan has also been developed to assess any traffic impacts expected to occur during construction works.

7.2 Findings

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

- Forecast pedestrian and vehicle volumes can be accommodated within the proposed concept design widening Vines Drive and accommodating buses into WSU campus. The proposed concept works would be sufficient as a permanent solution (based on traffic modelling results), however would be preferable as an interim solution to be replaced by the TfNSW major works in the area.
- Forecast additional vehicle traffic volumes are low and can be comfortably accommodated in the local and state road network while sustaining good levels of intersection performance.
- Northbound (from Penrith to Richmond) and southbound (from Richmond to Penrith) bus services will be critical for moving people to the respective train stations, for connecting access to Greater Sydney (an expected part of the site operations).
- The proposed car parking provision is considered suitable, accommodating general daily demands within the Centre of Excellence site and accommodating peak demands within the University car park (which has availability and would be used off-peak).

The proposed development is deemed suitable on consideration of the traffic and transport elements of the site and its surrounds, and the transport strategy proposed for its management. Only minor items are required to be resolved during further design (see below).

7.3 Next Steps

Following the approval of this SSDA, the expected future works would include:

- Detailed design and Local Traffic Committee approval of the widening of Vines Drive proposal, including Vines Drive-Maintenance Lane roundabout and bus bays
- Ongoing consultation with Transport for NSW to target the preferred intersection option at Vines Drive
- Ongoing consultation with Transport for NSW to determine and implement additional bus services to the site
- Further development of the School Transport Plan and Construction Traffic and Pedestrian Management Plan (subject to the relevant conditions of consent)

Appendix A – Agency Consultation

Centre of Excellence – Transport Working Group Meeting #1

Meeting Details	
Project	Centre of Excellence in Agriculture Education – SSD – 15001460 – Centre of Excellence (CoE)
Date	16 March 2021
Location	Skype for Business
Attendees	**SINSW –** Matthew Metlege, Rebecca Lehman **CIPL –** Lizza Young, John Stalley, Maddy Stenniken **TTW –** Michael Babbage, Paul Yannoulatos, Nathaniel Borja **RCC –** Tom Hemmett, Kim Pappas **TfNSW** – John Broady, Billy Yung, Felix Liu, Malgy Coman, **Hawkesbury CC** – Andrew Johnston, Colleen Haron, Christopher Amit,
Apologies	Jack Bruderlin (JB)-SI NSW, Pahee Rathan (PR)-Transport

	Task	Responsible	Date
1.	**OVERVIEW OF THE PROPOSED NEW DEVELOPMENT** *Michael Babbage presented slide presentation for the Working Group #1 meeting.* - *MB gave an overview of the previous SEARs submission and differences between the two projects.* - *MB gave an overview of the Site Plan, project site location, services travel distances, public bus routes, bicycle network, external projects – Richmond Bridge duplication, Hawkesbury Liveability project, local roads and community infrastructure program.* - *Travel Survey for staff and students* *– preliminary staff results received thus far.* *– Comments received:* o *Lack of bus services; low frequency bus services* o *Safety concerns for cycling* o *Car usage relates to speed, convenience, running errands* - *Constraints and opportunities* o *Long travel distances to specialised non-catchment school* o *High private vehicle uses* o *No bus routes operate within university campus* o *Little to no existing bike route infrastructure (and usage)* o *Outside the north west growth area – limited planned improvements* - *Opportunities* o *Potential shared transport with Richmond HS* o *Local and regional upgrades including town centre* o *Terrain suitable for walking, cycling* o *Dual transport demands with school and university improvements* - *Overall transport hierarchy in line with TfNSW Road User Space Allocation Policy where pedestrians and cyclist are the top priorities. While private cars are in the lower end of the hierarchy.* Main Differences from previous SSD Hurlstone Agricultural High School (HAHS) with the new Centre of Excellence (CoE) **Old Scheme** / **New Scheme** Student Capacity: 1,500 students inc boarding / 380 students (nil boarding) Staff Capacity: 110 staff / 18 staff Car Parking: 220 spaces / TBC	Note SI NSW	 22 Mar'21

	Task	Responsible	Date
	<table><tr><td>Buses</td><td>5 buses/coaches</td><td>TBC</td></tr><tr><td>Boarding Accom</td><td>300 students incl</td><td>60 beds (inclusive)</td></tr></table> Transport raised query on the total number of students to be accommodated – i.e. more than 380, including day trippers. SI to revert and respond SI NSW provide additional information with respect to the modes of transportation for the students at CoE	SI NSW	
2.	*Anticipated SEARs inclusions* - *Transport and Accessibility impact Assessment* - *Green travel plan / School Transport Plan (preliminary)* - *Operational traffic and access management plan (preliminary)* - *Construction traffic management plan (preliminary)* Transport NSW - to advise if additional reports are required	Transport NSW	
3.	Proposed Traffic Study areas, requesting Transport and Council comment/endorsement  ▪ Proposed study area (Intersections inclusive for counts and modelling): o *Londonderry Road – Vines Drive* o *Londonderry Road – Southee Road* o *Lennox Street – Paget Street* o *Lennox Street – Bourke Street – Blacktown Road* ▪ Travel Survey currently underway for RHS – Anticipated to validate current understanding that 98% is via car usage – driving and parking Morning Peak (60%) and Afternoon Spread (30%),	TTW Note	
4.	Colliers provided additional information about the proposed Centre of Excellence (CoE). ▪ The CoE is expected to cater more than the 380 students from the Day-to-day excursions. ▪ Colliers and TTW is still investigating the Transport servicing strategy. ▪ One option for transport of students to the CoE may be picking up students from Richmond High School (RHS) as there are 380 students who will be taking selective studies in the CoE. ▪ Council and Transport's raised questions if CoE has future expansion plans. Colliers responded that CoE is to accommodate 380 students based on the business case model conducted where the calculated maximum demand is 380 students for agricultural and science specialty school. There is no		

	Task	Responsible	Date
	commitment for future expansion of CoE. TTW added that future expansion will be subjected to different DA. ▪ Collier confirms that the CoE is a 99 year lease.		
5.	**Questions for Council** ▪ TTW queried Council about Stage 2 funding list for pedestrian and cyclist path upgrade or shared paths that may benefit the school and the residents in the area. Council responded that Council has 10-year projected program where projects will come from but can't say where the stage is at. Council (AJ) noted that coordination of Stage 2 projects could be looked into. ▪ Council (AJ) requested the addition of Campus Drive – Blacktown Road intersection to the proposed traffic study scope	TTW	
6.	**Questions for Transport for NSW** ▪ TfNSW queried the traffic distribution where traffic is expected to and from RHS. TTW replied that there are expected transport demand from different directions, but this is still unresolved at this stage. TfNSW (MC) noted that agreement/endorsement of the proposed traffic modelling scope may need to wait until a preliminary transport and access strategy is further developed. ▪ TTW raised if there is a master plan for future bus transport service expansion. TfNSW (JB) responded that there are no plans that he is aware of. ▪ Collier asked TfNSW if bus services can be provided or service improvement since there is a lack of public bus transport and development of CoE will increase the demand in the area. TfNSW (JB) responded that it is understood that CoE is a low volume students and are anticipated to come from different locations every day. SINSW / TTW to provide further information in future. ▪ TTW queried the status of the Preferred Option Report for the Richmond Bridge Duplication. TfNSW (FL) noted this is still under investigation with no preference.		

The above represents the authors understanding of issues and conclusions reached. Any errors or omissions brought to the attention of CIPM in writing will be addressed, and the record revised.

Closure sequence for minute author.

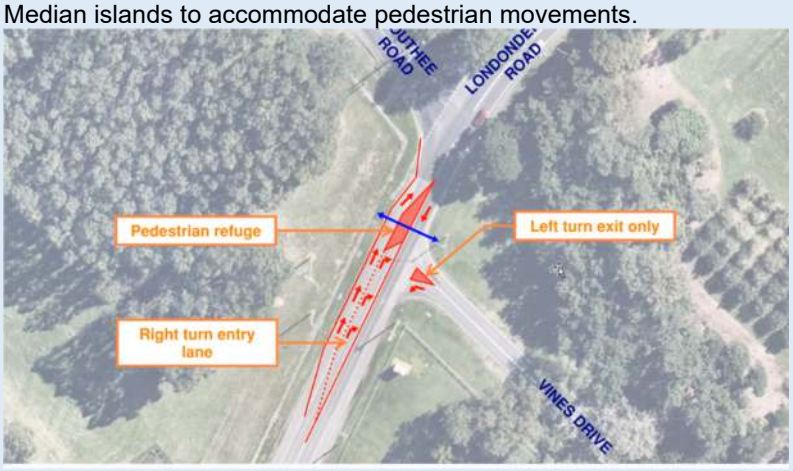
a) Most current minute is to be maintained until closure of item/issue.
b) Closed meeting minute is to be formatted as ~~strikethrough~~
c) Next meeting, closed minute can be dropped off completely.

Centre of Excellence – Transport Working Group Meeting #2

Meeting Details	
Project	Centre of Excellence in Agriculture Education – SSD – 15001460 – Centre of Excellence (CoE)
Date	13 April 2021
Location	Microsoft Teams
Attendees	**SINSW –** Matthew Metlege (MM), Jack Bruderlin (JBr) **CIPL –** Lizza Young (LY), Maddy Stenniken, Jacob Ainsworth **TTW –** Michael Babbage (MB), Paul Yannoulatos, Nathaniel Borja **TfNSW** – John Broady (JB), Mark Ozinga (MO), Malgy Coman (MC), **Hawkesbury CC** – Andrew Johnston (AJ), Colleen Haron (CH) **NBRS –** Stephanie Ferguson, Ewan Saunders
Apologies	Rebecca Lehman, SI NSW, Pahee Rathan (PR), Felix Liu -TfNSW, John Stalley (CIPL),

	Task	Responsible	Date
1.	**TTW Overview** - MB gave brief overview of project site and scope, travel hierarchy addressed in accordance with TfNSW Road User Space Allocation Policy. - EIS lodgement expected to be May 2021		
2.	**Operational Modes** MB presented slides outlining operational hours of school and volume of people moving through during the week. - 325 students per day plus 25 staff, split 60-40% between CoE and Richmond Ag college. - School programs and excursions, 100 visitors per day - Conference facilities 150 people - On site accommodation 62 beds. - Typical Monday – Friday school day 325 students plus 25 staff, has capacity for additional 100 program or conference visitors, up to the site capacity of 450 people. - Saturday/Sunday conference facilities operate, onsite accommodation may also occupied at the same time. - (MM) noted that visitors over 100 would be planned events (up to 150 conference attendees), and the site total may exceed this as the 62-bed accommodation might also be in use - MO (Mark Ozinga), raised question about school enrolments, important to understand modes and how catchments (walking, cycling, buses) will be addressed, LY clarified the enrolments would build up increase over 5-year period. - JB, raised how students will move between schools.	Note	
3.	**Travel mode expectations** - MB outlined travel modes will vary greatly, most staff will drive, most students would use public transport, don't expect many students will be in walking or cycling catchment as closest homes are 10min walk away.		

	Task	Responsible	Date
	- Public and private bus services… private buses will bring program visitors (direct transfer from their school) - John Broady (JB), suggested program visitors coming by train and connecting bus, would need to arrive at the same time as other students, as to avoid using another charter bus. - Malgy Coman (MC), are Richmond Ag Colllege students 60% travel coming to base school or CoE? MB outlined it would be students traveling directly to CoE. - MM advised the school does have a mini bus at present, message is being relayed by principal that students make their own way to the school if they need to be there.		
4.	**Public transport Strategy.** - Existing bus routes on Londonderry road connects the two stations. - TfNSW advised that regularly scheduled buses from station should be not too much of a problem, requested enrolment and timing details to assist with planning and budgeting	Note	
5.	**Public Transport works,** - Seek, increase of route 677 to and from Richmond and Penrith Station - Seek additional use of route 5037 (to Windsor high school) - JB, student numbers and bell times bring concerns about arrival times of buses, 195 students would require 4 busses (approx $500k/bus), - JB suggested the need to stagger arrival of students so we can use one or two busses that do multiple trips. - LY offered bus services could be progressively added in line with student enrolments pending demand - MB outlined we would not know the location of students and their way of getting to school until enrolments have firmed up - SI NSW to provide high level guidance where the potential enrolments would be coming from (if possible) - JB noted that regularly scheduled school buses from the station should not be too much of a problem and requested student numbers and arrival/departure times for investigation and justification of future services. Early warning from SINSW assists with the planning and budgeting of services. - MC advised weekend train services (for conference visitors) are limited and car usage is likely higher.	Note	
6.	**Private bus strategy** - To be organised by individual schools as required - No further comment from TfNSW and Council	Note	

	Task	Responsible	Date
7.	**Car parking** - Onsite car park of staff 34 spaces - Visitor and accessibility outside admin building, also where pickup and drop off would be. - No further comment from TfNSW and Council		
8.	**Kiss and Drop** - Low demand for kiss and Drop, however onsite facility will be available. No further comment from TfNSW and Council -		
9.	**Minimal pedestrian usage** - Minimal local pedestrians expected, footpaths south side of Vines drive to be extended. - No further comment from TfNSW and Council	Note	
10.	**Cyclist** - Non catchment school, therefore nominal bike storage - No further comment from TfNSW and Council		
11.	**Traffic Works Strategy** - Vines drive to be left-out only, but right and left in retained. - Potential right-out ban at Southee Road could be incorporated subject to Council and TfNSW inputs. - Median islands to accommodate pedestrian movements.  - AJ - Council previously provided advice with preference to Southee and Vines realignment but could look at the proposed left-out concept. Council noted that they could look at the proposed left-out restrictions at Vines/Londonderry (despite it not being their preferred solution) - LY advised that as tenant on WSU land, it has no authority to offer this as a solution. Project team see more complications with the realignment strategy due to use of WSU land.		

	Task	Responsible	Date
	- MB noted that the expected travel activity due to the size of the development would be low. We are proposing an approach which addresses the safety concerns and is commensurate with the size of the proposed development. Based on low volumes, the proposed is an appropriate scale of mitigation. - JB – aligning intersection, futureproofs the road. John noted it would limit road and if a future bus needed to turn right. - MB noted a previous restriction was Transport NSW wasn't looking to put public buses through Vines Drive. - JB noted all required is 3.2-3.5 width – 6.5m road is sufficient. Current 5.8m - MB requested TfNSW opinion thoughts on Vines. Bus 2.5+400mm, 2.9/bus. JB noted public buses wouldn't go down current road width. - MB noted internal restrictions need to be tabled with the university. - TTW Team to be given contact details of appropriate TfNSW team (Network and Safety) to discuss School Zone requirements - Council and Transport NSW to finalise and confirm traffic count location, to provide comment prior to the start of school term.	Action	13th April

The above represents the authors understanding of issues and conclusions reached. Any errors or omissions brought to the attention of CIPM in writing will be addressed, and the record revised.

Closure sequence for minute author.

a) Most current minute is to be maintained until closure of item/issue.
b) Closed meeting minute is to be formatted as ~~strikethrough~~
c) Next meeting, closed minute can be dropped off completely.

Your Ref: SSD-15001460

26 April 2021

Ms L Young
Colliers International
Level 30, Grosvenor Place, 225 George Street
SYDNEY NSW 2000

Email: Lizza.Young@colliers.com

Dear Madam,

Re: Hawkesbury Centre of Excellence – Transport Working Group (SSD-15001460)
Property: 2 College Street RICHMOND NSW (Lot 2 DP 1051798)

Reference is made to the Minutes prepared for the Transport Working Group Meeting held on 13 April 2021 for the proposed Hawkesbury Centre of Excellence at 2 College Street, Richmond. Upon review of the supplied Minutes and Traffic Works Strategy, Council provides the following comments with respect to traffic and transportation strategies:

1. The relationship between the Centre of Excellence, Richmond Agricultural College and Richmond High School requires clarification. Section 2 of the Minutes suggests that there will be 325 students split between the Centre of Excellence and Richmond Agricultural College and that the student numbers will be split 60-40 between the two schools. It is understood that students of Richmond Agricultural College will attend both the Centre of Excellence and Richmond High School, and that both agricultural specialist and selective streams will be provided by Richmond Agricultural College.

   Student and transportation data was not included in the supplied Minutes however given that a component of the Richmond Agricultural College students will be local it is considered that safe pedestrian and cyclist connectivity between the Centre of Excellence, public transport network and local residential areas is important.

   Any Traffic Study should clearly address pedestrian and cyclist connectivity. Such a study must include information addressing the following:

   a) The expected number of students and staff at the proposed facility which will be catching public transport, walking and cycling. It must define how travel from the bus stops or train stations to the Centre of Excellence will be undertaken. It is expected that empirical data (pedestrian counts) from a similar development would be used to inform any assumptions made.
   b) An assessment of the current local pedestrian and cycle infrastructure.
   c) Undertakings to construct/upgrade any pedestrian and cycle infrastructure that is required to provide safe connectivity to public transport and local pedestrian routes.

2. With respect to the Traffic Works Strategy, the roadworks highlighted in the Minutes may necessitate a ban on right turns from Southee Road. Council are not supportive of a ban on right turns from Southee Road on the following grounds:

- Southee Road is the main link between Londonderry Road and Castlereagh Road, both being arterial roads;
- There is no other convenient route in the vicinity to use in its stead to access Londonderry Road to travel in the Penrith direction;
- This will result in an unacceptable impact on residents in the vicinity, university users and the community as a whole; and
- There are other options/works that can be considered/carried out to improve the usability and safety of the Londonderry Road/Southee Road/Vines Drive intersections and environs.

3. Council maintains its position that a modification of the intersections of Londonderry Road/Southee Road and Londonderry Road/Vines Drive to realign these intersections is needed. Such a modification would redirect Vines Drive to line up with Southee Road, and include an intersection treatment such as a roundabout. It is considered that the intersection works are still warranted for the following reasons:

    - Council does not support restrictions to right hand turns from Southee Road (as discussed above).
    - Londonderry Road is a classified road.
    - Southee Road provides a busy link between Londonderry Road and Castlereagh Road. Castlereagh Road is also a classified road.
    - Londonderry Road construction, in the vicinity, is akin to many local rural roads in respect to a narrow road pavement width, no slip lanes, no kerb and guttering and degraded road pavement edges.
    - Frequent queuing (at peak times) is experienced on Londonderry Road when waiting for vehicles to make right hand turns into Southee Road or Vines Drive, and when turning right from Southee Road onto Londonderry Road;
    - The proposed development will result in increased bus movements within the area of these intersections;
    - The proposed development will result in increased truck movements within the area of these intersections;
    - The proposed development will result in an increase in the number of inexperienced drivers accessing the site at these intersections; and
    - It will ensure the longevity of road functionality and safety in the locality.

4. The traffic counts being undertaken will show existing numbers of vehicles, and in respect to traffic entering and leaving the university will only reflect the current use of the university and not the optimum use of the university. It is acknowledged that student numbers have declined over recent years (i.e. details provided for the previous proposal identified that university student numbers had decreased from 6,000 to 2,000 over the past decade) however student numbers could easily increase in the future. Therefore it is considered reasonable that a higher occupancy rate for the university be determined and reflected in any Traffic Study.

5. Likewise, whilst the carparking capacity of the university may not currently be fully utilised due to lower student numbers, this may change in the future. Development Applications approved for the university site have determined car parking requirements to cater for the various uses, and these spaces are needed to cater for those uses regardless of reduced numbers. As such it is not considered appropriate for the Centre of Excellence to use university car parking as this may cause problems in the future.

    Adequate carparking to cater for the school and ancillary uses is to be provided adjacent to the school and the proposed number of spaces is to be justified.

6. Vines Drive and other roads within the university site are private roads and it should be clarified as to whether public buses will enter the site.

7. It is unclear where bus stops will be provided along Londonderry Road. The bus stops may be used by younger students so their location and connections to the Centre of Excellence need to be considered in terms of safety.

8. It is anticipated that the primary mode of transport for Conference attendees will be private vehicles.

9. Traffic Studies at intersections should also consider:

    a) Exiting the university site at Campus Drive and Blacktown Road. The previous study carried out for the proposed Hurlstone Agricultural High School (SSD 17_8614) identified that this intersection had a level of service of 'F' when exiting from Campus Drive onto Blacktown Road. The safety of this intersection needs to be addressed.
    b) The presentation highlighted egress from the university at College Street. The use of this exit will require a rat run through the university and it is unclear if this would be encouraged by the university.

Should you wish to discuss this matter further please give me a call on (02) 4560 4549.

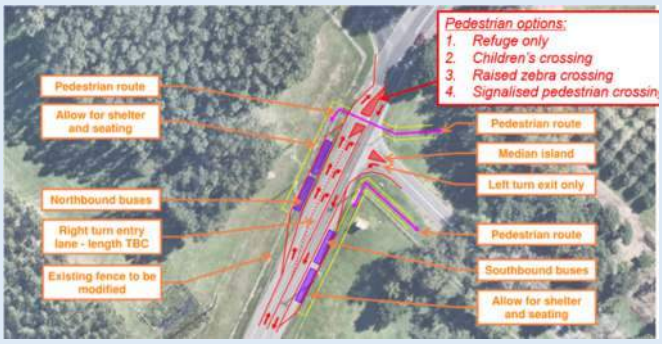
Yours faithfully

Andrew Johnston | Senior Town Planner | Hawkesbury City Council
☎ (02) 4560 4549 | 🖷 (02) 4587 7740 | www.hawkesbury.nsw.gov.au

Centre of Excellence – Transport Working Group Meeting #3

Meeting Details	
Project	Centre of Excellence in Agriculture Education – SSD – 15001460 – Centre of Excellence (CoE)
Date	27 April 2021
Location	Microsoft Teams
Attendees	**SINSW –** Matthew Metlege (MM), Rebecca Lehman (RL) **CIPL –** Lizza Young (LY), Maddy Stenniken (MS), Jacob Ainsworth (JA) **TTW –** Michael Babbage (MB), Paul Yannoulatos (PY), Nathanial Borja (NB) **TfNSW** – John Broady (JB), Felix Liu (FL), **Hawkesbury CC** – Andrew Johnston (AJ), Colleen Haron (CH) **NBRS –** Stephanie Ferguson (SF), Ewan Saunders (ES)
Apologies	**SINSW –**Jack Bruderlin (JB) **TfNSW** - Malgy Coleman (MC), Billy Yung (BY), Pahee Rathan (PR), Mark Ozinga (MO) **Hawkesbury CC -** Christopher Amit (CA), Andrew Johnston (AJ) **RCC –** Tom Hemmett (TH)**,** Kim Pappas (KP), Darren Vozzo (DV)

	Task	Responsible	Date
1.	**TTW Overview** ○ TTW (MB) presented a recap of the site location in relation to the surrounding Richmond area, and the site layout within the WSU campus. *EIS lodgement expected May 2021.*		
2.	**Previous Outcomes** ○ TTW (MB) detailed the outcomes of the previous Transport Working Group meeting (13 April 2021) and recent actions to present to this meeting. Traffic counts are due to occur next week (3 May) after the WSU mid-term break. EIS lodgement is due for May 2021.	Note	
3.	**Transport Hierarchy** ○ TTW (MB) revisited the transport hierarchy being considered for the site which is in accordance with the NSW Road User Space Allocation Policy. General strategy for most travel modes was considered acceptable at the previous meeting, subject to some key items such as numbers and times for bus services, safe pedestrian movements across Londonderry Road, and an agreed treatment of the Vines Drive intersection.	TTW	
4.	**Council Advice** ○ TTW (MB) noted that advice had been received from Council the previous afternoon (26 April 2021) and provided responses to each item. More detailed responses will be provided directly and/or in the EIS documentation. ○ TTW (MB) also clarified that the concept design is proposing to retain the right turn out of Southee Road, rather than remove it which was Council's	Note	

	Task	Responsible	Date
	understanding. The previous concept scheme noted this as an option for consideration only and does not need to be progressed.		
5.	Vines Drive / Londonderry Road - TTW (MB) explained that a key element of Council's advice was in relation to Council's suggested realignment of Vines Drive and Southee Road. Responses to each of Council's specific comments were given. More detailed responses will be provided directly and/or in the EIS documentation. ○ TTW (MB) presented the developed concept proposal, now including bus bays in both directions, footpaths and pedestrian connections, and consideration of options for pedestrian movements across Londonderry Road.  ○ Council (AJ) noted that there is a lot going on with the proposal and that there is a difference of opinion. Council maintains their position in recommending that Vines Drive should be realigned to Southee Road. ○ Council (CH) queried whether WSU supports the scheme, as it would change their operations and re-route traffic on internal roads which may not be up to standard. Colliers (LY) explained that consultation is underway, and that the proposals are subject to commercial implications, and assuming that internal items are resolved with WSU that the project team is seeking feedback from Council and TfNSW on the current proposal. ○ Council (AJ) queried the distance between intersections and whether the concept would comply with relevant standards. The concept would need a Road Safety Audit (RSA) as part of the application. Council believes there is a better option available and that the presented concept has not changed this position. ○ TTW (MB) noted to Council that the detailed design requirements are acknowledged and that safety items would be resolved during design development, but at the highest level this discussion is seeking to resolve whether the right-turn ban proposal would in principle address Council's concerns. ○ The project team is of the position that a realignment is not warranted by the scale of the proposal, and that the right-turn ban is an alternative scheme which addresses all of Council's concerns. Council (AJ) suggested that the project team should look at the realignment.	Note Note Note Note Note Note	

	Task	Responsible	Date
	○ TfNSW (FL) advised that comments from TfNSW would need to come from the Network & Safety team (no attendees at this meeting), information and requests can be sent via Felix Liu. ○ TfNSW (FL) queried where right-turn traffic would go, and if this traffic would attempt to break the rules, and therefore if a median island should be provided. TTW (MB) noted that this could be considered in the design development. TfNSW (FL) also noted that the design would be subject to a Road Safety Audit, indicating items such as sight distance to the refuge island on the bend of Londonderry Road. ○ TfNSW (FL) queried whether the right-turn lane is sufficient based on traffic modelling results. TTW (MB) noted that the concept plan is indicative only and the right-turn lane would be designed to accommodate the necessary queue lengths. ○ TfNSW (JB) noted that the layout in terms of buses look fairly good, but that if the pedestrian crossing point were to move e.g. south from the current concept, the bus stops should also move accordingly, to maintain best pedestrian desire lines. TTW (MB) agreed that pedestrian desire lines will be critical to avoiding illegal/unsafe crossings. ○ SINSW (RL) queried whether the eastern leg at Vines Drive would need to accommodate north-south pedestrian movements, or if these occur elsewhere. TTW (MB) noted that pedestrian zebra crossings are provided further east within the WSU campus and those are the intended crossing points.	TfNSW Note TTW Note Note	7/05/21
6.	**Londonderry Road pedestrian options** ○ TTW (MB) presented a high-level overview of different pedestrian control options and the relevant TfNSW warrants and requirements. ○ TfNSW (FL) noted that a Children's Crossing option would require referral to the Network & Safety team for further comment. For signals, has the project considered discounted warrants? TfNSW (FL) also noted that all legs of a signalised intersection should be provided with pedestrian crossings i.e. Vines Drive. TTW (MB) clarified that the option would not be a signalised intersection but a mid-block pedestrian crossing on Londonderry Road. ○ Council (AJ) had no comments on the pedestrian crossing options.	Note Note Note	
7.	**Traffic Study Scope** ○ TTW (MB) presented the proposed scope of traffic counts and modelling which has been previously provided to Council and TfNSW and is awaiting TfNSW endorsement. Due to absences at the meeting this will be finalised offline. Counts are due to occur starting 3 May 2021.	Note	
8.	**EIS supporting documentation** ○ TTW (MB) requested input on any additional documentation required for the EIS lodgement. Council (AJ) suggested that a Road Safety Audit and	Note	

	Task	Responsible	Date
	detailed plans for the intersection proposal should be provided. TfNSW (FL) had no further requirements.		
9.	10. Any other items ○ Council (AJ) noted that pedestrian links to the local area (Hobartville, Richmond, train stations) should be considered. TTW (MB) advised that Council's relevant comment in recent advice had been noted and this will be documented in the EIS.	Note	

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Centre of Excellence – Transport Working Group Meeting #4

Meeting Details	
Project	Centre of Excellence Hawksbury - Transport Working Group Meeting #4
Date	17 June 2021
Location	Microsoft Teams
Attendees	**SINSW –** Matthew Metlege (MM), Rebecca Lehman (RL) **CIPL –** Lizza Young (LY), Jacob Ainsworth (JA) **TTW –** Michael Babbage (MB), Nathaniel Borja (NB) **TfNSW** – John Broady (JB), Felix Liu (FL). **Hawkesbury CC** – Andrew Johnston (AJ), Colleen Haron (CH) **NBRS –** Ewan Saunders (ES), Macella Salzmann (MSz), Stephanie Ferguson (SF)
Apologies	**TfNSW** - Malgy Coman (MC), Billy Yung (BY), Pahee Rathan (PR), Mark Ozinga (MO) **Hawkesbury CC -** Christopher Amit (CA) **RCC –** Tom Hemmett (TH) **CPL** - Maddy Stenniken (MS) **TTW** - Paul Yannoulatos (PY)

	Task	Responsible	Date
1.	**TTW Overview**	Note	
	- *TTW gave overview of both CoE and RHS site localities.*	Note	
2.	**Recent announcements / outcomes**		
	- Previous outcomes reviewed. - *Announcement of preferred corridor and concept design for Richmond bridge duplication project, despite the previous 3 transport working groups, this is the first time the project team have been made aware of project progress since the strategic project was raised at the first Transport Working Group.* - *In conjunction with CoE, TTW have been preparing RHS traffic and travel plan.*	Note Note Note	
3.	**Outstanding**		
	- *Traffic outcome is critical for SSDA lodgement.*	Note	
4.	**Richmond High School**		
	- *MB confirmed preferred points of contact for TfNSW, Council, and Busways.*	Note	

	Task	Responsible	Date
5.	**Bridge Duplication project** - *Bridge duplication proposal will impact both CoE / RHS traffic strategy.* - *MB outlined project team's intent to understand impact on Londonderry Road / Vines Drive intersection.* - *TfNSW (FL) confirmed Londonderry / Vines Drive intersection will be upgraded in stage 2 of the bridge duplication project. Currently planned for 2026.* - *The level of detail the project team is seeking is currently unknown by TfNSW* - *TfNSW (FL) will follow up post meeting for detailed material of proposed upgrades and issued to TTW (MB) and CPL (LY) by next week.* - *HCC are unaware of any further detail on the bridge duplication scope beyond current public documents.* - *(FL) queried project time frame, LY advised school is to be operational by term 1 2023.* - *FL to confirm contact within TfNSW for the Richmond Bridge Duplication project. LY stressed importance of facilitating a meeting urgently to understand the scope & programme of works.* - *HCC noted that the Richmond Bridge project team is accepting feedback until 5 July 2021 and recommended that the CoE/RHS team provide feedback through that channel.*	Note Note Note Note TfNSW Note Note Note TTW/CPL	21/06
6.	**Questions and Comments** - *JB suggested a bus strategy could be to create a U-turn bay in Vines Drive near Londonderry Rd and buses could all divert in to avoid students crossing Londonderry Rd. MB reiterated pedestrians crossing Londonderry road would still need to be accounted for but that an option like this could be considered.*	Note	

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Centre of Excellence – Transport Working Group Meeting #5

Meeting Details	
Project	Centre of Excellence Hawksbury - Transport Working Group Meeting #5
Date	24 June 2021
Location	Microsoft Teams
Attendees	**SINSW –** Matthew Metlege (MM), Rebecca Lehman (RL), Tim O'Sullivan, Angelina Kochergin (AK), Sasha Kovacina (SK). **CIPL –** Lizza Young (LY), Jacob Ainsworth (JA), Maddy Stenniken (MS). **TTW –** Michael Babbage (MB), Nathaniel Borja (NB) **TfNSW** – John Broady (JB), Felix Liu (FL), Timothy Webster (TW). **Hawkesbury CC** – Andrew Johnston (AJ), Colleen Haron (CH). **RPS** – Rob Dwyer (RD).
Apologies	**TfNSW** - Malgy Coman (MC).

	Task	Responsible	Date
1.	**Bridge Duplication**		
	- TfNSW (TW) noted the Southee Rd / Londonderry Rd intersection proposal is still preliminary and not a confirmed preferred option.	Note	
	- TfNSW (TW) gave overview of proposed intersection upgrades and road realignments. Bus bays are provided in their scope. This is still a strategic preliminary design, pedestrian safety to be worked through.	Note	
	- TfNSW (TW) noted these upgrades will be completed in stage 2 of the bridge duplication project, likely be completed circa 2026/2027.	Note	
	- It was noted that WSU have provided principal support for this project's alignment option. Joe Lantz to be point of contact for WSU.	Note	
	- TfNSW (TW) noted, currently funding for Richmond Bridge duplication construction is not available yet. As such, the applicant should propose the interim design for the intersection upgrade to facilitate the proposed development.	Note	
2.	**SSDA Lodgement**		
	- The project team (LY) noted we are ready of SSD lodgement, but it will be a number of months before TfNSW finalise this as the preferred option. The detail we require for lodgement is currently not resolved.	Note	
	- TTW (MB) noted as traffic volumes for broader bridge duplication project are still unknown, our impact on traffic volumes are negligible. Traffic modelling for the bridge duplication project will not be undertaken by this team.	Note	
	- An interim design is necessary for SSD lodgement, so when funding becomes available program can proceed. Further discussion with TfNSW required on how interim proposal is to be delivered.	CPL	08/07
	- Further traffic modelling for our interim proposal is required. - Existing Layout and demand. - Interim layout and future demand.	TTW	08/07
	- Concept design plan, swept path diagram and civil design plan to be submitted to TfNSW review.	CPL	08/07

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Centre of Excellence – TfNSW Consultation

Meeting Details	
Project	Centre of Excellence Hawksbury - Transport Working Group Meeting #6
Date	29 June 2021
Location	Microsoft Teams
Attendees	**SINSW –** Matthew Metlege (MM), Rebecca Lehman (RL), Tim O'Sullivan (TOs), Angelina Kochergin (AK), Sasha Kovacina (SK), Jennifer Barclay (JBa). **CIPL –** Lizza Young (LY), Jacob Ainsworth (JA), Maddy Stenniken (MS), John Stalley (JSt). **TTW –** Michael Babbage (MB), Nathaniel Borja (NB), Paul Yannoulatos (PY). **TfNSW** – Felix Liu (FL), Timothy Webster (TW), Laura Van putten (LV), Christo Opperman (CO) **WSU** – Michaela Briggs (MBs), Craig Smith (CS),
Apologies	**WSU** – Joseph Lantz (JL). **CPL** – John Staley (JS)

	Task	Responsible	Date
1.	**Overview**		
	TfNSW (TW) gave high level review of Richmond bridge duplication project. Post the consultation period, it is intended for this to be the preferred option. Confirmation expected late 2021.	Note	
	TfNSW (TW) noted stage 1 to begin mid next year (2022), stage 2 (remainder of project) likely to begin 2024.	Note	
	TfNSW (TW) noted traffic volumes would not increase until completion for stage 2.	Note	
	TfNSW (TW) noted $500m has been committed to the project ($400m federal funding, $100m state)		
2.	**Commentary**		
	CPL (LY) noted the project team's interest for the interim works to be the most optimal use of time and money. There is to be minimal abortive work.	Note	
	SINSW (TOs) made the suggestion to expedite this intersection as a stage 1A of the bridge upgrade project.	Note	
	CPL (LY) reiterated, the project team's position to submit SSDA as soon as traffic strategy is finalised. School needs to be operational by term 1 2023.	Note	
3.	**Proposal**		
	TTW (PY) noted intention to develop interim proposal that will be operational term 1 2023, TTW have proposal in mind. In the scope of the broader bridge project, our development's traffic impact is insignificant.	Note	
	TTW (MB) presented interim concept proposal for Vines Drive T intersection. And noted this proposal is the minimal work we can do.	Note	
	Project team to assess with council what the minimal work we can do to make school operational.	CPL / TTW	-
	Cost is estimated between 800k - $1.3m, TfNSW (TW) suggested cost sharing opportunity.	Note	
	TfNSW (LV) noted the construct of traffic signals takes around 18 months.	Note	

	Task	Responsible	Date
	CPL (LY) to direct traffic response and coordinate transport meeting – to assess options with TfNSW.	CPL	16/07

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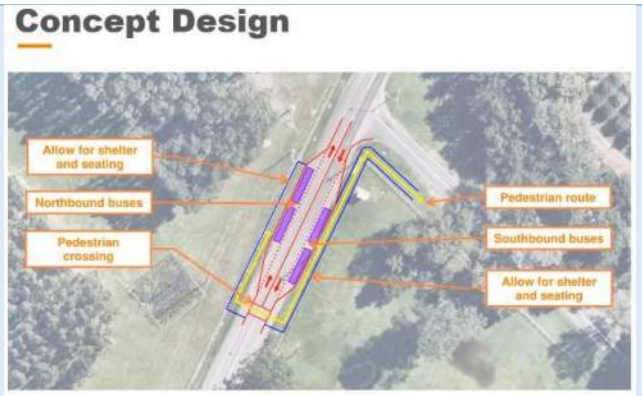
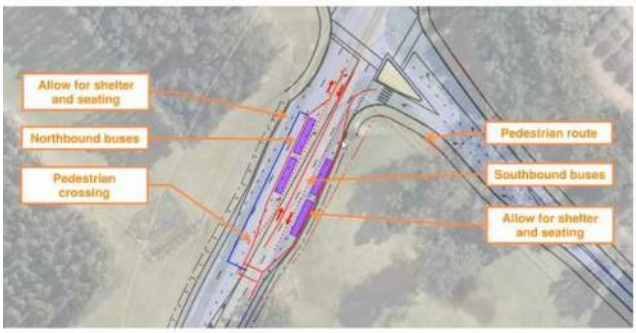
Centre of Excellence – Transport Working Group #5

Meeting Details	
Project	Centre of Excellence Hawksbury - Transport Working Group Meeting #5
Date	27 July 2021
Location	Microsoft Teams
Attendees	**CPL –** Lizza Young (LY), Jacob Ainsworth (JA), John Stalley (JSt), Maddy Stenniken (MS) **RCC** – Amy Warton (AW), Tom Hemmett (TH) **RPS** – Rob Dwyer (RD), Christine Bower (CB) **WSU** – Michaela Briggs (MBs), Craig Smith (CS), Joseph Lantz (JL) **TfNSW** – Felix Liu (FL), John Broady (JB), Laura Van Putten (LV), Malgy Coman (MC), Timothy Webster (TW) **HCC** – Andrew Johnston (AJ), **SINSW –** Matthew Metlege (MM), Rebecca Lehman (RL) **TTW –** Michael Babbage (MB), Nathaniel Borja (NB), Paul Yannoulatos (PY) **RCC** - Tom Hemmett (TH)
Apologies/Distribution	**SINSW –**Rebecca Lehman (RL), Tim O'Sullivan (TOs), Angelina Kochergin (AK), Sasha Kovacina (SK), **TfNSW** –Christo Opperman (CO) **RCC** – Amy Warton (AW), David Moffat (DM) **HCC** – Christopher Amit (CA)

	Task	Responsible	Date
1.	**Overview**		
1.1	*MB outlined previous meetings outcome:* - *Last transport working group* - *TfNSW bridge meeting* - *Recent changes*	Note	
2.	**Concept Design**		
2.1	*New concept design was presented:* - *Safe ferrying of pedestrians from northbound buses across Southee road.* - *150 pedestrian movements per busy time,* - *700 vehicle movements per hour.* - *MB presented overlay of proposed concept with TfNSW's bridge duplication project. Highlighting interface between the two strategies.*	Note	
2.2			

	Task	Responsible	Date
2.3	**TfNSW Overlay Adjustment** 		
3.	**Comments and Queries**		
3.1	*Bus Route* *Query - TfNSW (JB) outlined from a bus planning perspective, preference for there to be a bus turning bay on Vines Drive. 8km bus turning movememt not preferred.* *Comment - CPL (LY) and SINSW (MM) noted use of Vines Drive is a commercial risk for SINSW. SINSW (MM) confirmed this would be consulted with WSU further in parallel to the lodgement of currrent Concept in TIA.*	*Note*	
3.2	*Pavement* *Query - TfNSW (TW) queried pavement design. Design should be aligned to meet TfNSW standards to remove abortive works. CPL to organise pavement consultation during design development phase.* *Comment - TfNSW (TW) happy to facilitate coordination.*	*TfNSW / CPL / TTW*	
3.3	*Pedestrian Crossing* *TfNSW (FL) could not comment on pedestrian crossing at this time. Further internal consultation required to discuss concerns. Review of TIA will assist in identifying existing concerns.* *CPL (LY) noted EIS is to be lodged in the next couple of weeks i.e. Early Aug'21* *TTW (MB) noted TIA will incorporate the latest concept strategy.* *TIA to be issued to TfNSW (FL) in parallel for review and comment. Review comments to be dealt with in the 'Response to Submissions' within the SSD process.*	*TfNSW*	
3.4	*Bus Bays on Main Road* *TfNSW (LVP) requested concept design to be issued and queried a solution to take children off the main road.* *CPL (LY) noted this had been considered in previous investigations.*	*Note*	
3.5	*Copy of Presentation* *HCC (AJ) requested copy of presentation, return comments to be returned within the week.* *CPL (LY) confirmed presentation will be circulated.*	*TTW*	*4 Aug'21*
3.6	*Programme* *HCC (AJ) queried TfNSW early works, TfNSW (TW) noted project completion 2024 – 2026. Consideration of pedestrian paths were also queried.*	*Note*	
3.7	*Consideration of 40km/hr zone* *TTW (MB) suggested 40km/h zone to be implemented.* *TfNSW (LVP) noted school zones are generally not supported when school isn't visible. Also difficult to remove once implemented. TfNSW (TW) also unsupportive of school zone in bridge duplication context.*	*Note*	

	Task	Responsible	Date
3.8	*TfNSW requested a review of site lines as part of concept submission.*	*Note*	
4.	**Other Matters – Early Works**		
4.1	*<u>Remediation on Site:</u>* *CPL (LY) noted the project team is investigating early works i.e. remediation works, RPS (RD) noted category 2 works don't require consent. More information to be issued to HCC for review.*	*Note*	
4.2	*<u>Temporary Construction Access Road:</u>* *CPL (LY) advise that there may be a need for to a Temporary Rd access off from Londonderry Rd and queried if this can be included under Exempt Development.* *TfNSW (MC) advised that Section 138 will need to be lodged via HCC Council. Council to issue a referral to TfNSW for approval.* *TfNSW (LVP) advised that TfNSW will need to be satisfied that there are no other viable means of access other than Londonderry Rd.*	*Note*	

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Centre of Excellence – Transport Working Group – RtS SYD21 / 00245

Meeting Details	
Project	Centre of Excellence Hawksbury - Transport Working Group Meeting #7
Date	14 October 2021
Location	Microsoft Teams
Attendees	**CPL –** Lizza Young (LY), Maddy Stenniken (MS) **RCC** – Amy Warton (AW), Tom Hemmett (TH), Kayan Tabbouche (KT) **TfNSW** –John Broady (JB), Malgy Coman (MC), Sasha Kovacina (SK), Peter Bache (PB), **SINSW –** Matthew Metlege (MM), Justin Barrett, **TTW –** Michael Babbage (MB), Nathaniel Borja (NB), Paul Yannoulatos (PY)
Apologies/Distribution	**SINSW –**Rebecca Lehman (RL) **TfNSW** –Felix Liu (FL) **HCC** – Andrew Johnston (AJ),

	Task	Responsible	Date
1.	**Overview**		
1.1	Introductions were made by all parties	Note	
2.	**Response to Submission**		
2.1	TTW(MB) gave overview of the proposed response being prepared by the CoE project. - Widening of Vines Drive - 30m Diameter roundabout at Clydesdale Road to accommodate Coaches - Bus bay accommodates 3 buses at any time - Bus shelter to be considered	Note	
2.2	School travel plan - TTW confirmed no issues with proposed condition by TfNSW. Standard across SI.	Note	
2.3	Weekend Conference Use - Additional modelling will be provided in RtS. - Modelling results captured within typical fluctuations expected.	TTW	
2.4	Bus Queries - TfNSW requested any frequencies from Penrith direction to be outlined in response. - TTW advised that no further information would be required at this stage for the future planning of bus services.	TTW	
2.5	Londonderry Road Intersection - Transport would need to issue Section 138 for the modifications - TTW to issue concepts civil, utilities, stormwater to be provided to Transport - Sight Distance Analysis to be included in drawings by TTW. - RSA will be included in the RtS as requested by DPIE. - TfNSW (PB) to review signage, line marking,	TTW / TfNSW	
2.6	Vines Drive - PB noted conern with quantities of pedestrian crossings through Vines Drive. PB would welcome providing recommendations with the Vines Drive crossings. - MB confirmed re-work required for new wall. Advice from Safety Audit will help to this also.	TTW	

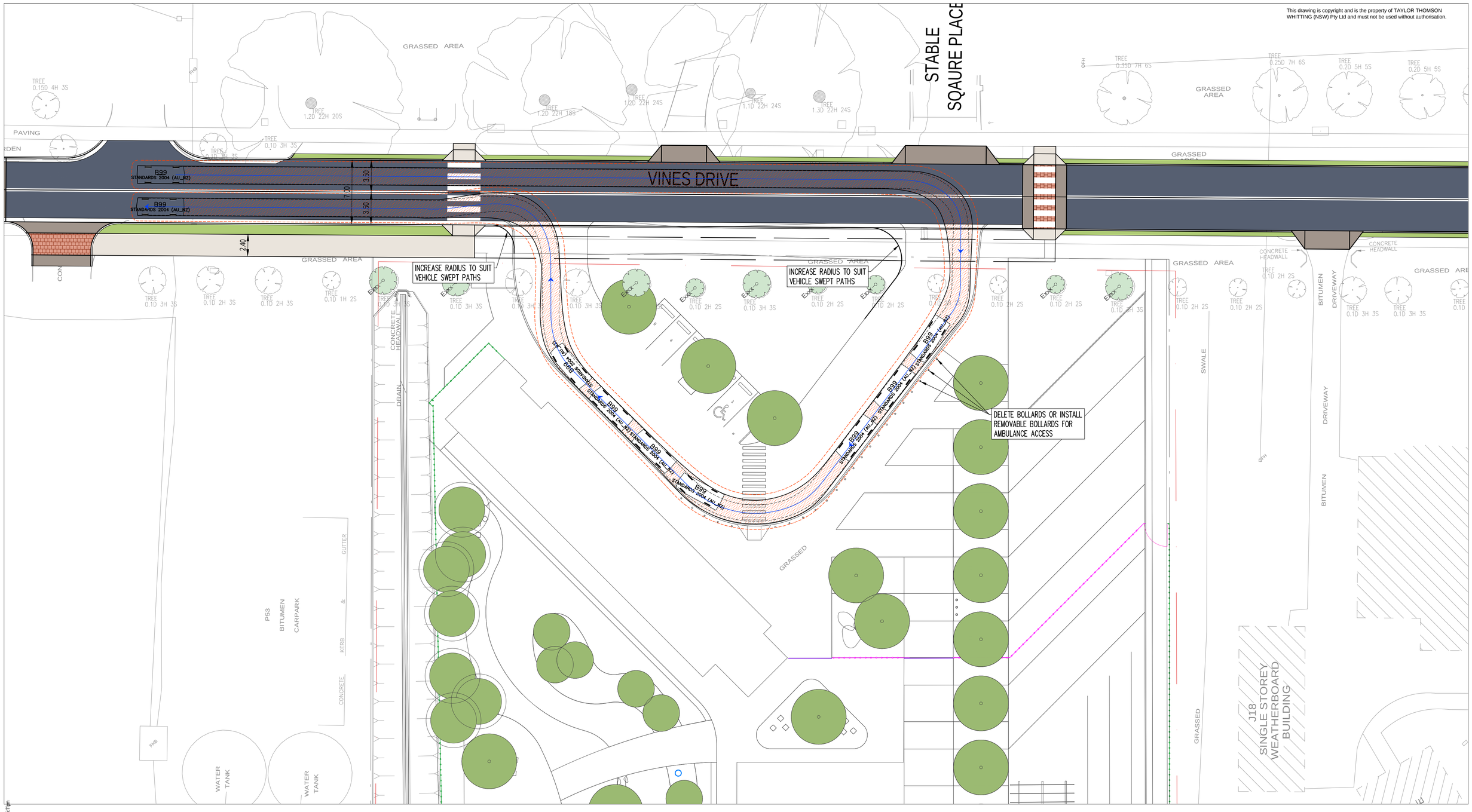
	Task	Responsible	Date
	- PB noted noted that whilst private road, its not closed off, therefore needs to meet current legislation.		
2.7	Vines Drive – Width - JB confirmed 3.2m lanes is the minimum, however, 3.5m is preferred. A bus + mirrors is 2.9m. - Variances between 3.2m-3.5 is acceptable if required, however recommend 1 transition. This would reduce driver error long term. - RCC (AW) noted, due to existing services & infrastructure 3.2m may benefit greatly.	TTW / RCC	
2.8	Raised Crossing - JB recommends minimal raised thresholds to minimise buses ruining road conditions.	TTW / RCC	
2.9	Duplication Project & Londonderry Rd MB queried any involvement from project. SK confirmed too early to coordinate with Bridge Duplication Project. SK confirmed the proposed works by project at Londonderry is minimal and all will be redundant when the project is completed.	Note	
	Lizza Young closed the meeting, appreciating the positive response to the RtS and ongoing support of project.		

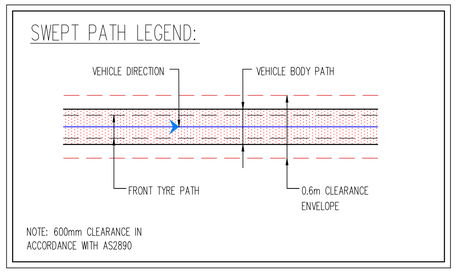
The above represents the authors understanding of issues and conclusions reached. Any errors or omissions brought to the attention of CIPM in writing will be addressed, and the record revised.

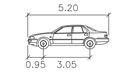
Closure sequence for minute author.

a) Most current minute is to be maintained until closure of item/issue.
b) Closed meeting minute is to be formatted as ~~strikethrough~~
c) Next meeting, closed minute can be dropped off completely.

Appendix B – Swept Path Analysis







B99

	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.9

FileName: SK11.dwg - USER: mbabbage - Plot File Created: Oct 10, 2021 - 5:11pm

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date
P1	PRELIMINARY	MB	MB	10.10.21

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Project
HAWKESBURY CENTRE OF EXCELLENCE

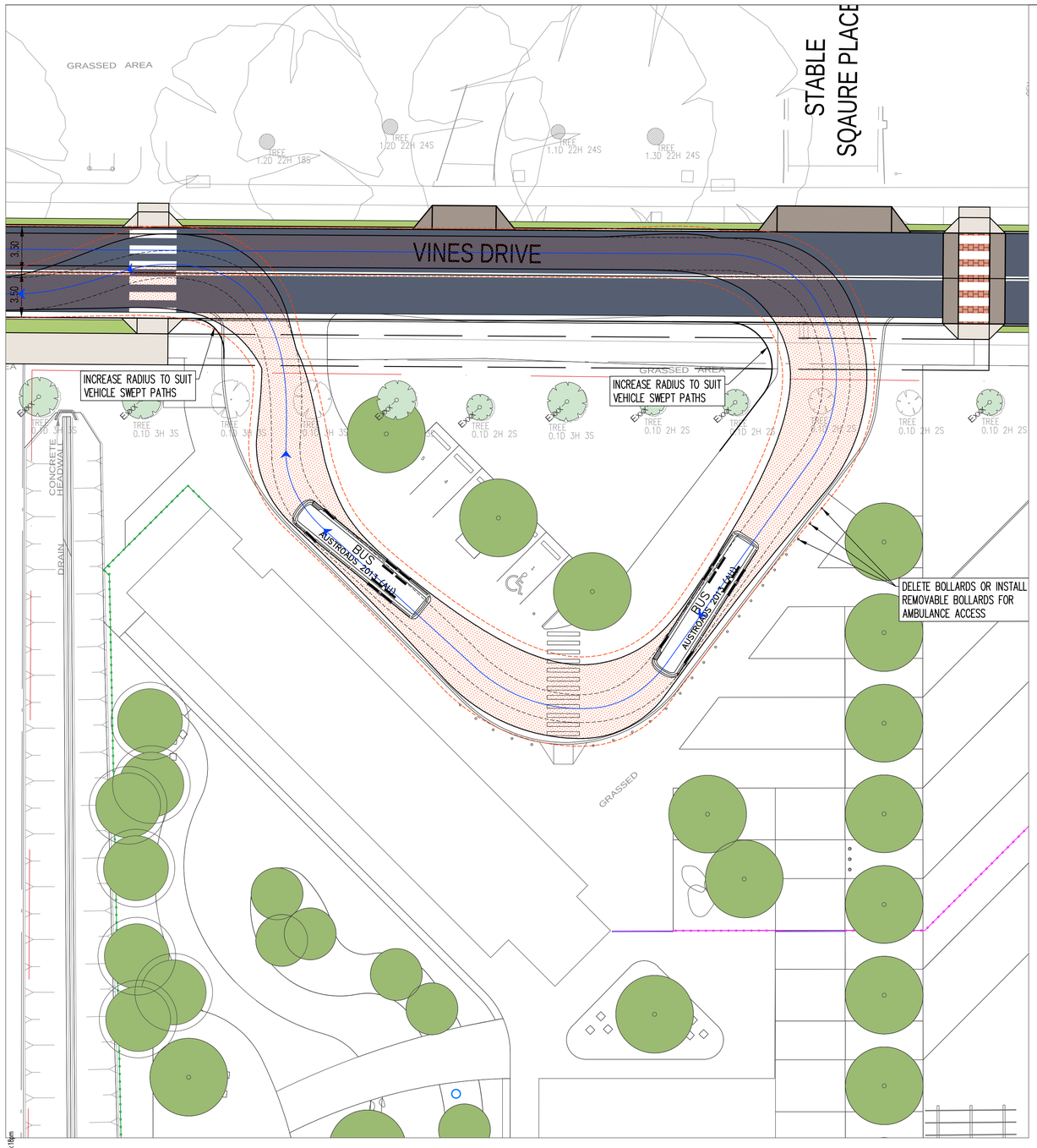
Sheet Subject
SWEPT PATH ANALYSIS - DROP-OFF AND PICK-UP

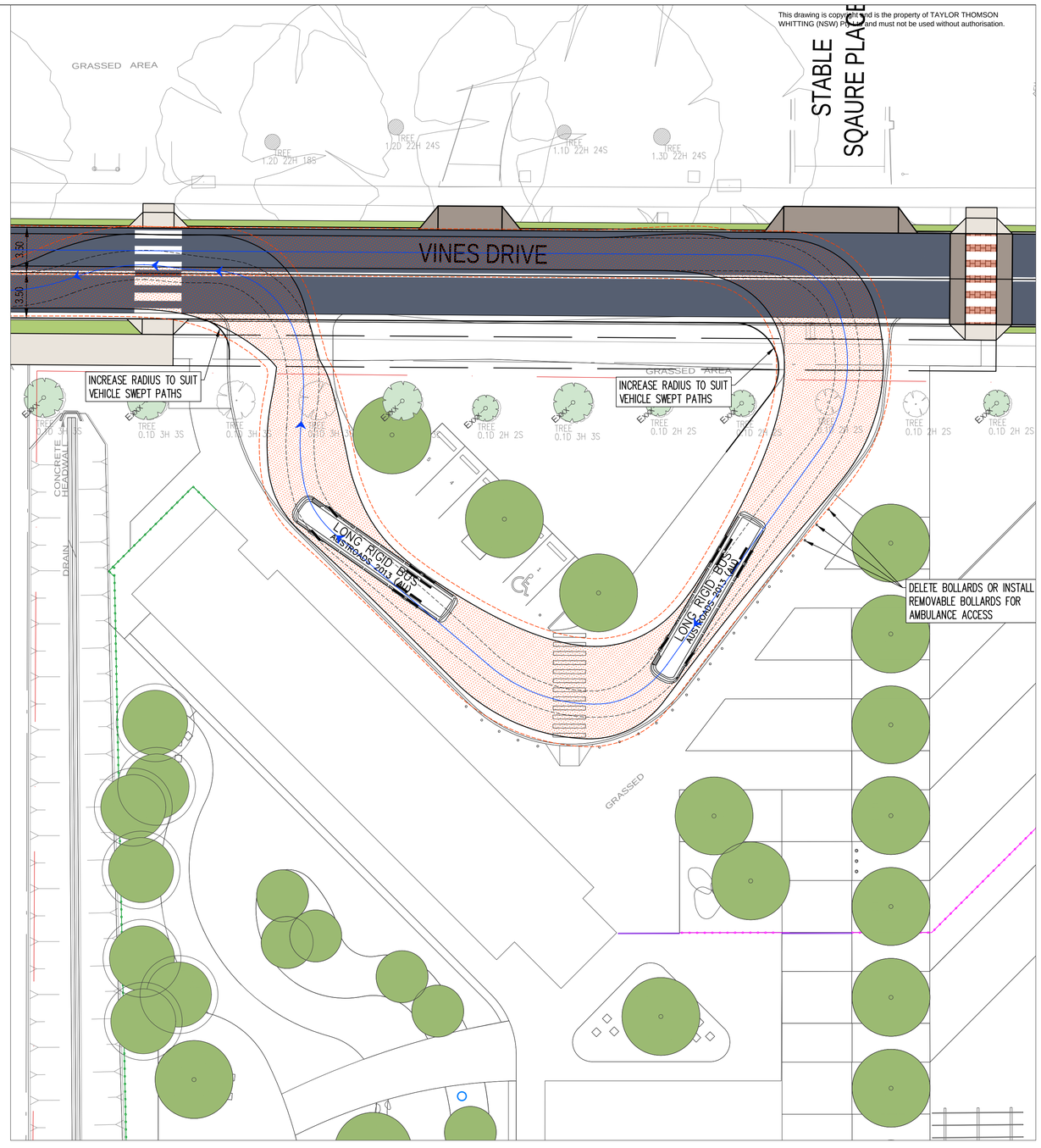
PRELIMINARY
NOT FOR CONSTRUCTION

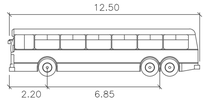
Scale : A1	Drawn	Authorised
1:200	MB	

Job No	Drawing No	Revision
211091	SK11	P1

Plot File Created: Oct 10, 2021 - 5:11pm



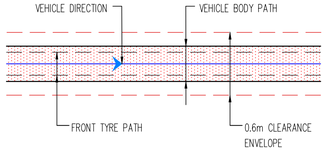




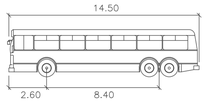
BUS

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 36.6

SWEPT PATH LEGEND:



NOTE: 600mm CLEARANCE IN ACCORDANCE WITH AS2890



LONG RIGID BUS

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 46.4

FileName: SK12.dwg - USER: mbabbage - Plot File Created: Oct 10, 2021 - 5:18pm

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date
P1	PRELIMINARY	MB	MB	10.10.21

Rev	Description	Eng	Draft	Date

Rev	Description	Eng	Draft	Date

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Project
HAWKESBURY CENTRE OF EXCELLENCE

Sheet Subject
SWEPT PATH ANALYSIS - BUS AND COACH ACCESS

Scale : A1	Drawn	Authorised
1:200	MB	

Job No	Drawing No	Revision
211091	SK12	P1

Plot File Created: Oct 10, 2021 - 5:18pm

WEATHER OBSERVATION STATION

"J17" METAL SHED IN ENCLOSURE

TO THS

TURNING CIRCLE TO BE REVIEWED FOR LARGER VEHICLE ACCESS

INCREASE RADIUS TO SUIT VEHICLE SWEPT PATHS

BANK

BANK

SWALE

GRASSED LOADING DOCK

DRIVEWAY

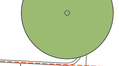
BITUMEN

OF

TREE 0.60 14H 10S

B99 STANDARDS 2004 (AU_NZ)

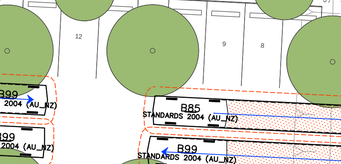
B85 STANDARDS 2004 (AU_NZ)



B85

	meters
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

SWEPT PATH LEGEND:



NOTE: 600mm CLEARANCE IN ACCORDANCE WITH AS2890

B99

	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.9

FileName: SK14.dwg – USER: mbabbage – Plot File Created: Oct. 10, 2021 – 5:19pm

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date
P1	PRELIMINARY	MB	MB	10.10.21

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Project
HAWKESBURY CENTRE OF EXCELLENCE

Sheet Subject
SWEPT PATH ANALYSIS - CAR PARK

Scale : A1 1:200
Drawn MB
Authorised
Job No 211091
Drawing No SK14
Revision P1
Plot File Created: Oct 10, 2021 - 5:19pm

PRELIMINARY
NOT FOR CONSTRUCTION

WEATHER OBSERVATION STATION

"J17" METAL SHED IN ENCLOSURE

TO THS

TURNING CIRCLE TO BE REVIEWED FOR LARGER VEHICLE ACCESS

INCREASE RADIUS TO SUIT VEHICLE SWEPT PATHS

TOYOTA COASTER Custom

BANK

SWALE

GRASSED LOOKOUT

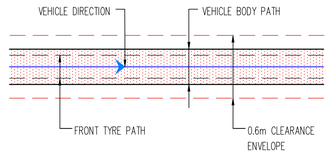
DRIVEWAY

BITUMEN

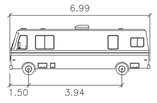
OF

TREE 0.60 14H 10S

SWEPT PATH LEGEND:



NOTE: 600mm CLEARANCE IN ACCORDANCE WITH AS2890



TOYOTA COASTER

	meters
Width	: 2.02
Track	: 1.69
Lock to Lock Time	: 6.0
Steering Angle	: 33.1

FileName: SK15.dwg – USER: mbabbage – Plot File Created: Oct 10, 2021 – 5:21pm

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date
P1	PRELIMINARY	MB	MB	10.10.21

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Project
HAWKESBURY CENTRE OF EXCELLENCE

Sheet Subject
SWEPT PATH ANALYSIS - CAR PARK - MINIBUS ACCESS

Scale : A1	Drawn	Authorised
1:200	MB	

Job No	Drawing No	Revision
211091	SK15	P1

Plot File Created: Oct 10, 2021 - 5:21pm

Appendix C – Traffic Counts

Job No	AUNSW680
Client	0
Site	Londonderry Road
Location	north of Southee Road
Site No	1
Start Date	4-May-21
Description	Volume Summary
Direction	Combined

Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	10-May	4-May	5-May	6-May	7-May	8-May	9-May		
AM Peak	524	498	529	537	478	610	535		
PM Peak	641	655	621	682	596	578	466	**6492**	**6166**
0:00	12	11	15	15	19	40	40	14	22
1:00	14	9	12	8	16	13	24	12	14
2:00	13	19	15	22	17	13	15	17	16
3:00	13	20	14	15	14	15	17	15	15
4:00	57	45	35	36	41	19	11	43	35
5:00	115	131	137	118	110	46	20	122	97
6:00	257	262	247	232	247	109	48	249	200
7:00	400	392	398	389	399	205	146	396	333
8:00	524	498	529	537	478	312	278	513	451
9:00	458	416	462	446	443	416	334	445	425
10:00	347	330	397	396	418	564	437	378	413
11:00	375	377	406	365	392	610	535	383	437
12:00	387	363	394	409	464	578	466	403	437
13:00	411	378	395	401	433	517	355	404	413
14:00	478	443	497	450	540	441	377	482	461
15:00	629	537	619	552	596	439	362	587	533
16:00	641	655	621	682	563	392	344	632	557
17:00	538	503	603	545	528	359	337	543	488
18:00	299	302	366	339	325	250	237	326	303
19:00	183	176	173	205	174	143	170	182	175
20:00	117	140	149	137	143	108	129	137	132
21:00	85	85	128	129	106	129	86	107	107
22:00	67	50	53	77	111	89	52	72	71
23:00	18	29	23	31	52	64	12	31	33
Total	6438	6171	6688	6536	6629	5871	4832	6492	6166

7-19	5487	5194	5687	5511	5579	5083	4208	5492	5250
6-22	6129	5857	6384	6214	6249	5572	4641	6167	5864
6-24	6214	5936	6460	6322	6412	5725	4705	6269	5968
0-24	6438	6171	6688	6536	6629	5871	4832	6492	6166

Job No	AUNSW680
Client	0
Site	Vines Drive
Location	east of Londonderry Road
Site No	2
Start Date	4-May-21
Description	Volume Summary
Direction	Combined

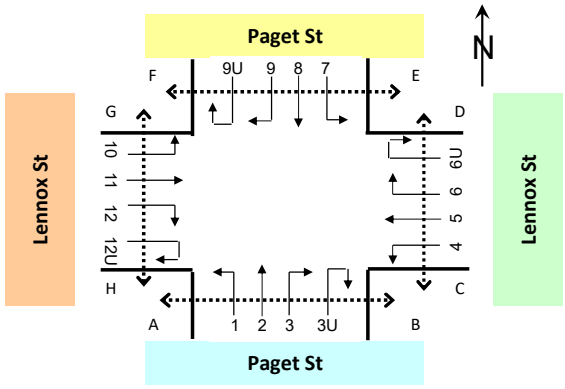
MATRIX Traffic and Transport Data

Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	10-May	4-May	5-May	6-May	7-May	8-May	9-May		
AM Peak	90	121	107	108	103	22	11		
PM Peak	63	94	71	73	72	37	13	**858**	**675**
0:00	2	1	2	3	2	1	0	2	2
1:00	2	3	2	0	0	1	1	1	1
2:00	10	3	5	10	7	1	0	7	5
3:00	5	8	4	6	7	0	3	6	5
4:00	6	2	1	1	4	1	1	3	2
5:00	4	6	12	3	3	0	0	6	4
6:00	20	25	24	22	21	1	1	22	16
7:00	50	66	64	52	55	7	5	57	43
8:00	90	121	107	108	103	15	5	106	78
9:00	74	91	87	90	68	20	11	82	63
10:00	52	52	62	67	65	22	7	60	47
11:00	60	82	59	67	56	21	6	65	50
12:00	60	65	58	62	72	20	12	63	50
13:00	42	51	51	66	70	18	7	56	44
14:00	53	66	65	73	46	30	13	61	49
15:00	63	47	71	68	61	21	11	62	49
16:00	51	94	68	53	40	37	5	61	50
17:00	31	59	70	55	41	28	5	51	41
18:00	27	32	65	34	28	22	3	37	30
19:00	8	14	32	25	10	10	3	18	15
20:00	4	10	25	7	3	6	5	10	9
21:00	5	5	41	15	3	29	0	14	14
22:00	13	4	3	5	5	10	3	6	6
23:00	3	1	1	0	7	3	2	2	2
Total	735	908	979	892	777	324	109	858	675

7-19	653	826	827	795	705	261	90	761	594
6-22	690	880	949	864	742	307	99	825	647
6-24	706	885	953	869	754	320	104	833	656
0-24	735	908	979	892	777	324	109	858	675

Job No. : AUNSW680
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : WSU Richmond
Location : 1. Lennox St / Paget St

Day/Date : Thu, 6th May 2021
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary

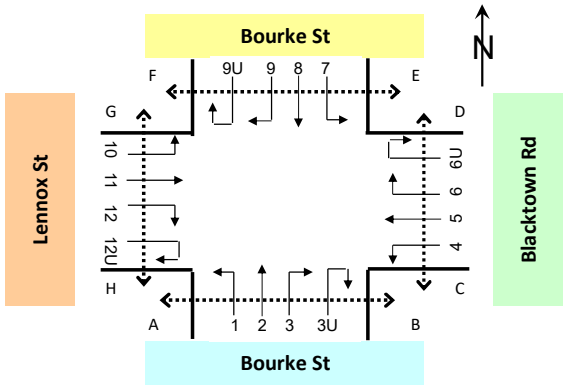


Approach	Paget St				Lennox St				Paget St				Lennox St				Grand Total
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	
8:15 to 9:15	259	16	0	**275**	455	29	0	**484**	142	3	0	**145**	533	32	0	**565**	**1,469**
15:45 to 16:45	216	12	0	**228**	579	18	0	**597**	296	8	0	**304**	478	27	0	**505**	**1,634**

Approach	Paget St				Lennox St				Paget St				Lennox St				Grand Total
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	
6:00 to 7:00	102	10	0	**112**	181	22	0	**203**	44	1	0	**45**	432	33	0	**465**	**825**
6:15 to 7:15	115	12	0	**127**	208	29	0	**237**	55	1	0	**56**	454	27	0	**481**	**901**
6:30 to 7:30	119	14	0	**133**	222	26	0	**248**	65	1	0	**66**	506	18	0	**524**	**971**
6:45 to 7:45	127	14	0	**141**	243	30	0	**273**	78	2	0	**80**	553	23	0	**576**	**1,070**
7:00 to 8:00	153	13	0	**166**	270	29	0	**299**	96	4	0	**100**	564	24	0	**588**	**1,153**
7:15 to 8:15	173	11	0	**184**	326	22	0	**348**	106	7	0	**113**	574	26	0	**600**	**1,245**
7:30 to 8:30	218	10	0	**228**	378	22	0	**400**	110	7	0	**117**	578	31	0	**609**	**1,354**
7:45 to 8:45	234	10	0	**244**	425	22	0	**447**	121	8	0	**129**	559	29	0	**588**	**1,408**
8:00 to 9:00	244	14	0	**258**	458	26	0	**484**	122	6	0	**128**	554	34	0	**588**	**1,458**
8:15 to 9:15	259	16	0	**275**	455	29	0	**484**	142	3	0	**145**	533	32	0	**565**	**1,469**
8:30 to 9:30	227	17	0	**244**	429	29	0	**458**	159	4	0	**163**	494	30	0	**524**	**1,389**
8:45 to 9:45	217	18	0	**235**	389	25	0	**414**	168	3	0	**171**	468	34	0	**502**	**1,322**
9:00 to 10:00	205	13	0	**218**	367	19	0	**386**	174	2	0	**176**	423	31	0	**454**	**1,234**
AM Totals	**704**	**50**	**0**	**754**	**1,276**	**96**	**0**	**1,372**	**436**	**13**	**0**	**449**	**1,973**	**122**	**0**	**2,095**	**4,670**
14:00 to 15:00	154	13	2	**169**	461	18	0	**479**	243	6	0	**249**	465	21	0	**486**	**1,383**
14:15 to 15:15	172	12	2	**186**	485	15	0	**500**	246	4	0	**250**	479	24	0	**503**	**1,439**
14:30 to 15:30	178	14	1	**193**	503	21	0	**524**	229	3	0	**232**	487	22	0	**509**	**1,458**
14:45 to 15:45	187	12	0	**199**	506	21	0	**527**	225	2	0	**227**	477	15	1	**493**	**1,446**
15:00 to 16:00	210	11	0	**221**	520	19	0	**539**	223	2	0	**225**	457	22	1	**480**	**1,465**
15:15 to 16:15	213	13	0	**226**	553	20	0	**573**	238	6	0	**244**	446	21	1	**468**	**1,511**
15:30 to 16:30	211	13	0	**224**	578	17	0	**595**	267	7	0	**274**	440	24	1	**465**	**1,558**
15:45 to 16:45	216	12	0	**228**	579	18	0	**597**	296	8	0	**304**	478	27	0	**505**	**1,634**
16:00 to 17:00	203	10	0	**213**	572	18	0	**590**	318	7	0	**325**	476	21	0	**497**	**1,625**
16:15 to 17:15	182	11	0	**193**	555	16	0	**571**	338	3	0	**341**	493	18	0	**511**	**1,616**
16:30 to 17:30	183	10	0	**193**	552	15	0	**567**	331	2	0	**333**	489	13	0	**502**	**1,595**
16:45 to 17:45	177	10	0	**187**	543	15	0	**558**	315	3	0	**318**	448	10	0	**458**	**1,521**
17:00 to 18:00	178	8	0	**186**	530	15	0	**545**	310	4	0	**314**	418	7	0	**425**	**1,470**
PM Totals	**745**	**42**	**2**	**789**	**2,083**	**70**	**0**	**2,153**	**1,094**	**19**	**0**	**1,113**	**1,816**	**71**	**1**	**1,888**	**5,943**

Job No. : AUNSW680
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : WSU Richmond
Location : 2. Lennox St / Bourke St / Blacktown Rd

Day/Date : Thu, 6th May 2021
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary

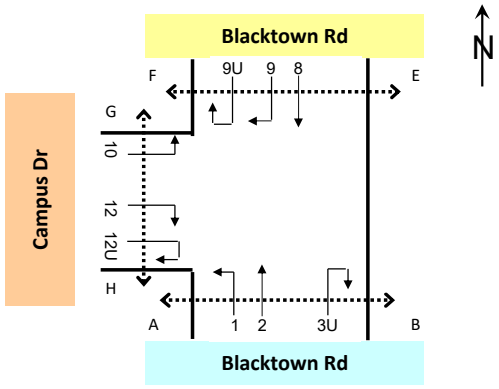


Approach	Bourke St				Blacktown Rd				Bourke St				Lennox St				Grand Total
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	
8:15 to 9:15	139	3	0	**142**	550	38	0	**588**	268	11	0	**279**	531	29	0	**560**	**1,569**
15:45 to 16:45	103	2	0	**105**	623	20	0	**643**	396	7	1	**404**	444	25	0	**469**	**1,621**

Approach	Bourke St				Blacktown Rd				Bourke St				Lennox St				Grand Total
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	
6:00 to 7:00	103	0	0	**103**	229	22	0	**251**	91	6	0	**97**	468	41	0	**509**	**960**
6:15 to 7:15	103	0	0	**103**	254	30	0	**284**	113	5	0	**118**	507	34	0	**541**	**1,046**
6:30 to 7:30	124	0	0	**124**	265	30	0	**295**	118	7	0	**125**	563	31	0	**594**	**1,138**
6:45 to 7:45	127	0	0	**127**	263	35	0	**298**	135	4	0	**139**	587	33	0	**620**	**1,184**
7:00 to 8:00	133	3	0	**136**	311	35	0	**346**	162	5	0	**167**	630	32	0	**662**	**1,311**
7:15 to 8:15	136	4	0	**140**	368	30	0	**398**	174	6	0	**180**	623	28	0	**651**	**1,369**
7:30 to 8:30	126	5	0	**131**	422	31	0	**453**	224	6	0	**230**	621	27	0	**648**	**1,462**
7:45 to 8:45	135	6	0	**141**	506	30	0	**536**	250	11	0	**261**	599	23	0	**622**	**1,560**
8:00 to 9:00	140	4	0	**144**	526	36	0	**562**	248	12	0	**260**	565	29	0	**594**	**1,560**
8:15 to 9:15	139	3	0	**142**	550	38	0	**588**	268	11	0	**279**	531	29	0	**560**	**1,569**
8:30 to 9:30	133	2	0	**135**	527	35	0	**562**	237	14	0	**251**	495	28	0	**523**	**1,471**
8:45 to 9:45	103	1	0	**104**	468	34	0	**502**	214	14	0	**228**	467	32	0	**499**	**1,333**
9:00 to 10:00	71	0	0	**71**	460	24	0	**484**	195	18	0	**213**	434	29	0	**463**	**1,231**
AM Totals	**447**	**7**	**0**	**454**	**1,526**	**117**	**0**	**1,643**	**696**	**41**	**0**	**737**	**2,097**	**131**	**0**	**2,228**	**5,062**
14:00 to 15:00	93	3	1	**97**	504	23	0	**527**	243	13	0	**256**	467	24	0	**491**	**1,371**
14:15 to 15:15	107	2	1	**110**	561	20	0	**581**	251	9	0	**260**	473	27	0	**500**	**1,451**
14:30 to 15:30	106	2	1	**109**	601	28	0	**629**	303	9	0	**312**	454	24	0	**478**	**1,528**
14:45 to 15:45	100	1	1	**102**	607	28	0	**635**	314	8	0	**322**	440	16	0	**456**	**1,515**
15:00 to 16:00	90	0	0	**90**	616	26	0	**642**	332	6	1	**339**	418	19	0	**437**	**1,508**
15:15 to 16:15	92	1	0	**93**	608	26	0	**634**	368	8	1	**377**	412	19	0	**431**	**1,535**
15:30 to 16:30	104	1	0	**105**	618	21	0	**639**	365	8	1	**374**	418	23	0	**441**	**1,559**
15:45 to 16:45	103	2	0	**105**	623	20	0	**643**	396	7	1	**404**	444	25	0	**469**	**1,621**
16:00 to 17:00	91	2	0	**93**	616	18	0	**634**	393	8	0	**401**	448	20	0	**468**	**1,596**
16:15 to 17:15	88	2	0	**90**	585	17	0	**602**	378	6	0	**384**	471	17	0	**488**	**1,564**
16:30 to 17:30	81	2	0	**83**	575	18	0	**593**	383	5	0	**388**	471	13	0	**484**	**1,548**
16:45 to 17:45	85	2	0	**87**	554	20	0	**574**	324	5	0	**329**	427	11	0	**438**	**1,428**
17:00 to 18:00	86	2	0	**88**	530	17	0	**547**	294	5	0	**299**	420	10	0	**430**	**1,364**
PM Totals	**360**	**7**	**1**	**368**	**2,266**	**84**	**0**	**2,350**	**1,262**	**32**	**1**	**1,295**	**1,753**	**73**	**0**	**1,826**	**5,839**

Job No. : AUNSW680
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : WSU Richmond
Location : 3. Blacktown Rd / Campus Dr

Day/Date : Thu, 6th May 2021
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary

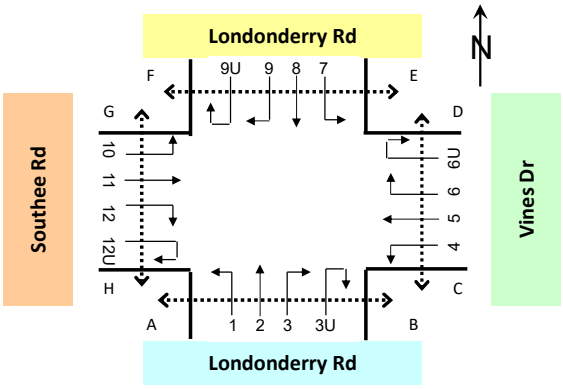


Approach	Blacktown Rd					Blacktown Rd				Campus Dr				Grand Total
Time Period	Lights	Heavies	Cyclists	Total		Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	
8:00 to 9:00	623	38	0	**661**		587	33	0	**620**	21	1	0	**22**	**1,303**
15:45 to 16:45	590	18	0	**608**		524	21	0	**545**	99	0	0	**99**	**1,252**

Approach	Blacktown Rd					Blacktown Rd				Campus Dr				Grand Total
Time Period	Lights	Heavies	Cyclists	Total		Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	
6:00 to 7:00	238	24	0	**262**		496	34	0	**530**	0	0	0	**0**	**792**
6:15 to 7:15	276	28	0	**304**		536	25	0	**561**	1	0	0	**1**	**866**
6:30 to 7:30	306	27	0	**333**		587	22	0	**609**	2	0	0	**2**	**944**
6:45 to 7:45	333	30	0	**363**		595	23	0	**618**	4	0	0	**4**	**985**
7:00 to 8:00	405	30	0	**435**		622	22	0	**644**	12	0	1	**13**	**1,092**
7:15 to 8:15	472	27	0	**499**		621	28	0	**649**	20	0	1	**21**	**1,169**
7:30 to 8:30	529	28	0	**557**		616	29	0	**645**	21	0	1	**22**	**1,224**
7:45 to 8:45	592	32	0	**624**		618	28	0	**646**	24	0	1	**25**	**1,295**
8:00 to 9:00	623	38	0	**661**		587	33	0	**620**	21	1	0	**22**	**1,303**
8:15 to 9:15	634	42	0	**676**		548	28	0	**576**	20	1	0	**21**	**1,273**
8:30 to 9:30	602	39	0	**641**		521	26	0	**547**	23	1	0	**24**	**1,212**
8:45 to 9:45	537	35	0	**572**		480	30	0	**510**	21	1	0	**22**	**1,104**
9:00 to 10:00	501	24	0	**525**		449	31	0	**480**	24	0	0	**24**	**1,029**
AM Totals	**1,767**	**116**	**0**	**1,883**		**2,154**	**120**	**0**	**2,274**	**57**	**1**	**1**	**59**	**4,216**
14:00 to 15:00	511	25	0	**536**		512	24	0	**536**	63	0	0	**63**	**1,135**
14:15 to 15:15	564	19	0	**583**		516	23	0	**539**	68	0	0	**68**	**1,190**
14:30 to 15:30	594	28	0	**622**		514	22	0	**536**	89	0	0	**89**	**1,247**
14:45 to 15:45	598	31	0	**629**		492	16	0	**508**	98	0	0	**98**	**1,235**
15:00 to 16:00	589	23	0	**612**		492	17	0	**509**	91	0	0	**91**	**1,212**
15:15 to 16:15	578	28	0	**606**		487	19	0	**506**	102	0	0	**102**	**1,214**
15:30 to 16:30	587	23	0	**610**		490	19	0	**509**	92	0	0	**92**	**1,211**
15:45 to 16:45	590	18	0	**608**		524	21	0	**545**	99	0	0	**99**	**1,252**
16:00 to 17:00	592	19	0	**611**		522	17	0	**539**	94	0	0	**94**	**1,244**
16:15 to 17:15	560	18	0	**578**		544	15	0	**559**	94	0	0	**94**	**1,231**
16:30 to 17:30	553	17	0	**570**		543	12	0	**555**	83	0	0	**83**	**1,208**
16:45 to 17:45	525	18	0	**543**		490	12	0	**502**	61	1	0	**62**	**1,107**
17:00 to 18:00	513	15	0	**528**		484	11	0	**495**	48	1	0	**49**	**1,072**
PM Totals	**2,205**	**82**	**0**	**2,287**		**2,010**	**69**	**0**	**2,079**	**296**	**1**	**0**	**297**	**4,663**

Job No. : AUNSW680
Client : Taylor Thomson Whitting (NSW) Pty Ltd
Suburb : WSU Richmond
Location : 4. Londonderry Rd / Southee Rd / Vines Dr

Day/Date : Thu, 6th May 2021
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



Approach	Londonderry Rd				Vines Dr				Londonderry Rd				Southee Rd				Grand Total
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	
8:15 to 9:15	456	8	0	**464**	32	5	0	**37**	202	9	0	**211**	212	4	0	**216**	**928**
16:15 to 17:15	331	8	0	**339**	108	4	0	**112**	395	6	0	**401**	120	4	0	**124**	**976**

Approach	Londonderry Rd				Vines Dr				Londonderry Rd				Southee Rd				Grand Total
Time Period	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	Lights	Heavies	Cyclists	Total	
6:00 to 7:00	170	10	0	**180**	8	0	0	**8**	85	3	0	**88**	141	8	0	**149**	**425**
6:15 to 7:15	198	9	0	**207**	9	1	0	**10**	101	5	0	**106**	168	5	0	**173**	**496**
6:30 to 7:30	197	10	0	**207**	10	1	0	**11**	117	6	0	**123**	179	4	0	**183**	**524**
6:45 to 7:45	215	9	0	**224**	12	3	0	**15**	141	8	0	**149**	175	4	0	**179**	**567**
7:00 to 8:00	260	7	0	**267**	15	4	0	**19**	152	8	0	**160**	191	6	0	**197**	**643**
7:15 to 8:15	303	7	0	**310**	16	4	0	**20**	157	8	1	**166**	202	7	0	**209**	**705**
7:30 to 8:30	361	6	0	**367**	19	5	0	**24**	170	8	1	**179**	222	7	0	**229**	**799**
7:45 to 8:45	428	6	0	**434**	19	4	0	**23**	170	8	1	**179**	241	7	0	**248**	**884**
8:00 to 9:00	457	9	0	**466**	23	4	0	**27**	177	8	1	**186**	231	4	0	**235**	**914**
8:15 to 9:15	456	8	0	**464**	32	5	0	**37**	202	9	0	**211**	212	4	0	**216**	**928**
8:30 to 9:30	427	9	0	**436**	32	6	0	**38**	198	8	0	**206**	184	4	0	**188**	**868**
8:45 to 9:45	352	9	0	**361**	33	6	0	**39**	192	8	0	**200**	151	4	0	**155**	**755**
9:00 to 10:00	293	7	0	**300**	31	6	0	**37**	186	7	0	**193**	128	3	0	**131**	**661**
AM Totals	**1,180**	**33**	**0**	**1,213**	**77**	**14**	**0**	**91**	**600**	**26**	**1**	**627**	**691**	**21**	**0**	**712**	**2,643**
14:00 to 15:00	243	9	3	**255**	63	8	1	**72**	254	5	2	**261**	108	5	0	**113**	**701**
14:15 to 15:15	288	9	2	**299**	60	4	0	**64**	260	7	3	**270**	123	4	0	**127**	**760**
14:30 to 15:30	313	10	1	**324**	81	5	0	**86**	255	8	1	**264**	131	3	0	**134**	**808**
14:45 to 15:45	315	8	0	**323**	99	5	0	**104**	273	8	1	**282**	138	3	0	**141**	**850**
15:00 to 16:00	338	11	0	**349**	104	4	0	**108**	264	8	1	**273**	138	1	0	**139**	**869**
15:15 to 16:15	340	12	1	**353**	114	6	0	**120**	302	9	0	**311**	110	1	0	**111**	**895**
15:30 to 16:30	322	13	1	**336**	104	5	0	**109**	335	10	0	**345**	116	1	0	**117**	**907**
15:45 to 16:45	333	11	1	**345**	102	5	0	**107**	380	11	0	**391**	113	2	0	**115**	**958**
16:00 to 17:00	335	7	1	**343**	96	5	0	**101**	401	10	0	**411**	107	5	0	**112**	**967**
16:15 to 17:15	331	8	0	**339**	108	4	0	**112**	395	6	0	**401**	120	4	0	**124**	**976**
16:30 to 17:30	343	6	0	**349**	106	6	0	**112**	393	2	0	**395**	115	4	0	**119**	**975**
16:45 to 17:45	336	9	0	**345**	97	6	0	**103**	342	1	0	**343**	109	5	0	**114**	**905**
17:00 to 18:00	310	9	0	**319**	102	6	0	**108**	303	2	0	**305**	100	2	0	**102**	**834**
PM Totals	**1,226**	**36**	**4**	**1,266**	**365**	**23**	**1**	**389**	**1,222**	**25**	**3**	**1,250**	**453**	**13**	**0**	**466**	**3,371**

Appendix D – Intersection Modelling Results

MOVEMENT SUMMARY

Site: 1 [Londonderry x Vines 2021 AM WOD (Site Folder: 2021 Without Development)]

Network: N101 [2021-WOD-AM-N1 (Network Folder: 2021 Without Development)]

Londonderry Road x Vines Drive
2021: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	12	0.0	12	0.0	0.071	6.5	LOS A	0.2	1.8	0.51	0.74	0.51	50.3
23	R2	27	19.2	27	19.2	0.071	11.8	LOS A	0.2	1.8	0.51	0.74	0.51	45.2
Approach		39	13.5	39	13.5	0.071	10.2	LOS A	0.2	1.8	0.51	0.74	0.51	47.4
NorthEast: Londonderry Road														
24	L2	105	2.0	105	2.0	0.211	2.7	LOS A	0.0	0.0	0.00	0.14	0.00	55.5
25	T1	293	3.6	293	3.6	0.211	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	58.6
Approach		398	3.2	398	3.2	0.211	0.7	NA	0.0	0.0	0.00	0.14	0.00	57.7
SouthWest: Londonderry Road														
31	T1	401	2.1	401	2.1	0.282	0.6	LOS A	0.9	6.4	0.23	0.12	0.23	56.3
32	R2	87	0.0	87	0.0	0.282	7.4	LOS A	0.9	6.4	0.23	0.12	0.23	56.0
Approach		488	1.7	488	1.7	0.282	1.8	NA	0.9	6.4	0.23	0.12	0.23	56.2
All Vehicles		925	2.8	925	2.8	0.282	1.7	NA	0.9	6.4	0.14	0.16	0.14	56.3

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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 [Londonderry x Southee 2021 AM WOD (Site Folder: 2021 Without Development)]

Network: N101 [2021-WOD-AM-N1 (Network Folder: 2021 Without Development)]

Londonderry Road x Southee Road
2021: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Londonderry Road														
25	T1	206	4.1	206	4.1	0.123	0.2	LOS A	0.2	1.2	0.09	0.04	0.09	56.9
26	R2	16	6.7	16	6.7	0.123	7.5	LOS A	0.2	1.2	0.09	0.04	0.09	55.6
Approach		222	4.3	222	4.3	0.123	0.7	NA	0.2	1.2	0.09	0.04	0.09	56.7
NorthWest: Southee Road														
27	L2	38	5.6	38	5.6	0.301	7.3	LOS A	1.2	8.8	0.53	0.81	0.60	47.8
29	R2	189	1.1	189	1.1	0.301	9.2	LOS A	1.2	8.8	0.53	0.81	0.60	46.5
Approach		227	1.9	227	1.9	0.301	8.9	LOS A	1.2	8.8	0.53	0.81	0.60	46.8
SouthWest: Londonderry Road														
30	L2	111	1.9	111	1.9	0.227	2.7	LOS A	0.0	0.0	0.00	0.14	0.00	55.5
31	T1	318	3.6	318	3.6	0.227	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	57.4
Approach		428	3.2	428	3.2	0.227	0.7	NA	0.0	0.0	0.00	0.14	0.00	56.6
All Vehicles		878	3.1	878	3.1	0.301	2.8	NA	1.2	8.8	0.16	0.29	0.18	52.5

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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 [Blacktown x Campus 2021 AM WOD (Site Folder: 2021 Without Development)]

Network: N101 [2021-WOD-AM-N2 (Network Folder: 2021 Without Development)]

Blacktown Road x Campus Drive
2021: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blacktown Road														
21	L2	93	2.3	93	2.3	0.051	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
22	T1	619	6.8	619	6.8	0.331	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		712	6.2	712	6.2	0.331	1.0	NA	0.0	0.0	0.00	0.08	0.00	75.7
NorthWest: Blacktown Road														
28	T1	557	5.1	557	5.1	0.297	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
29	R2	49	2.1	49	2.1	0.083	11.5	LOS A	0.3	2.0	0.60	0.84	0.60	54.7
Approach		606	4.9	606	4.9	0.297	1.0	NA	0.3	2.0	0.05	0.07	0.05	76.9
SouthWest: Campus Road														
30	L2	7	0.0	7	0.0	0.119	6.9	LOS A	0.4	2.6	0.00	0.58	0.00	33.7
32	R2	15	7.1	15	7.1	0.119	34.5	LOS C	0.4	2.6	0.00	0.58	0.00	44.0
Approach		22	4.8	22	4.8	0.119	25.3	LOS B	0.4	2.6	0.00	0.58	0.00	41.5
All Vehicles		1340	5.6	1340	5.6	0.331	1.4	NA	0.4	2.6	0.02	0.08	0.02	75.3

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 3 [Paget x Lennox 2021 AM WOD (Site Folder: 2021 Without Development)]

Network: N101 [2021-WOD-AM-N2 (Network Folder: 2021 Without Development)]

Paget Street x Lennox Street
2021: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 30 seconds (Site Practical 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Paget Street														
1	L2	84	5.0	84	5.0	0.235	18.0	LOS B	1.1	8.2	0.87	0.74	0.87	41.9
2	T1	165	5.7	165	5.7	* 0.602	13.4	LOS A	3.1	22.9	0.96	0.82	1.07	44.6
3	R2	40	7.9	40	7.9	0.602	19.1	LOS B	3.1	22.9	0.96	0.82	1.07	40.9
Approach		289	5.8	289	5.8	0.602	15.5	LOS B	3.1	22.9	0.93	0.80	1.02	43.3
East: Lennox Street														
4	L2	14	0.0	14	0.0	0.223	12.4	LOS A	1.7	12.4	0.69	0.57	0.69	51.7
5	T1	400	7.1	400	7.1	0.604	8.5	LOS A	4.5	33.2	0.80	0.70	0.83	48.5
6	R2	96	2.2	96	2.2	* 0.604	14.9	LOS B	4.5	33.2	0.86	0.78	0.92	44.1
Approach		509	6.0	509	6.0	0.604	9.8	LOS A	4.5	33.2	0.81	0.71	0.85	47.8
North: Paget Street														
7	L2	38	0.0	38	0.0	0.102	16.4	LOS B	0.5	3.4	0.85	0.70	0.85	23.5
8	T1	89	1.2	89	1.2	0.346	12.2	LOS A	1.6	11.4	0.90	0.72	0.90	39.6
9	R2	25	8.3	25	8.3	0.346	16.9	LOS B	1.6	11.4	0.90	0.72	0.90	34.7
Approach		153	2.1	153	2.1	0.346	14.0	LOS A	1.6	11.4	0.89	0.71	0.89	36.6
West: Lennox Street														
10	L2	84	1.3	84	1.3	0.431	13.4	LOS A	3.6	26.2	0.77	0.68	0.77	42.8
11	T1	466	6.3	466	6.3	0.431	7.7	LOS A	3.6	26.2	0.77	0.67	0.77	38.9
12	R2	44	7.1	44	7.1	0.431	13.1	LOS A	3.1	22.8	0.77	0.66	0.77	48.9
Approach		595	5.7	595	5.7	0.431	8.9	LOS A	3.6	26.2	0.77	0.67	0.77	41.1
All Vehicles		1546	5.4	1546	5.4	0.604	11.0	LOS A	4.5	33.2	0.82	0.71	0.85	43.6

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.
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
South: Paget Street											
P1	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
East: Lennox Street											
P2	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
North: Paget Street											

P3 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
West: Lennox Street										
P4 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
All Pedestrians	211	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96

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: 4 [Blacktown x Bourke 2021 AM WOD (Site Folder: 2021 Without Development)]

Network: N101 [2021-WOD-AM-N2 (Network Folder: 2021 Without Development)]

Blacktown Road x Bourke Street x Lennox Street
2021: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bourke Street														
1	L2	1	0.0	1	0.0	0.076	29.5	LOS C	1.2	8.3	0.77	0.58	0.77	24.4
2	T1	132	1.6	132	1.6	0.234	24.3	LOS B	3.4	23.9	0.80	0.64	0.80	33.3
3b	R3	17	6.3	17	6.3	0.234	31.0	LOS C	3.4	23.9	0.81	0.67	0.81	23.1
Approach		149	2.1	149	2.1	0.234	25.1	LOS B	3.4	23.9	0.80	0.65	0.80	32.4
SouthEast: Blacktown Road														
21b	L3	17	12.5	17	12.5	0.157	15.3	LOS B	2.9	21.7	0.49	0.67	0.49	44.3
21a	L1	464	7.3	464	7.3	0.434	14.5	LOS A	10.1	74.3	0.57	0.72	0.57	41.0
23a	R1	138	3.1	138	3.1	* 0.434	14.9	LOS B	10.1	74.3	0.61	0.74	0.61	43.8
Approach		619	6.5	619	6.5	0.434	14.6	LOS B	10.1	74.3	0.58	0.72	0.58	41.9
North: Bourke Street														
7a	L1	120	2.6	120	2.6	0.232	30.0	LOS C	3.7	26.3	0.81	0.76	0.81	21.0
8	T1	112	4.7	112	4.7	0.443	26.2	LOS B	5.7	41.5	0.86	0.74	0.86	31.4
9	R2	62	5.1	62	5.1	* 0.443	31.8	LOS C	5.7	41.5	0.86	0.74	0.86	21.7
Approach		294	3.9	294	3.9	0.443	28.9	LOS C	5.7	41.5	0.84	0.75	0.84	25.8
West: Lennox Street														
10	L2	119	2.7	119	2.7	0.168	14.5	LOS B	3.2	23.2	0.50	0.69	0.50	43.1
12a	R1	466	5.9	466	5.9	0.426	14.2	LOS A	8.8	64.6	0.58	0.70	0.58	38.5
12	R2	4	0.0	4	0.0	0.426	15.5	LOS B	8.8	64.6	0.59	0.70	0.59	43.0
Approach		589	5.2	589	5.2	0.426	14.2	LOS A	8.8	64.6	0.56	0.70	0.56	39.8
All Vehicles		1652	5.2	1652	5.2	0.443	18.0	LOS B	10.1	74.3	0.64	0.71	0.64	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.
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
South: Bourke Street											
P1	Full	53	12.1	LOS B	0.1	0.1	0.55	0.55	39.2	35.2	0.90
SouthEast: Blacktown Road											
P5	Full	53	29.0	LOS C	0.1	0.1	0.85	0.85	56.0	35.2	0.63
North: Bourke Street											

P3 Full	53	12.1	LOS B	0.1	0.1	0.55	0.55	39.2	35.2	0.90
West: Lennox Street										
P4 Full	53	29.0	LOS C	0.1	0.1	0.85	0.85	56.0	35.2	0.63
All Pedestrians	211	20.5	LOS C	0.1	0.1	0.70	0.70	47.6	35.2	0.74

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 [Londonderry x Vines 2021 PM WOD (Site Folder: 2021 Without Development)]

Network: N101 [2021-WOD-PM-N1 (Network Folder: 2021 Without Development)]

Londonderry Road x Vines Drive
2021: Existing Conditions - Without Development
PM Peak: 15:45-14:45
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	53	0.0	53	0.0	0.161	7.1	LOS A	0.6	4.1	0.52	0.75	0.52	51.0
23	R2	60	8.8	60	8.8	0.161	10.7	LOS A	0.6	4.1	0.52	0.75	0.52	46.5
Approach		113	4.7	113	4.7	0.161	9.0	LOS A	0.6	4.1	0.52	0.75	0.52	49.3
NorthEast: Londonderry Road														
24	L2	31	0.0	31	0.0	0.228	2.7	LOS A	0.0	0.0	0.00	0.04	0.00	56.5
25	T1	405	3.1	405	3.1	0.228	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	59.5
Approach		436	2.9	436	2.9	0.228	0.2	NA	0.0	0.0	0.00	0.04	0.00	59.3
SouthWest: Londonderry Road														
31	T1	358	3.2	358	3.2	0.191	0.0	LOS A	0.0	0.3	0.02	0.01	0.02	59.7
32	R2	4	0.0	4	0.0	0.191	7.5	LOS A	0.0	0.3	0.02	0.01	0.02	57.6
Approach		362	3.2	362	3.2	0.191	0.1	NA	0.0	0.3	0.02	0.01	0.02	59.7
All Vehicles		911	3.2	911	3.2	0.228	1.3	NA	0.6	4.1	0.07	0.11	0.07	57.5

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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 [Londonderry x Southee 2021 PM WOD (Site Folder: 2021 Without Development)]

Network: N101 [2021-WOD-PM-N1 (Network Folder: 2021 Without Development)]

Londonderry Road x Southee Road
2017: Existing Conditions - Without Development
PM Peak: 15:45-16:45
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Londonderry Road														
25	T1	345	3.0	345	3.0	0.239	0.6	LOS A	0.7	4.9	0.21	0.11	0.21	53.4
26	R2	66	1.6	66	1.6	0.239	7.5	LOS A	0.7	4.9	0.21	0.11	0.21	54.7
Approach		412	2.8	412	2.8	0.239	1.7	NA	0.7	4.9	0.21	0.11	0.21	53.9
NorthWest: Southee Road														
27	L2	31	0.0	31	0.0	0.179	6.5	LOS A	0.6	4.4	0.49	0.75	0.49	48.4
29	R2	91	2.3	91	2.3	0.179	10.0	LOS A	0.6	4.4	0.49	0.75	0.49	46.3
Approach		121	1.7	121	1.7	0.179	9.1	LOS A	0.6	4.4	0.49	0.75	0.49	47.0
SouthWest: Londonderry Road														
30	L2	160	4.6	160	4.6	0.224	2.7	LOS A	0.0	0.0	0.00	0.21	0.00	54.8
31	T1	258	3.7	258	3.7	0.224	0.0	LOS A	0.0	0.0	0.00	0.21	0.00	56.3
Approach		418	4.0	418	4.0	0.224	1.0	NA	0.0	0.0	0.00	0.21	0.00	55.5
All Vehicles		951	3.2	951	3.2	0.239	2.3	NA	0.7	4.9	0.15	0.23	0.15	53.0

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 3 [Paget x Lennox 2021 PM WOD (Site Folder: 2021 Without Development)]

Network: N101 [2021-WOD-PM-N2 (Network Folder: 2021 Without Development)]

Paget Street x Lennox Street
2021: Existing Conditions - Without Development
PM Peak: 15:45-16:45
Site Category: Existing Scenario - Without Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 30 seconds (Site Practical 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Paget Street														
1	L2	64	6.6	64	6.6	0.181	18.1	LOS B	0.8	6.3	0.86	0.73	0.86	41.9
2	T1	159	4.6	159	4.6	0.504	12.7	LOS A	2.5	18.4	0.93	0.75	0.94	45.6
3	R2	17	6.3	17	6.3	0.504	18.3	LOS B	2.5	18.4	0.93	0.75	0.94	42.1
Approach		240	5.3	240	5.3	0.504	14.5	LOS B	2.5	18.4	0.91	0.75	0.92	44.3
East: Lennox Street														
4	L2	23	4.5	23	4.5	0.262	12.8	LOS A	2.0	14.7	0.71	0.60	0.71	51.3
5	T1	500	3.4	500	3.4	0.709	9.4	LOS A	6.3	44.8	0.83	0.77	0.94	47.8
6	R2	105	1.0	105	1.0	* 0.709	15.9	LOS B	6.3	44.8	0.89	0.87	1.07	43.5
Approach		628	3.0	628	3.0	0.709	10.6	LOS A	6.3	44.8	0.83	0.78	0.96	47.2
North: Paget Street														
7	L2	89	1.2	89	1.2	0.243	16.7	LOS B	1.2	8.5	0.88	0.74	0.88	23.1
8	T1	177	3.6	177	3.6	* 0.701	14.7	LOS B	3.7	26.7	0.98	0.91	1.25	38.1
9	R2	54	2.0	54	2.0	0.701	19.2	LOS B	3.7	26.7	0.98	0.91	1.25	33.0
Approach		320	2.6	320	2.6	0.701	16.0	LOS B	3.7	26.7	0.95	0.86	1.14	34.9
West: Lennox Street														
10	L2	99	0.0	99	0.0	0.414	13.4	LOS A	3.4	24.9	0.76	0.68	0.76	42.6
11	T1	361	6.7	361	6.7	0.414	7.9	LOS A	3.4	24.9	0.77	0.69	0.77	37.6
12	R2	72	5.9	72	5.9	0.414	13.8	LOS A	2.6	19.3	0.79	0.69	0.79	47.6
Approach		532	5.3	532	5.3	0.414	9.7	LOS A	3.4	24.9	0.77	0.69	0.77	41.1
All Vehicles		1720	4.0	1720	4.0	0.709	11.9	LOS A	6.3	44.8	0.85	0.76	0.93	42.8

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
South: Paget Street											
P1	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
East: Lennox Street											
P2	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
North: Paget Street											

P3 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
West: Lennox Street										
P4 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
All Pedestrians	211	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96

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: 4 [Blacktown x Bourke 2021 PM WOD (Site Folder: 2021 Without Development)]

Network: N101 [2021-WOD-PM-N2 (Network Folder: 2021 Without Development)]

Blacktown Road x Bourke Street x Lennox Street
2021: Existing Conditions
PM Peak: 15:45-16:45
Site Category: Existing Scenario - Without Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bourke Street														
1	L2	5	0.0	5	0.0	0.049	22.9	LOS B	0.9	6.2	0.65	0.52	0.65	29.0
2	T1	81	0.0	81	0.0	0.150	19.2	LOS B	2.1	14.8	0.71	0.59	0.71	36.1
3b	R3	24	8.7	24	8.7	0.150	27.3	LOS B	2.1	14.8	0.74	0.64	0.74	24.7
Approach		111	1.9	111	1.9	0.150	21.2	LOS B	2.1	14.8	0.71	0.60	0.71	33.8
SouthEast: Blacktown Road														
21b	L3	40	5.3	40	5.3	0.210	20.6	LOS B	4.0	29.1	0.63	0.72	0.63	41.4
21a	L1	515	3.1	515	3.1	0.580	20.9	LOS B	14.5	103.9	0.75	0.78	0.75	35.9
23a	R1	122	2.6	122	2.6	* 0.580	21.6	LOS B	14.5	103.9	0.79	0.80	0.79	39.6
Approach		677	3.1	677	3.1	0.580	21.0	LOS B	14.5	103.9	0.75	0.78	0.75	37.1
North: Bourke Street														
7a	L1	128	0.8	128	0.8	0.174	22.7	LOS B	3.3	23.2	0.69	0.73	0.69	25.0
8	T1	203	1.6	203	1.6	0.594	22.4	LOS B	9.2	65.9	0.84	0.74	0.84	33.7
9	R2	93	3.4	93	3.4	* 0.594	28.0	LOS B	9.2	65.9	0.84	0.74	0.84	23.9
Approach		424	1.7	424	1.7	0.594	23.7	LOS B	9.2	65.9	0.79	0.74	0.79	29.7
West: Lennox Street														
10	L2	68	7.7	68	7.7	0.175	19.4	LOS B	3.3	24.6	0.62	0.70	0.62	39.3
12a	R1	422	4.5	422	4.5	0.444	19.4	LOS B	9.0	65.5	0.69	0.73	0.69	34.0
12	R2	3	66.7	3	66.7	0.444	21.6	LOS B	9.0	65.5	0.71	0.74	0.71	33.7
Approach		494	5.3	494	5.3	0.444	19.4	LOS B	9.0	65.5	0.68	0.73	0.68	35.0
All Vehicles		1705	3.3	1705	3.3	0.594	21.2	LOS B	14.5	103.9	0.74	0.75	0.74	34.6

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.
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
South: Bourke Street											
P1	Full	53	17.6	LOS B	0.1	0.1	0.66	0.66	44.7	35.2	0.79
SouthEast: Blacktown Road											
P5	Full	53	21.8	LOS C	0.1	0.1	0.74	0.74	48.9	35.2	0.72
North: Bourke Street											

P3 Full	53	17.6	LOS B	0.1	0.1	0.66	0.66	44.7	35.2	0.79
West: Lennox Street										
P4 Full	53	21.8	LOS C	0.1	0.1	0.74	0.74	48.9	35.2	0.72
All Pedestrians	211	19.7	LOS B	0.1	0.1	0.70	0.70	46.8	35.2	0.75

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: 5 [Blacktown x Campus 2021 PM WOD (Site Folder: 2021 Without Development)]

Network: N101 [2021-WOD-PM-N2 (Network Folder: 2021 Without Development)]

Blacktown Road x Campus Drive
2021: Existing Conditions - Without Development
PM Peak: 15:45-16:45
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blacktown Road														
21	L2	8	0.0	8	0.0	0.005	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
22	T1	632	3.0	632	3.0	0.330	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		640	3.0	640	3.0	0.330	0.2	NA	0.0	0.0	0.00	0.01	0.00	79.3
NorthWest: Blacktown Road														
28	T1	567	3.9	567	3.9	0.298	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
29	R2	6	0.0	6	0.0	0.009	10.4	LOS A	0.0	0.2	0.54	0.70	0.54	55.7
Approach		574	3.9	574	3.9	0.298	0.2	NA	0.0	0.2	0.01	0.01	0.01	79.4
SouthWest: Campus Road														
30	L2	49	0.0	49	0.0	0.359	9.9	LOS A	1.4	9.7	0.00	0.58	0.00	35.9
32	R2	55	0.0	55	0.0	0.359	33.1	LOS C	1.4	9.7	0.00	0.58	0.00	47.1
Approach		104	0.0	104	0.0	0.359	22.1	LOS B	1.4	9.7	0.00	0.58	0.00	42.9
All Vehicles		1318	3.1	1318	3.1	0.359	1.9	NA	1.4	9.7	0.00	0.05	0.00	74.2

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 1 [Londonderry x Vines 2021 AM WD (Site Folder: 2021 With Development)]

Network: N101 [2021-WD-AM-N1 (Network Folder: 2021 With Development)]

Londonderry Road x Vines Drive
2021: Future Growth + School
AM Peak: 8:15-9:15
Site Category: With Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	17	0.0	17	0.0	0.070	6.5	LOS A	0.2	1.6	0.47	0.72	0.47	51.0
23	R2	29	0.0	29	0.0	0.070	10.4	LOS A	0.2	1.6	0.47	0.72	0.47	46.4
Approach		46	0.0	46	0.0	0.070	9.0	LOS A	0.2	1.6	0.47	0.72	0.47	48.7
NorthEast: Londonderry Road														
24	L2	108	1.9	108	1.9	0.213	2.7	LOS A	0.0	0.0	0.00	0.15	0.00	55.5
25	T1	293	3.6	293	3.6	0.213	0.0	LOS A	0.0	0.0	0.00	0.15	0.00	58.5
Approach		401	3.1	401	3.1	0.213	0.7	NA	0.0	0.0	0.00	0.15	0.00	57.7
SouthWest: Londonderry Road														
31	T1	401	2.1	401	2.1	0.294	0.7	LOS A	1.0	7.4	0.26	0.14	0.26	55.9
32	R2	101	0.0	101	0.0	0.294	7.5	LOS A	1.0	7.4	0.26	0.14	0.26	55.7
Approach		502	1.7	502	1.7	0.294	2.1	NA	1.0	7.4	0.26	0.14	0.26	55.8
All Vehicles		949	2.2	949	2.2	0.294	1.8	NA	1.0	7.4	0.16	0.17	0.16	56.1

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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 [Londonderry x Southee 2021 AM WD (Site Folder: 2021 With Development)]

Network: N101 [2021-WD-AM-N1 (Network Folder: 2021 With Development)]

Londonderry Road x Southee Road
2021: Future Growth + School
AM Peak: 8:15-9:15
Site Category: With Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Londonderry Road														
25	T1	209	4.0	209	4.0	0.125	0.2	LOS A	0.2	1.2	0.09	0.04	0.09	57.0
26	R2	16	6.7	16	6.7	0.125	7.5	LOS A	0.2	1.2	0.09	0.04	0.09	55.6
Approach		225	4.2	225	4.2	0.125	0.7	NA	0.2	1.2	0.09	0.04	0.09	56.7
NorthWest: Southee Road														
27	L2	38	5.6	38	5.6	0.303	7.3	LOS A	1.2	8.9	0.53	0.82	0.60	47.8
29	R2	189	1.1	189	1.1	0.303	9.3	LOS A	1.2	8.9	0.53	0.82	0.60	46.5
Approach		227	1.9	227	1.9	0.303	9.0	LOS A	1.2	8.9	0.53	0.82	0.60	46.7
SouthWest: Londonderry Road														
30	L2	112	1.9	112	1.9	0.229	2.7	LOS A	0.0	0.0	0.00	0.14	0.00	55.5
31	T1	320	3.6	320	3.6	0.229	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	57.4
Approach		432	3.2	432	3.2	0.229	0.7	NA	0.0	0.0	0.00	0.14	0.00	56.6
All Vehicles		884	3.1	884	3.1	0.303	2.8	NA	1.2	8.9	0.16	0.29	0.18	52.5

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 3 [Paget x Lennox 2021 AM WOD (Site Folder: 2021 Without Development)]

Network: N101 [2021-WD-AM-N2 (Network Folder: 2021 With Development)]

Paget Street x Lennox Street
2021: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 30 seconds (Site Practical 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Paget Street														
1	L2	84	5.0	84	5.0	0.235	18.0	LOS B	1.1	8.2	0.87	0.74	0.87	41.9
2	T1	165	5.7	165	5.7	* 0.602	13.4	LOS A	3.1	22.9	0.96	0.82	1.07	44.6
3	R2	40	7.9	40	7.9	0.602	19.1	LOS B	3.1	22.9	0.96	0.82	1.07	40.9
Approach		289	5.8	289	5.8	0.602	15.5	LOS B	3.1	22.9	0.93	0.80	1.02	43.3
East: Lennox Street														
4	L2	14	0.0	14	0.0	0.223	12.4	LOS A	1.7	12.4	0.69	0.57	0.69	51.7
5	T1	400	7.1	400	7.1	0.604	8.5	LOS A	4.5	33.2	0.80	0.70	0.83	48.5
6	R2	96	2.2	96	2.2	* 0.604	14.9	LOS B	4.5	33.2	0.86	0.78	0.92	44.1
Approach		509	6.0	509	6.0	0.604	9.8	LOS A	4.5	33.2	0.81	0.71	0.85	47.8
North: Paget Street														
7	L2	38	0.0	38	0.0	0.102	16.4	LOS B	0.5	3.4	0.85	0.70	0.85	23.5
8	T1	89	1.2	89	1.2	0.346	12.2	LOS A	1.6	11.4	0.90	0.72	0.90	39.6
9	R2	25	8.3	25	8.3	0.346	16.9	LOS B	1.6	11.4	0.90	0.72	0.90	34.7
Approach		153	2.1	153	2.1	0.346	14.0	LOS A	1.6	11.4	0.89	0.71	0.89	36.6
West: Lennox Street														
10	L2	84	1.3	84	1.3	0.431	13.4	LOS A	3.6	26.2	0.77	0.68	0.77	42.8
11	T1	466	6.3	466	6.3	0.431	7.7	LOS A	3.6	26.2	0.77	0.67	0.77	38.9
12	R2	44	7.1	44	7.1	0.431	13.1	LOS A	3.1	22.8	0.77	0.66	0.77	48.9
Approach		595	5.7	595	5.7	0.431	8.9	LOS A	3.6	26.2	0.77	0.67	0.77	41.1
All Vehicles		1546	5.4	1546	5.4	0.604	11.0	LOS A	4.5	33.2	0.82	0.71	0.85	43.6

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.
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
South: Paget Street											
P1	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
East: Lennox Street											
P2	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
North: Paget Street											

P3 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
West: Lennox Street										
P4 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
All Pedestrians	211	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96

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: 4 [Blacktown x Bourke 2021 AM WOD (Site Folder: 2021 Without Development)]

Network: N101 [2021-WD-AM-N2 (Network Folder: 2021 With Development)]

Blacktown Road x Bourke Street x Lennox Street
2021: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bourke Street														
1	L2	1	0.0	1	0.0	0.076	29.5	LOS C	1.2	8.3	0.77	0.58	0.77	24.4
2	T1	132	1.6	132	1.6	0.234	24.3	LOS B	3.4	23.9	0.80	0.64	0.80	33.3
3b	R3	17	6.3	17	6.3	0.234	31.0	LOS C	3.4	23.9	0.81	0.67	0.81	23.1
Approach		149	2.1	149	2.1	0.234	25.1	LOS B	3.4	23.9	0.80	0.65	0.80	32.4
SouthEast: Blacktown Road														
21b	L3	17	12.5	17	12.5	0.157	15.3	LOS B	2.9	21.7	0.49	0.67	0.49	44.3
21a	L1	464	7.3	464	7.3	0.434	14.5	LOS A	10.1	74.3	0.57	0.72	0.57	41.0
23a	R1	138	3.1	138	3.1	* 0.434	14.9	LOS B	10.1	74.3	0.61	0.74	0.61	43.8
Approach		619	6.5	619	6.5	0.434	14.6	LOS B	10.1	74.3	0.58	0.72	0.58	41.9
North: Bourke Street														
7a	L1	120	2.6	120	2.6	0.232	30.0	LOS C	3.7	26.3	0.81	0.76	0.81	21.0
8	T1	112	4.7	112	4.7	0.443	26.2	LOS B	5.7	41.5	0.86	0.74	0.86	31.4
9	R2	62	5.1	62	5.1	* 0.443	31.8	LOS C	5.7	41.5	0.86	0.74	0.86	21.7
Approach		294	3.9	294	3.9	0.443	28.9	LOS C	5.7	41.5	0.84	0.75	0.84	25.8
West: Lennox Street														
10	L2	119	2.7	119	2.7	0.168	14.5	LOS B	3.2	23.2	0.50	0.69	0.50	43.1
12a	R1	466	5.9	466	5.9	0.426	14.2	LOS A	8.8	64.6	0.58	0.70	0.58	38.5
12	R2	4	0.0	4	0.0	0.426	15.5	LOS B	8.8	64.6	0.59	0.70	0.59	43.0
Approach		589	5.2	589	5.2	0.426	14.2	LOS A	8.8	64.6	0.56	0.70	0.56	39.8
All Vehicles		1652	5.2	1652	5.2	0.443	18.0	LOS B	10.1	74.3	0.64	0.71	0.64	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.
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
South: Bourke Street											
P1	Full	53	12.1	LOS B	0.1	0.1	0.55	0.55	39.2	35.2	0.90
SouthEast: Blacktown Road											
P5	Full	53	29.0	LOS C	0.1	0.1	0.85	0.85	56.0	35.2	0.63
North: Bourke Street											

P3 Full	53	12.1	LOS B	0.1	0.1	0.55	0.55	39.2	35.2	0.90
West: Lennox Street										
P4 Full	53	29.0	LOS C	0.1	0.1	0.85	0.85	56.0	35.2	0.63
All Pedestrians	211	20.5	LOS C	0.1	0.1	0.70	0.70	47.6	35.2	0.74

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: 5 [Blacktown x Campus 2021 AM WOD (Site Folder: 2021 Without Development)]

Network: N101 [2021-WD-AM-N2 (Network Folder: 2021 With Development)]

Blacktown Road x Campus Drive
2021: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blacktown Road														
21	L2	93	2.3	93	2.3	0.051	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
22	T1	619	6.8	619	6.8	0.331	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		712	6.2	712	6.2	0.331	1.0	NA	0.0	0.0	0.00	0.08	0.00	75.7
NorthWest: Blacktown Road														
28	T1	557	5.1	557	5.1	0.297	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
29	R2	49	2.1	49	2.1	0.083	11.5	LOS A	0.3	2.0	0.60	0.84	0.60	54.7
Approach		606	4.9	606	4.9	0.297	1.0	NA	0.3	2.0	0.05	0.07	0.05	76.9
SouthWest: Campus Road														
30	L2	7	0.0	7	0.0	0.119	6.9	LOS A	0.4	2.6	0.00	0.58	0.00	33.7
32	R2	15	7.1	15	7.1	0.119	34.5	LOS C	0.4	2.6	0.00	0.58	0.00	44.0
Approach		22	4.8	22	4.8	0.119	25.3	LOS B	0.4	2.6	0.00	0.58	0.00	41.5
All Vehicles		1340	5.6	1340	5.6	0.331	1.4	NA	0.4	2.6	0.02	0.08	0.02	75.3

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 1 [Londonderry x Vines 2021 PM WD (Site Folder: 2021 With Development)]

Network: N101 [2021-WD-PM-N1 (Network Folder: 2021 With Development)]

Londonderry Road x Vines Drive
2021: Future Growth + School
PM Peak: 15:45-16:45
Site Category: With Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	65	0.0	65	0.0	0.174	7.2	LOS A	0.6	4.3	0.51	0.75	0.51	51.3
23	R2	65	0.0	65	0.0	0.174	10.2	LOS A	0.6	4.3	0.51	0.75	0.51	46.8
Approach		131	0.0	131	0.0	0.174	8.7	LOS A	0.6	4.3	0.51	0.75	0.51	49.7
NorthEast: Londonderry Road														
24	L2	33	0.0	33	0.0	0.230	2.7	LOS A	0.0	0.0	0.00	0.04	0.00	56.5
25	T1	405	3.1	405	3.1	0.230	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	59.5
Approach		438	2.9	438	2.9	0.230	0.2	NA	0.0	0.0	0.00	0.04	0.00	59.3
SouthWest: Londonderry Road														
31	T1	358	3.2	358	3.2	0.197	0.1	LOS A	0.1	0.8	0.04	0.02	0.04	59.3
32	R2	11	0.0	11	0.0	0.197	7.5	LOS A	0.1	0.8	0.04	0.02	0.04	57.4
Approach		368	3.1	368	3.1	0.197	0.3	NA	0.1	0.8	0.04	0.02	0.04	59.2
All Vehicles		937	2.6	937	2.6	0.230	1.4	NA	0.6	4.3	0.09	0.13	0.09	57.2

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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 [Londonderry x Southee 2021 PM WD (Site Folder: 2021 With Development)]

Network: N101 [2021-WD-PM-N1 (Network Folder: 2021 With Development)]

Londonderry Road x Southee Road
2021: Future Growth + School
PM Peak: 15:45-14:45
Site Category: With Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Londonderry Road														
25	T1	347	3.0	347	3.0	0.240	0.6	LOS A	0.7	5.0	0.21	0.11	0.21	53.4
26	R2	66	1.6	66	1.6	0.240	7.6	LOS A	0.7	5.0	0.21	0.11	0.21	54.7
Approach		414	2.8	414	2.8	0.240	1.7	NA	0.7	5.0	0.21	0.11	0.21	53.9
NorthWest: Southee Road														
27	L2	31	0.0	31	0.0	0.180	6.5	LOS A	0.6	4.4	0.49	0.75	0.49	48.3
29	R2	91	2.3	91	2.3	0.180	10.0	LOS A	0.6	4.4	0.49	0.75	0.49	46.3
Approach		121	1.7	121	1.7	0.180	9.1	LOS A	0.6	4.4	0.49	0.75	0.49	46.9
SouthWest: Londonderry Road														
30	L2	162	4.5	162	4.5	0.227	2.7	LOS A	0.0	0.0	0.00	0.21	0.00	54.8
31	T1	261	3.6	261	3.6	0.227	0.0	LOS A	0.0	0.0	0.00	0.21	0.00	56.3
Approach		423	4.0	423	4.0	0.227	1.0	NA	0.0	0.0	0.00	0.21	0.00	55.5
All Vehicles		958	3.2	958	3.2	0.240	2.3	NA	0.7	5.0	0.15	0.23	0.15	53.0

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 3 [Paget x Lennox 2021 PM WD (Site Folder: 2021 With Development)]

Network: N101 [2021-WD-PM-N2 (Network Folder: 2021 With Development)]

Paget Street x Lennox Street
2021: Future Growth + School
PM Peak: 15:45-16:45
Site Category: With Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 30 seconds (Site Practical 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Paget Street														
1	L2	66	6.3	66	6.3	0.187	18.1	LOS B	0.9	6.5	0.86	0.73	0.86	41.9
2	T1	161	4.6	161	4.6	0.510	12.7	LOS A	2.6	18.7	0.93	0.76	0.95	45.6
3	R2	17	6.3	17	6.3	0.510	18.3	LOS B	2.6	18.7	0.93	0.76	0.95	42.0
Approach		244	5.2	244	5.2	0.510	14.6	LOS B	2.6	18.7	0.92	0.75	0.93	44.2
East: Lennox Street														
4	L2	23	4.5	23	4.5	0.262	12.8	LOS A	2.0	14.7	0.71	0.60	0.71	51.3
5	T1	500	3.4	500	3.4	0.709	9.4	LOS A	6.3	44.8	0.83	0.77	0.94	47.8
6	R2	105	1.0	105	1.0	* 0.709	15.9	LOS B	6.3	44.8	0.89	0.87	1.07	43.5
Approach		628	3.0	628	3.0	0.709	10.6	LOS A	6.3	44.8	0.83	0.78	0.96	47.2
North: Paget Street														
7	L2	89	1.2	89	1.2	0.243	16.7	LOS B	1.2	8.5	0.88	0.74	0.88	23.1
8	T1	178	3.6	178	3.6	* 0.705	14.7	LOS B	3.7	26.9	0.98	0.92	1.26	38.1
9	R2	54	2.0	54	2.0	0.705	19.3	LOS B	3.7	26.9	0.98	0.92	1.26	33.0
Approach		321	2.6	321	2.6	0.705	16.0	LOS B	3.7	26.9	0.95	0.87	1.15	34.9
West: Lennox Street														
10	L2	99	0.0	99	0.0	0.415	13.4	LOS A	3.4	25.0	0.76	0.68	0.76	42.6
11	T1	361	6.7	361	6.7	0.415	7.9	LOS A	3.4	25.0	0.77	0.69	0.77	37.6
12	R2	73	5.8	73	5.8	0.415	13.8	LOS A	2.6	19.3	0.79	0.69	0.79	47.5
Approach		533	5.3	533	5.3	0.415	9.7	LOS A	3.4	25.0	0.77	0.69	0.77	41.1
All Vehicles		1726	4.0	1726	4.0	0.709	11.9	LOS A	6.3	44.8	0.85	0.76	0.93	42.8

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
South: Paget Street											
P1	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
East: Lennox Street											
P2	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
North: Paget Street											

P3 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
West: Lennox Street										
P4 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
All Pedestrians	211	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96

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: 4 [Blacktown x Bourke 2021 PM WD (Site Folder: 2021 With Development)]

Network: N101 [2021-WD-PM-N2 (Network Folder: 2021 With Development)]

Blacktown Road x Bourke Street x Lennox Street
2021: Future Growth + School
PM Peak: 15:45-14:45
Site Category: With Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bourke Street														
1	L2	5	0.0	5	0.0	0.116	23.4	LOS B	2.2	15.3	0.67	0.54	0.67	28.9
2	T1	84	0.0	84	0.0	0.116	17.0	LOS B	2.2	15.3	0.68	0.55	0.68	38.4
3b	R3	38	5.6	38	5.6	0.116	28.8	LOS C	1.2	8.5	0.76	0.73	0.76	21.7
Approach		127	1.7	127	1.7	0.116	20.8	LOS B	2.2	15.3	0.70	0.60	0.70	33.4
SouthEast: Blacktown Road														
21b	L3	40	5.3	40	5.3	0.210	20.6	LOS B	4.0	29.1	0.63	0.72	0.63	41.4
21a	L1	515	3.1	515	3.1	0.580	20.9	LOS B	14.5	103.9	0.75	0.78	0.75	35.9
23a	R1	122	2.6	122	2.6	* 0.580	21.6	LOS B	14.5	103.9	0.79	0.80	0.79	39.6
Approach		677	3.1	677	3.1	0.580	21.0	LOS B	14.5	103.9	0.75	0.78	0.75	37.1
North: Bourke Street														
7a	L1	128	0.8	128	0.8	0.174	22.7	LOS B	3.3	23.2	0.69	0.73	0.69	25.0
8	T1	205	1.5	205	1.5	0.575	21.6	LOS B	9.1	65.2	0.83	0.74	0.83	34.3
9	R2	93	3.4	93	3.4	* 0.575	27.2	LOS B	9.1	65.2	0.83	0.74	0.83	24.4
Approach		426	1.7	426	1.7	0.575	23.1	LOS B	9.1	65.2	0.79	0.73	0.79	30.1
West: Lennox Street														
10	L2	68	7.7	68	7.7	0.175	19.1	LOS B	3.3	24.6	0.62	0.70	0.62	39.3
12a	R1	422	4.5	422	4.5	0.444	19.4	LOS B	9.0	65.5	0.69	0.73	0.69	34.0
12	R2	3	66.7	3	66.7	0.444	21.6	LOS B	9.0	65.5	0.71	0.74	0.71	33.7
Approach		494	5.3	494	5.3	0.444	19.4	LOS B	9.0	65.5	0.68	0.73	0.68	35.0
All Vehicles		1724	3.3	1724	3.3	0.580	21.1	LOS B	14.5	103.9	0.73	0.74	0.73	34.7

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.
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
South: Bourke Street											
P1	Full	53	17.6	LOS B	0.1	0.1	0.66	0.66	44.7	35.2	0.79
SouthEast: Blacktown Road											
P5	Full	53	21.8	LOS C	0.1	0.1	0.74	0.74	48.9	35.2	0.72
North: Bourke Street											

P3 Full	53	17.6	LOS B	0.1	0.1	0.66	0.66	44.7	35.2	0.79
West: Lennox Street										
P4 Full	53	21.8	LOS C	0.1	0.1	0.74	0.74	48.9	35.2	0.72
All Pedestrians	211	19.7	LOS B	0.1	0.1	0.70	0.70	46.8	35.2	0.75

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: 5 [Blacktown x Campus 2021 PM WD (Site Folder: 2021 With Development)]

Network: N101 [2021-WD-PM-N2 (Network Folder: 2021 With Development)]

Blacktown Road x Campus Drive
2021: Future Growth + School
PM Peak: 15:45-16:45
Site Category: With Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blacktown Road														
21	L2	15	0.0	15	0.0	0.008	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	59.7
22	T1	632	3.0	632	3.0	0.330	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		646	2.9	646	2.9	0.330	0.2	NA	0.0	0.0	0.00	0.01	0.00	78.6
NorthWest: Blacktown Road														
28	T1	581	3.8	581	3.8	0.305	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.2
29	R2	6	0.0	6	0.0	0.010	10.4	LOS A	0.0	0.2	0.54	0.70	0.54	55.7
Approach		587	3.8	587	3.8	0.305	0.2	NA	0.0	0.2	0.01	0.01	0.01	78.8
SouthWest: Campus Road														
30	L2	49	0.0	49	0.0	0.368	10.2	LOS A	1.4	10.0	0.00	0.58	0.00	35.4
32	R2	55	0.0	55	0.0	0.368	34.1	LOS C	1.4	10.0	0.00	0.58	0.00	46.7
Approach		104	0.0	104	0.0	0.368	22.8	LOS B	1.4	10.0	0.00	0.58	0.00	42.4
All Vehicles		1338	3.1	1338	3.1	0.368	2.0	NA	1.4	10.0	0.00	0.06	0.00	73.7

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 1 [Londonderry x Vines 2031 AM WOD (Site Folder: 2031 Without Development)]

Network: N101 [2031-WOD-AM-N1 (Network Folder: 2031 Without Development)]

Londonderry Road x Vines Drive
2031: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	13	0.0	13	0.0	0.091	6.6	LOS A	0.3	2.3	0.57	0.77	0.57	49.5
23	R2	31	20.7	31	20.7	0.091	13.3	LOS A	0.3	2.3	0.57	0.77	0.57	44.0
Approach		43	14.6	43	14.6	0.091	11.3	LOS A	0.3	2.3	0.57	0.77	0.57	46.3
NorthEast: Londonderry Road														
24	L2	116	1.8	116	1.8	0.233	2.7	LOS A	0.0	0.0	0.00	0.14	0.00	55.5
25	T1	323	3.6	323	3.6	0.233	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	58.6
Approach		439	3.1	439	3.1	0.233	0.7	NA	0.0	0.0	0.00	0.14	0.00	57.7
SouthWest: Londonderry Road														
31	T1	443	2.1	443	2.1	0.316	0.8	LOS A	1.1	8.1	0.26	0.12	0.27	56.1
32	R2	97	0.0	97	0.0	0.316	7.9	LOS A	1.1	8.1	0.26	0.12	0.27	55.8
Approach		540	1.8	540	1.8	0.316	2.0	NA	1.1	8.1	0.26	0.12	0.27	56.0
All Vehicles		1022	2.9	1022	2.9	0.316	1.9	NA	1.1	8.1	0.16	0.16	0.17	56.1

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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 [Londonderry x Southee 2031 AM WOD (Site Folder: 2031 Without Development)]

Network: N101 [2031-WOD-AM-N1 (Network Folder: 2031 Without Development)]

Londonderry Road x Southee Road
2031: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Londonderry Road														
25	T1	228	4.1	228	4.1	0.137	0.3	LOS A	0.2	1.4	0.10	0.04	0.10	56.9
26	R2	17	6.3	17	6.3	0.137	7.8	LOS A	0.2	1.4	0.10	0.04	0.10	55.6
Approach		245	4.3	245	4.3	0.137	0.8	NA	0.2	1.4	0.10	0.04	0.10	56.7
NorthWest: Southee Road														
27	L2	42	5.0	42	5.0	0.357	7.8	LOS A	1.6	11.3	0.57	0.86	0.71	47.2
29	R2	209	1.0	209	1.0	0.357	10.2	LOS A	1.6	11.3	0.57	0.86	0.71	45.5
Approach		252	1.7	252	1.7	0.357	9.8	LOS A	1.6	11.3	0.57	0.86	0.71	45.9
SouthWest: Londonderry Road														
30	L2	122	1.7	122	1.7	0.251	2.7	LOS A	0.0	0.0	0.00	0.14	0.00	55.5
31	T1	351	3.6	351	3.6	0.251	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	57.3
Approach		473	3.1	473	3.1	0.251	0.7	NA	0.0	0.0	0.00	0.14	0.00	56.6
All Vehicles		969	3.0	969	3.0	0.357	3.1	NA	1.6	11.3	0.17	0.30	0.21	52.0

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 3 [Paget x Lennox 2031 AM WOD (Site Folder: 2031 Without Development)]

Network: N101 [2031-WOD-AM-N2 (Network Folder: 2031 Without Development)]

Paget Street x Lennox Street
2031: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 30 seconds (Site Practical 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Paget Street														
1	L2	93	4.5	93	4.5	0.257	18.1	LOS B	1.2	9.1	0.88	0.75	0.88	41.9
2	T1	182	5.2	182	5.2	* 0.666	14.1	LOS A	3.6	26.0	0.97	0.87	1.17	44.0
3	R2	44	7.1	44	7.1	0.666	19.7	LOS B	3.6	26.0	0.97	0.87	1.17	40.3
Approach		319	5.3	319	5.3	0.666	16.0	LOS B	3.6	26.0	0.94	0.83	1.09	42.9
East: Lennox Street														
4	L2	15	0.0	15	0.0	0.250	12.5	LOS A	1.9	14.0	0.70	0.58	0.70	51.6
5	T1	442	6.4	442	6.4	0.677	9.3	LOS A	5.4	39.3	0.82	0.75	0.91	47.8
6	R2	106	2.0	106	2.0	* 0.677	16.0	LOS B	5.4	39.3	0.89	0.85	1.04	43.1
Approach		563	5.4	563	5.4	0.677	10.6	LOS A	5.4	39.3	0.83	0.76	0.93	47.1
North: Paget Street														
7	L2	42	0.0	42	0.0	0.113	16.6	LOS B	0.5	3.8	0.85	0.70	0.85	23.5
8	T1	99	1.1	99	1.1	0.390	12.4	LOS A	1.8	12.8	0.91	0.73	0.91	39.5
9	R2	28	7.4	28	7.4	0.390	17.0	LOS B	1.8	12.8	0.91	0.73	0.91	34.6
Approach		169	1.9	169	1.9	0.390	14.2	LOS A	1.8	12.8	0.89	0.72	0.89	36.5
West: Lennox Street														
10	L2	93	1.1	93	1.1	0.477	13.7	LOS A	4.1	29.7	0.79	0.70	0.79	42.7
11	T1	515	5.7	515	5.7	0.477	8.0	LOS A	4.1	29.7	0.79	0.69	0.79	38.7
12	R2	48	6.5	48	6.5	0.477	13.3	LOS A	3.5	25.5	0.79	0.68	0.79	48.7
Approach		656	5.1	656	5.1	0.477	9.2	LOS A	4.1	29.7	0.79	0.69	0.79	40.9
All Vehicles		1707	4.9	1707	4.9	0.677	11.4	LOS A	5.4	39.3	0.84	0.74	0.90	43.2

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)

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
South: Paget Street											
P1	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
East: Lennox Street											
P2	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
North: Paget Street											

P3 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
West: Lennox Street										
P4 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
All Pedestrians	211	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96

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: 4 [Blacktown x Bourke 2031 AM WOD (Site Folder: 2031 Without Development)]

Network: N101 [2031-WOD-AM-N2 (Network Folder: 2031 Without Development)]

Blacktown Road x Bourke Street x Lennox Street
2031: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bourke Street														
1	L2	1	0.0	1	0.0	0.082	28.9	LOS C	1.3	9.2	0.76	0.58	0.76	24.9
2	T1	145	1.4	145	1.4	0.252	24.2	LOS B	3.7	26.4	0.80	0.65	0.80	33.4
3b	R3	19	5.6	19	5.6	0.252	31.1	LOS C	3.7	26.4	0.82	0.68	0.82	23.0
Approach		165	1.9	165	1.9	0.252	25.0	LOS B	3.7	26.4	0.80	0.65	0.80	32.4
SouthEast: Blacktown Road														
21b	L3	19	11.1	19	11.1	0.177	15.9	LOS B	3.3	24.8	0.52	0.68	0.52	44.1
21a	L1	513	6.6	513	6.6	0.489	15.4	LOS B	11.9	87.1	0.61	0.73	0.61	40.2
23a	R1	153	2.8	153	2.8	0.489	15.9	LOS B	11.9	87.1	0.65	0.76	0.65	43.1
Approach		684	5.8	684	5.8	0.489	15.5	LOS B	11.9	87.1	0.61	0.74	0.61	41.2
North: Bourke Street														
7a	L1	133	2.4	133	2.4	0.245	29.5	LOS C	4.0	28.7	0.81	0.76	0.81	21.3
8	T1	123	4.3	123	4.3	0.507	26.5	LOS B	6.3	46.1	0.87	0.75	0.87	31.3
9	R2	68	4.6	68	4.6	* 0.507	32.1	LOS C	6.3	46.1	0.87	0.75	0.87	21.6
Approach		324	3.6	324	3.6	0.507	28.9	LOS C	6.3	46.1	0.85	0.75	0.85	25.8
West: Lennox Street														
10	L2	132	2.4	132	2.4	0.196	15.2	LOS B	3.8	27.7	0.52	0.69	0.52	42.6
12a	R1	515	5.3	515	5.3	* 0.496	15.0	LOS B	10.1	73.8	0.61	0.71	0.61	37.7
12	R2	4	0.0	4	0.0	0.496	16.4	LOS B	10.1	73.8	0.62	0.72	0.62	42.4
Approach		651	4.7	651	4.7	0.496	15.1	LOS B	10.1	73.8	0.59	0.71	0.59	39.0
All Vehicles		1824	4.7	1824	4.7	0.507	18.6	LOS B	11.9	87.1	0.66	0.72	0.66	36.8

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
South: Bourke Street											
P1	Full	53	12.7	LOS B	0.1	0.1	0.56	0.56	39.8	35.2	0.89
SouthEast: Blacktown Road											
P5	Full	53	28.1	LOS C	0.1	0.1	0.84	0.84	55.2	35.2	0.64
North: Bourke Street											

P3 Full	53	12.7	LOS B	0.1	0.1	0.56	0.56	39.8	35.2	0.89
West: Lennox Street										
P4 Full	53	28.1	LOS C	0.1	0.1	0.84	0.84	55.2	35.2	0.64
All Pedestrians	211	20.4	LOS C	0.1	0.1	0.70	0.70	47.5	35.2	0.74

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: 5 [Blacktown x Campus 2031 AM WOD (Site Folder: 2031 Without Development)]

Network: N101 [2031-WOD-AM-N2 (Network Folder: 2031 Without Development)]

Blacktown Road x Campus Drive
2031: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blacktown Road														
21	L2	102	2.1	102	2.1	0.056	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	64.7
22	T1	684	6.2	684	6.2	0.365	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach		786	5.6	786	5.6	0.365	1.0	NA	0.0	0.0	0.00	0.08	0.00	75.7
NorthWest: Blacktown Road														
28	T1	615	4.6	615	4.6	0.327	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
29	R2	55	1.9	55	1.9	0.104	12.5	LOS A	0.3	2.4	0.66	0.88	0.66	53.9
Approach		669	4.4	669	4.4	0.327	1.1	NA	0.3	2.4	0.05	0.07	0.05	76.7
SouthWest: Campus Road														
30	L2	8	0.0	8	0.0	0.167	7.1	LOS A	0.5	3.5	0.00	0.58	0.00	30.6
32	R2	16	6.7	16	6.7	0.167	44.0	LOS D	0.5	3.5	0.00	0.58	0.00	41.3
Approach		24	4.3	24	4.3	0.167	31.1	LOS C	0.5	3.5	0.00	0.58	0.00	38.4
All Vehicles		1480	5.0	1480	5.0	0.365	1.5	NA	0.5	3.5	0.02	0.09	0.02	75.0

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 1 [Londonderry x Vines 2031 PM WOD (Site Folder: 2031 Without Development)]

Network: N101 [2031-WOD-PM-N1 (Network Folder: 2031 Without Development)]

Londonderry Road x Vines Drive
2031: Existing Conditions - Without Development
PM Peak: 15:45-14:45
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	58	0.0	58	0.0	0.197	7.4	LOS A	0.7	5.0	0.55	0.78	0.55	50.5
23	R2	66	9.5	66	9.5	0.197	11.8	LOS A	0.7	5.0	0.55	0.78	0.55	45.6
Approach		124	5.1	124	5.1	0.197	9.8	LOS A	0.7	5.0	0.55	0.78	0.55	48.6
NorthEast: Londonderry Road														
24	L2	34	0.0	34	0.0	0.252	2.7	LOS A	0.0	0.0	0.00	0.04	0.00	56.5
25	T1	447	3.1	447	3.1	0.252	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	59.5
Approach		481	2.8	481	2.8	0.252	0.2	NA	0.0	0.0	0.00	0.04	0.00	59.3
SouthWest: Londonderry Road														
31	T1	397	3.2	397	3.2	0.212	0.0	LOS A	0.1	0.4	0.02	0.01	0.02	59.7
32	R2	4	0.0	4	0.0	0.212	7.9	LOS A	0.1	0.4	0.02	0.01	0.02	57.6
Approach		401	3.1	401	3.1	0.212	0.1	NA	0.1	0.4	0.02	0.01	0.02	59.7
All Vehicles		1006	3.2	1006	3.2	0.252	1.3	NA	0.7	5.0	0.07	0.12	0.07	57.3

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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 [Londonderry x Southee 2031 PM WOD (Site Folder: 2031 Without Development)]

Network: N101 [2031-WOD-PM-N1 (Network Folder: 2031 Without Development)]

Londonderry Road x Southee Road
2031: Existing Conditions - Without Development
PM Peak: 15:45-16:45
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Londonderry Road														
25	T1	381	3.0	381	3.0	0.266	0.7	LOS A	0.8	5.9	0.23	0.11	0.23	53.1
26	R2	73	1.4	73	1.4	0.266	7.9	LOS A	0.8	5.9	0.23	0.11	0.23	54.7
Approach		454	2.8	454	2.8	0.266	1.8	NA	0.8	5.9	0.23	0.11	0.23	53.7
NorthWest: Southee Road														
27	L2	34	0.0	34	0.0	0.216	6.6	LOS A	0.7	5.3	0.53	0.77	0.54	47.8
29	R2	100	2.1	100	2.1	0.216	10.9	LOS A	0.7	5.3	0.53	0.77	0.54	45.5
Approach		134	1.6	134	1.6	0.216	9.8	LOS A	0.7	5.3	0.53	0.77	0.54	46.2
SouthWest: Londonderry Road														
30	L2	177	4.8	177	4.8	0.248	2.7	LOS A	0.0	0.0	0.00	0.21	0.00	54.8
31	T1	285	3.7	285	3.7	0.248	0.0	LOS A	0.0	0.0	0.00	0.21	0.00	56.3
Approach		462	4.1	462	4.1	0.248	1.0	NA	0.0	0.0	0.00	0.21	0.00	55.4
All Vehicles		1049	3.2	1049	3.2	0.266	2.5	NA	0.8	5.9	0.17	0.24	0.17	52.7

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 3 [Paget x Lennox 2031 PM WOD (Site Folder: 2031 Without Development)]

Network: N101 [2031-WOD-PM-N2 (Network Folder: 2031 Without Development)]

Paget Street x Lennox Street
2031: Existing Conditions - Without Development
PM Peak: 15:45-16:45
Site Category: Existing Scenario - Without Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 30 seconds (Site Practical 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Paget Street														
1	L2	71	6.0	71	6.0	0.198	18.2	LOS B	0.9	6.9	0.87	0.73	0.87	41.9
2	T1	176	4.2	176	4.2	0.559	13.1	LOS A	2.9	20.9	0.95	0.79	1.01	45.3
3	R2	19	5.6	19	5.6	0.559	18.7	LOS B	2.9	20.9	0.95	0.79	1.01	41.7
Approach		265	4.8	265	4.8	0.559	14.8	LOS B	2.9	20.9	0.92	0.77	0.97	44.1
East: Lennox Street														
4	L2	25	4.9	25	4.9	0.293	13.0	LOS A	2.3	16.7	0.72	0.61	0.72	51.2
5	T1	553	3.0	553	3.0	0.795	11.6	LOS A	7.9	56.7	0.87	0.85	1.10	45.8
6	R2	116	0.9	116	0.9	* 0.795	19.2	LOS B	7.9	56.7	0.95	0.99	1.31	40.8
Approach		694	2.8	694	2.8	0.795	12.9	LOS A	7.9	56.7	0.88	0.87	1.12	45.2
North: Paget Street														
7	L2	99	1.1	99	1.1	0.268	16.8	LOS B	1.3	9.4	0.88	0.74	0.88	23.1
8	T1	196	3.2	196	3.2	* 0.786	16.5	LOS B	4.4	31.7	1.00	1.01	1.47	37.0
9	R2	59	1.8	59	1.8	0.786	21.0	LOS B	4.4	31.7	1.00	1.01	1.47	31.8
Approach		354	2.4	354	2.4	0.786	17.3	LOS B	4.4	31.7	0.97	0.94	1.30	34.0
West: Lennox Street														
10	L2	109	0.0	109	0.0	0.471	13.6	LOS A	4.0	29.2	0.78	0.70	0.78	42.5
11	T1	399	6.1	399	6.1	0.471	8.4	LOS A	4.0	29.2	0.80	0.71	0.80	36.9
12	R2	79	5.3	79	5.3	0.471	14.8	LOS B	2.9	21.6	0.84	0.72	0.84	46.7
Approach		587	4.8	587	4.8	0.471	10.3	LOS A	4.0	29.2	0.80	0.71	0.80	40.5
All Vehicles		1900	3.6	1900	3.6	0.795	13.2	LOS A	7.9	56.7	0.88	0.82	1.04	41.6

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.
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
South: Paget Street											
P1	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
East: Lennox Street											
P2	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
North: Paget Street											

P3 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
West: Lennox Street										
P4 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
All Pedestrians	211	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96

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: 4 [Blacktown x Bourke 2031 PM WOD (Site Folder: 2031 Without Development)]

Network: N101 [2031-WOD-PM-N2 (Network Folder: 2031 Without Development)]

Blacktown Road x Bourke Street x Lennox Street
2031: Existing Conditions
PM Peak: 15:45-16:45
Site Category: Existing Scenario - Without Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bourke Street														
1	L2	6	0.0	6	0.0	0.057	21.8	LOS B	1.0	7.3	0.63	0.51	0.63	30.1
2	T1	89	0.0	89	0.0	0.173	19.5	LOS B	2.3	16.1	0.71	0.60	0.71	35.9
3b	R3	26	8.0	26	8.0	0.173	29.0	LOS C	2.3	16.1	0.77	0.66	0.77	23.6
Approach		122	1.7	122	1.7	0.173	21.6	LOS B	2.3	16.1	0.72	0.61	0.72	33.5
SouthEast: Blacktown Road														
21b	L3	44	4.8	44	4.8	0.255	22.2	LOS B	5.0	35.7	0.67	0.74	0.67	40.5
21a	L1	568	2.8	568	2.8	0.705	23.0	LOS B	17.0	122.0	0.80	0.80	0.80	34.5
23a	R1	135	2.3	135	2.3	* 0.705	23.9	LOS B	17.0	122.0	0.85	0.83	0.85	38.3
Approach		747	2.8	747	2.8	0.705	23.1	LOS B	17.0	122.0	0.80	0.81	0.80	35.8
North: Bourke Street														
7a	L1	142	0.7	142	0.7	0.181	21.5	LOS B	3.5	24.8	0.67	0.73	0.67	25.8
8	T1	225	1.4	225	1.4	0.724	26.7	LOS B	11.5	81.6	0.89	0.83	0.97	31.3
9	R2	102	3.1	102	3.1	* 0.724	32.3	LOS C	11.5	81.6	0.89	0.83	0.97	21.6
Approach		469	1.6	469	1.6	0.724	26.3	LOS B	11.5	81.6	0.83	0.80	0.88	28.2
West: Lennox Street														
10	L2	76	6.9	76	6.9	0.212	20.9	LOS B	4.1	29.8	0.66	0.72	0.66	38.4
12a	R1	466	4.1	466	4.1	0.535	21.1	LOS B	10.4	75.9	0.73	0.75	0.73	32.8
12	R2	3	66.7	3	66.7	0.535	23.5	LOS B	10.4	75.9	0.75	0.76	0.75	32.9
Approach		545	4.8	545	4.8	0.535	21.1	LOS B	10.4	75.9	0.72	0.75	0.72	33.8
All Vehicles		1884	3.0	1884	3.0	0.724	23.3	LOS B	17.0	122.0	0.78	0.77	0.79	33.3

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
South: Bourke Street											
P1	Full	53	18.9	LOS B	0.1	0.1	0.69	0.69	46.0	35.2	0.76
SouthEast: Blacktown Road											
P5	Full	53	20.4	LOS C	0.1	0.1	0.71	0.71	47.4	35.2	0.74
North: Bourke Street											

P3 Full	53	18.9	LOS B	0.1	0.1	0.69	0.69	46.0	35.2	0.76
West: Lennox Street										
P4 Full	53	20.4	LOS C	0.1	0.1	0.71	0.71	47.4	35.2	0.74
All Pedestrians	211	19.6	LOS B	0.1	0.1	0.70	0.70	46.7	35.2	0.75

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: 5 [Blacktown x Campus 2031 PM WOD (Site Folder: 2031 Without Development)]

Network: N101 [2031-WOD-PM-N2 (Network Folder: 2031 Without Development)]

Blacktown Road x Campus Drive
2031: Existing Conditions - Without Development
PM Peak: 15:45-16:45
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blacktown Road														
21	L2	9	0.0	9	0.0	0.005	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
22	T1	698	2.7	698	2.7	0.364	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach		707	2.7	707	2.7	0.364	0.2	NA	0.0	0.0	0.00	0.01	0.00	79.3
NorthWest: Blacktown Road														
28	T1	626	3.5	626	3.5	0.329	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
29	R2	7	0.0	7	0.0	0.012	11.1	LOS A	0.0	0.3	0.59	0.74	0.59	55.1
Approach		634	3.5	634	3.5	0.329	0.2	NA	0.0	0.3	0.01	0.01	0.01	79.3
SouthWest: Campus Road														
30	L2	55	0.0	55	0.0	0.496	15.9	LOS B	2.2	15.7	0.00	0.58	0.00	30.2
32	R2	60	0.0	60	0.0	0.496	46.7	LOS D	2.2	15.7	0.00	0.58	0.00	41.8
Approach		115	0.0	115	0.0	0.496	32.0	LOS C	2.2	15.7	0.00	0.58	0.00	37.3
All Vehicles		1456	2.8	1456	2.8	0.496	2.7	NA	2.2	15.7	0.00	0.05	0.00	72.7

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 1 [Londonderry x Vines 2031 AM WD (Site Folder: 2031 With Development)]

Network: N101 [2031-WD-AM-N1 (Network Folder: 2031 With Development)]

Londonderry Road x Vines Drive
2031: Future Growth + School
AM Peak: 8:15-9:15
Site Category: With Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	18	0.0	18	0.0	0.102	6.7	LOS A	0.3	2.5	0.55	0.75	0.55	49.7
23	R2	33	19.4	33	19.4	0.102	13.5	LOS A	0.3	2.5	0.55	0.75	0.55	44.3
Approach		51	12.5	51	12.5	0.102	11.0	LOS A	0.3	2.5	0.55	0.75	0.55	47.0
NorthEast: Londonderry Road														
24	L2	119	1.8	119	1.8	0.234	2.7	LOS A	0.0	0.0	0.00	0.15	0.00	55.5
25	T1	323	3.6	323	3.6	0.234	0.0	LOS A	0.0	0.0	0.00	0.15	0.00	58.5
Approach		442	3.1	442	3.1	0.234	0.7	NA	0.0	0.0	0.00	0.15	0.00	57.7
SouthWest: Londonderry Road														
31	T1	443	2.1	443	2.1	0.328	0.9	LOS A	1.3	9.5	0.29	0.14	0.31	55.7
32	R2	111	0.0	111	0.0	0.328	7.9	LOS A	1.3	9.5	0.29	0.14	0.31	55.6
Approach		554	1.7	554	1.7	0.328	2.3	NA	1.3	9.5	0.29	0.14	0.31	55.7
All Vehicles		1046	2.8	1046	2.8	0.328	2.1	NA	1.3	9.5	0.18	0.17	0.19	55.8

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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 [Londonderry x Southee 2031 AM WD (Site Folder: 2031 With Development)]

Network: N101 [2031-WD-AM-N1 (Network Folder: 2031 With Development)]

Londonderry Road x Southee Road
2031: Future Growth + School
AM Peak: 8:15-9:15
Site Category: With Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Londonderry Road														
25	T1	232	4.1	232	4.1	0.138	0.3	LOS A	0.2	1.4	0.10	0.04	0.10	56.9
26	R2	17	6.3	17	6.3	0.138	7.8	LOS A	0.2	1.4	0.10	0.04	0.10	55.6
Approach		248	4.2	248	4.2	0.138	0.8	NA	0.2	1.4	0.10	0.04	0.10	56.7
NorthWest: Southee Road														
27	L2	42	5.0	42	5.0	0.359	7.8	LOS A	1.6	11.4	0.57	0.86	0.72	47.1
29	R2	209	1.0	209	1.0	0.359	10.3	LOS A	1.6	11.4	0.57	0.86	0.72	45.4
Approach		252	1.7	252	1.7	0.359	9.9	LOS A	1.6	11.4	0.57	0.86	0.72	45.8
SouthWest: Londonderry Road														
30	L2	123	1.7	123	1.7	0.252	2.7	LOS A	0.0	0.0	0.00	0.14	0.00	55.5
31	T1	353	3.6	353	3.6	0.252	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	57.3
Approach		476	3.1	476	3.1	0.252	0.7	NA	0.0	0.0	0.00	0.14	0.00	56.6
All Vehicles		976	3.0	976	3.0	0.359	3.1	NA	1.6	11.4	0.17	0.30	0.21	52.0

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 3 [Paget x Lennox 2031 AM WD (Site Folder: 2031 With Development)]

Network: N101 [2031-WD-AM-N2 (Network Folder: 2031 With Development)]

Paget Street x Lennox Street
2031: Future Growth + School
AM Peak: 8:15-9:15
Site Category: With Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 30 seconds (Site Practical 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Paget Street														
1	L2	94	4.5	94	4.5	0.260	18.1	LOS B	1.3	9.2	0.88	0.75	0.88	41.9
2	T1	183	5.2	183	5.2	* 0.670	14.2	LOS A	3.6	26.2	0.97	0.87	1.18	44.0
3	R2	44	7.1	44	7.1	0.670	19.8	LOS B	3.6	26.2	0.97	0.87	1.18	40.2
Approach		321	5.2	321	5.2	0.670	16.1	LOS B	3.6	26.2	0.95	0.83	1.09	42.9
East: Lennox Street														
4	L2	15	0.0	15	0.0	0.250	12.5	LOS A	1.9	14.1	0.70	0.58	0.70	51.6
5	T1	442	6.4	442	6.4	0.678	9.3	LOS A	5.4	39.3	0.82	0.75	0.91	47.8
6	R2	106	2.0	106	2.0	* 0.678	16.0	LOS B	5.4	39.3	0.89	0.85	1.04	43.1
Approach		563	5.4	563	5.4	0.678	10.6	LOS A	5.4	39.3	0.83	0.76	0.93	47.1
North: Paget Street														
7	L2	42	0.0	42	0.0	0.114	16.6	LOS B	0.5	3.8	0.85	0.70	0.85	23.5
8	T1	101	1.0	101	1.0	0.395	12.4	LOS A	1.8	12.9	0.91	0.73	0.91	39.6
9	R2	28	7.4	28	7.4	0.395	17.0	LOS B	1.8	12.9	0.91	0.73	0.91	34.7
Approach		172	1.8	172	1.8	0.395	14.2	LOS A	1.8	12.9	0.89	0.72	0.89	36.6
West: Lennox Street														
10	L2	93	1.1	93	1.1	0.480	13.7	LOS A	4.1	29.9	0.79	0.70	0.79	42.7
11	T1	515	5.7	515	5.7	0.480	8.0	LOS A	4.1	29.9	0.79	0.69	0.79	38.6
12	R2	51	6.3	51	6.3	0.480	13.3	LOS A	3.5	25.5	0.79	0.68	0.79	48.7
Approach		658	5.1	658	5.1	0.480	9.2	LOS A	4.1	29.9	0.79	0.69	0.79	40.9
All Vehicles		1714	4.9	1714	4.9	0.678	11.4	LOS A	5.4	39.3	0.84	0.74	0.90	43.2

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)

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
South: Paget Street											
P1	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
East: Lennox Street											
P2	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
North: Paget Street											

P3 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
West: Lennox Street										
P4 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
All Pedestrians	211	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96

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: 4 [Blacktown x Bourke 2031 AM WD (Site Folder: 2031 With Development)]

Network: N101 [2031-WD-AM-N2 (Network Folder: 2031 With Development)]

Blacktown Road x Bourke Street x Lennox Street
2031: Future Growth + School
AM Peak: 8:15-9:15
Site Category: With Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bourke Street														
1	L2	1	0.0	1	0.0	0.085	28.1	LOS B	1.4	9.8	0.75	0.57	0.75	25.4
2	T1	147	1.4	147	1.4	0.260	23.4	LOS B	3.8	27.1	0.79	0.65	0.79	33.7
3b	R3	25	4.2	25	4.2	0.260	30.4	LOS C	3.8	27.1	0.81	0.68	0.81	23.3
Approach		174	1.8	174	1.8	0.260	24.5	LOS B	3.8	27.1	0.79	0.65	0.79	32.5
SouthEast: Blacktown Road														
21b	L3	19	11.1	19	11.1	0.181	16.4	LOS B	3.4	25.5	0.53	0.69	0.53	43.7
21a	L1	513	6.6	513	6.6	0.500	16.0	LOS B	12.2	89.7	0.62	0.74	0.62	39.7
23a	R1	153	2.8	153	2.8	0.500	16.6	LOS B	12.2	89.7	0.67	0.76	0.67	42.6
Approach		684	5.8	684	5.8	0.500	16.2	LOS B	12.2	89.7	0.63	0.74	0.63	40.7
North: Bourke Street														
7a	L1	133	2.4	133	2.4	0.235	28.6	LOS C	3.9	28.1	0.79	0.76	0.79	21.7
8	T1	126	4.2	126	4.2	0.490	25.6	LOS B	6.3	46.0	0.86	0.74	0.86	31.8
9	R2	68	4.6	68	4.6	* 0.490	31.2	LOS C	6.3	46.0	0.86	0.74	0.86	22.0
Approach		327	3.5	327	3.5	0.490	28.0	LOS B	6.3	46.0	0.83	0.75	0.83	26.4
West: Lennox Street														
10	L2	132	2.4	132	2.4	0.202	15.8	LOS B	4.0	28.7	0.54	0.70	0.54	42.2
12a	R1	515	5.3	515	5.3	* 0.510	15.6	LOS B	10.3	75.7	0.62	0.72	0.62	37.2
12	R2	4	0.0	4	0.0	0.510	17.0	LOS B	10.3	75.7	0.64	0.72	0.64	41.9
Approach		651	4.7	651	4.7	0.510	15.7	LOS B	10.3	75.7	0.61	0.72	0.61	38.5
All Vehicles		1836	4.6	1836	4.6	0.510	18.9	LOS B	12.2	89.7	0.67	0.73	0.67	36.5

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
South: Bourke Street											
P1	Full	53	13.3	LOS B	0.1	0.1	0.58	0.58	40.3	35.2	0.87
SouthEast: Blacktown Road											
P5	Full	53	27.3	LOS C	0.1	0.1	0.83	0.83	54.4	35.2	0.65
North: Bourke Street											

P3 Full	53	13.3	LOS B	0.1	0.1	0.58	0.58	40.3	35.2	0.87
West: Lennox Street										
P4 Full	53	27.3	LOS C	0.1	0.1	0.83	0.83	54.4	35.2	0.65
All Pedestrians	211	20.3	LOS C	0.1	0.1	0.70	0.70	47.3	35.2	0.74

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: 5 [Blacktown x Campus 2031 AM WD (Site Folder: 2031 With Development)]

Network: N101 [2031-WD-AM-N2 (Network Folder: 2031 With Development)]

Blacktown Road x Campus Drive
2031: Future Growth + School
AM Peak: 8:15-9:15
Site Category: With Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blacktown Road														
21	L2	116	1.8	116	1.8	0.063	6.8	LOS A	0.0	0.0	0.00	0.62	0.00	63.1
22	T1	684	6.2	684	6.2	0.365	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach		800	5.5	800	5.5	0.365	1.1	NA	0.0	0.0	0.00	0.09	0.00	74.8
NorthWest: Blacktown Road														
28	T1	621	4.6	621	4.6	0.331	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.5
29	R2	55	1.9	55	1.9	0.106	12.7	LOS A	0.3	2.4	0.66	0.88	0.66	53.8
Approach		676	4.4	676	4.4	0.331	1.1	NA	0.3	2.4	0.05	0.07	0.05	76.5
SouthWest: Campus Road														
30	L2	8	0.0	8	0.0	0.171	7.1	LOS A	0.5	3.6	0.00	0.58	0.00	30.3
32	R2	16	6.7	16	6.7	0.171	44.8	LOS D	0.5	3.6	0.00	0.58	0.00	41.0
Approach		24	4.3	24	4.3	0.171	31.7	LOS C	0.5	3.6	0.00	0.58	0.00	38.1
All Vehicles		1500	5.0	1500	5.0	0.365	1.6	NA	0.5	3.6	0.02	0.09	0.02	74.5

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 1 [Londonderry x Vines 2031 PM WD (Site Folder: 2031 With Development)]

Network: N101 [2031-WD-PM-N1 (Network Folder: 2031 With Development)]

Londonderry Road x Vines Drive
2031: Future Growth + School
PM Peak: 15:45-16:45
Site Category: With Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	71	0.0	71	0.0	0.220	7.4	LOS A	0.8	5.7	0.56	0.78	0.56	50.5
23	R2	72	8.8	72	8.8	0.220	12.0	LOS A	0.8	5.7	0.56	0.78	0.56	45.7
Approach		142	4.4	142	4.4	0.220	9.7	LOS A	0.8	5.7	0.56	0.78	0.56	48.8
NorthEast: Londonderry Road														
24	L2	36	0.0	36	0.0	0.253	2.7	LOS A	0.0	0.0	0.00	0.04	0.00	56.5
25	T1	447	3.1	447	3.1	0.253	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	59.5
Approach		483	2.8	483	2.8	0.253	0.2	NA	0.0	0.0	0.00	0.04	0.00	59.2
SouthWest: Londonderry Road														
31	T1	395	3.2	395	3.2	0.216	0.1	LOS A	0.1	0.9	0.04	0.02	0.04	59.4
32	R2	11	0.0	11	0.0	0.216	7.9	LOS A	0.1	0.9	0.04	0.02	0.04	57.4
Approach		405	3.1	405	3.1	0.216	0.3	NA	0.1	0.9	0.04	0.02	0.04	59.3
All Vehicles		1031	3.2	1031	3.2	0.253	1.6	NA	0.8	5.7	0.09	0.13	0.09	57.0

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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 [Londonderry x Southee 2031 PM WD (Site Folder: 2031 With Development)]

Network: N101 [2031-WD-PM-N1 (Network Folder: 2031 With Development)]

Londonderry Road x Southee Road
2031: Future Growth + School
PM Peak: 15:45-14:45
Site Category: With Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Londonderry Road														
25	T1	383	3.0	383	3.0	0.268	0.7	LOS A	0.8	5.9	0.23	0.11	0.23	53.1
26	R2	73	1.4	73	1.4	0.268	8.0	LOS A	0.8	5.9	0.23	0.11	0.23	54.6
Approach		456	2.8	456	2.8	0.268	1.8	NA	0.8	5.9	0.23	0.11	0.23	53.7
NorthWest: Southee Road														
27	L2	34	0.0	34	0.0	0.218	6.6	LOS A	0.8	5.4	0.53	0.78	0.54	47.7
29	R2	100	2.1	100	2.1	0.218	11.0	LOS A	0.8	5.4	0.53	0.78	0.54	45.4
Approach		134	1.6	134	1.6	0.218	9.9	LOS A	0.8	5.4	0.53	0.78	0.54	46.1
SouthWest: Londonderry Road														
30	L2	179	4.7	179	4.7	0.251	2.7	LOS A	0.0	0.0	0.00	0.21	0.00	54.8
31	T1	288	3.6	288	3.6	0.251	0.0	LOS A	0.0	0.0	0.00	0.21	0.00	56.3
Approach		467	4.1	467	4.1	0.251	1.0	NA	0.0	0.0	0.00	0.21	0.00	55.4
All Vehicles		1057	3.2	1057	3.2	0.268	2.5	NA	0.8	5.9	0.17	0.24	0.17	52.7

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 3 [Paget x Lennox 2031 PM WD (Site Folder: 2031 With Development)]

Network: N101 [2031-WD-PM-N2 (Network Folder: 2031 With Development)]

Paget Street x Lennox Street
2031: Future Growth + School
PM Peak: 15:45-16:45
Site Category: With Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 30 seconds (Site Practical 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Paget Street														
1	L2	73	5.8	73	5.8	0.204	18.2	LOS B	1.0	7.1	0.87	0.73	0.87	41.9
2	T1	177	4.2	177	4.2	0.562	13.1	LOS A	2.9	21.0	0.95	0.79	1.01	45.3
3	R2	19	5.6	19	5.6	0.562	18.7	LOS B	2.9	21.0	0.95	0.79	1.01	41.7
Approach		268	4.7	268	4.7	0.562	14.9	LOS B	2.9	21.0	0.93	0.78	0.98	44.0
East: Lennox Street														
4	L2	25	4.2	25	4.2	0.293	13.0	LOS A	2.3	16.7	0.72	0.61	0.72	51.2
5	T1	553	3.0	553	3.0	0.796	11.6	LOS A	7.9	56.7	0.87	0.85	1.10	45.8
6	R2	116	0.9	116	0.9	* 0.796	19.2	LOS B	7.9	56.7	0.95	0.99	1.31	40.8
Approach		694	2.7	694	2.7	0.796	12.9	LOS A	7.9	56.7	0.88	0.87	1.12	45.2
North: Paget Street														
7	L2	99	1.1	99	1.1	0.268	16.8	LOS B	1.3	9.4	0.88	0.74	0.88	23.1
8	T1	196	3.2	196	3.2	* 0.786	16.5	LOS B	4.4	31.8	1.00	1.01	1.47	37.1
9	R2	59	1.8	59	1.8	0.786	21.1	LOS B	4.4	31.8	1.00	1.01	1.47	31.8
Approach		354	2.4	354	2.4	0.786	17.3	LOS B	4.4	31.8	0.97	0.94	1.30	34.1
West: Lennox Street														
10	L2	109	0.0	109	0.0	0.473	13.6	LOS A	4.0	29.3	0.78	0.70	0.78	42.5
11	T1	399	6.1	399	6.1	0.473	8.4	LOS A	4.0	29.3	0.80	0.71	0.80	36.9
12	R2	80	5.3	80	5.3	0.473	14.8	LOS B	2.9	21.6	0.84	0.73	0.84	46.7
Approach		588	4.8	588	4.8	0.473	10.3	LOS A	4.0	29.3	0.80	0.71	0.80	40.5
All Vehicles		1904	3.6	1904	3.6	0.796	13.2	LOS A	7.9	56.7	0.88	0.82	1.04	41.6

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.
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
South: Paget Street											
P1	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
East: Lennox Street											
P2	Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
North: Paget Street											

P3 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
West: Lennox Street										
P4 Full	53	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96
All Pedestrians	211	9.6	LOS A	0.0	0.0	0.80	0.80	36.7	35.2	0.96

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: 4 [Blacktown x Bourke 2031 PM WD (Site Folder: 2031 With Development)]

Network: N101 [2031-WD-PM-N2 (Network Folder: 2031 With Development)]

Blacktown Road x Bourke Street x Lennox Street
2031: Future Growth + School
PM Peak: 15:45-14:45
Site Category: With Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bourke Street														
1	L2	6	0.0	6	0.0	0.122	22.3	LOS B	2.3	16.4	0.65	0.53	0.65	30.1
2	T1	93	0.0	93	0.0	0.122	15.6	LOS B	2.3	16.4	0.65	0.53	0.65	39.5
3b	R3	41	5.1	41	5.1	0.122	28.1	LOS B	1.2	8.8	0.75	0.73	0.75	21.9
Approach		140	1.5	140	1.5	0.122	19.6	LOS B	2.3	16.4	0.68	0.59	0.68	34.2
SouthEast: Blacktown Road														
21b	L3	44	4.8	44	4.8	0.255	22.3	LOS B	5.0	35.7	0.67	0.74	0.67	40.5
21a	L1	568	2.8	568	2.8	0.705	23.0	LOS B	17.0	122.0	0.80	0.80	0.80	34.5
23a	R1	135	2.3	135	2.3	* 0.705	23.9	LOS B	17.0	122.0	0.85	0.83	0.85	38.3
Approach		747	2.8	747	2.8	0.705	23.1	LOS B	17.0	122.0	0.80	0.81	0.80	35.8
North: Bourke Street														
7a	L1	142	0.7	142	0.7	0.181	21.6	LOS B	3.5	24.8	0.67	0.73	0.67	25.8
8	T1	227	1.4	227	1.4	0.607	20.4	LOS B	9.9	70.7	0.81	0.73	0.81	35.0
9	R2	102	3.1	102	3.1	* 0.607	25.9	LOS B	9.9	70.7	0.81	0.73	0.81	25.2
Approach		472	1.6	472	1.6	0.607	21.9	LOS B	9.9	70.7	0.77	0.73	0.77	31.0
West: Lennox Street														
10	L2	76	6.9	76	6.9	0.212	20.6	LOS B	4.1	29.8	0.66	0.72	0.66	38.4
12a	R1	466	4.1	466	4.1	0.535	21.2	LOS B	10.4	75.9	0.73	0.75	0.73	32.8
12	R2	3	66.7	3	66.7	0.535	23.5	LOS B	10.4	75.9	0.75	0.76	0.75	32.9
Approach		545	4.8	545	4.8	0.535	21.1	LOS B	10.4	75.9	0.72	0.75	0.72	33.8
All Vehicles		1904	3.0	1904	3.0	0.705	22.0	LOS B	17.0	122.0	0.76	0.76	0.76	34.1

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
South: Bourke Street											
P1	Full	53	18.9	LOS B	0.1	0.1	0.69	0.69	46.0	35.2	0.76
SouthEast: Blacktown Road											
P5	Full	53	20.4	LOS C	0.1	0.1	0.71	0.71	47.4	35.2	0.74
North: Bourke Street											

P3 Full	53	18.9	LOS B	0.1	0.1	0.69	0.69	46.0	35.2	0.76
West: Lennox Street										
P4 Full	53	20.4	LOS C	0.1	0.1	0.71	0.71	47.4	35.2	0.74
All Pedestrians	211	19.6	LOS B	0.1	0.1	0.70	0.70	46.7	35.2	0.75

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: 5 [Blacktown x Campus 2031 PM WD (Site Folder: 2031 With Development)]

Network: N101 [2031-WD-PM-N2 (Network Folder: 2031 With Development)]

Blacktown Road x Campus Drive
2031: Future Growth + School
PM Peak: 15:45-16:45
Site Category: With Development
Give-Way (Two-Way)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Blacktown Road														
21	L2	16	0.0	16	0.0	0.009	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	60.1
22	T1	698	2.7	698	2.7	0.364	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach		714	2.7	714	2.7	0.364	0.2	NA	0.0	0.0	0.00	0.01	0.00	78.6
NorthWest: Blacktown Road														
28	T1	641	3.4	641	3.4	0.336	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.2
29	R2	7	0.0	7	0.0	0.012	11.1	LOS A	0.0	0.3	0.59	0.74	0.59	55.1
Approach		648	3.4	648	3.4	0.336	0.2	NA	0.0	0.3	0.01	0.01	0.01	78.8
SouthWest: Campus Road														
30	L2	55	0.0	55	0.0	0.511	16.9	LOS B	2.3	16.3	0.00	0.58	0.00	29.5
32	R2	60	0.0	60	0.0	0.511	48.7	LOS D	2.3	16.3	0.00	0.58	0.00	41.1
Approach		115	0.0	115	0.0	0.511	33.5	LOS C	2.3	16.3	0.00	0.58	0.00	36.6
All Vehicles		1477	2.8	1477	2.8	0.511	2.8	NA	2.3	16.3	0.00	0.06	0.00	72.1

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 1 [Londonderry x Vines 2021 AM WOD - Weekend (Site Folder: 2021 Witout Development (Weekend))]

Londonderry Road x Vines Drive
2021: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	3	0	3	0.0	0.010	6.1	LOS A	0.0	0.2	0.33	0.59	0.33	52.6
23	R2	6	0	6	0.0	0.010	7.1	LOS A	0.0	0.2	0.33	0.59	0.33	47.3
Approach		9	0	9	0.0	0.010	6.8	LOS A	0.0	0.2	0.33	0.59	0.33	49.8
NorthEast: Londonderry Road														
24	L2	11	0	12	0.0	0.108	2.7	LOS A	0.0	0.0	0.00	0.03	0.00	56.7
25	T1	189	0	199	0.0	0.108	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	59.7
Approach		200	0	211	0.0	0.108	0.1	NA	0.0	0.0	0.00	0.03	0.00	59.5
SouthWest: Londonderry Road														
31	T1	219	0	231	0.0	0.125	0.0	LOS A	0.1	0.5	0.03	0.02	0.03	59.3
32	R2	9	0	9	0.0	0.125	6.2	LOS A	0.1	0.5	0.03	0.02	0.03	57.4
Approach		228	0	240	0.0	0.125	0.3	NA	0.1	0.5	0.03	0.02	0.03	59.2
All Vehicles		437	0	460	0.0	0.125	0.4	NA	0.1	0.5	0.02	0.04	0.02	59.0

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

MOVEMENT SUMMARY

Site: 1 [Londonderry x Vines 2021 PM WOD - Weekend (Site Folder: 2021 Witout Development (Weekend))]

Londonderry Road x Vines Drive
2021: Existing Conditions - Without Development
PM Peak: 15:45-14:45
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	23	0	24	0.0	0.052	6.2	LOS A	0.2	1.3	0.34	0.62	0.34	52.5
23	R2	26	0	27	0.0	0.052	7.7	LOS A	0.2	1.3	0.34	0.62	0.34	47.2
Approach		49	0	52	0.0	0.052	7.0	LOS A	0.2	1.3	0.34	0.62	0.34	50.4
NorthEast: Londonderry Road														
24	L2	30	0	32	0.0	0.126	2.7	LOS A	0.0	0.0	0.00	0.07	0.00	56.3
25	T1	202	0	213	0.0	0.126	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	59.3
Approach		232	0	244	0.0	0.126	0.3	NA	0.0	0.0	0.00	0.07	0.00	58.9
SouthWest: Londonderry Road														
31	T1	266	0	280	0.0	0.147	0.0	LOS A	0.0	0.2	0.01	0.01	0.01	59.7
32	R2	4	0	4	0.0	0.147	6.4	LOS A	0.0	0.2	0.01	0.01	0.01	57.6
Approach		270	0	284	0.0	0.147	0.1	NA	0.0	0.2	0.01	0.01	0.01	59.7
All Vehicles		551	0	580	0.0	0.147	0.8	NA	0.2	1.3	0.04	0.09	0.04	58.1

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

MOVEMENT SUMMARY

Site: 1 [Londonderry x Vines 2021 AM WD - Weekend (Site Folder: 2021 With Development (Weekend))]

Londonderry Road x Vines Drive
2021: Existing Conditions - With Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - With Development
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	20	0	21	0.0	0.033	6.1	LOS A	0.1	0.8	0.31	0.59	0.31	52.7
23	R2	14	0	15	0.0	0.033	7.4	LOS A	0.1	0.8	0.31	0.59	0.31	47.5
Approach		34	0	36	0.0	0.033	6.6	LOS A	0.1	0.8	0.31	0.59	0.31	51.2
NorthEast: Londonderry Road														
24	L2	16	0	17	0.0	0.111	2.7	LOS A	0.0	0.0	0.00	0.04	0.00	56.6
25	T1	189	0	199	0.0	0.111	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	59.6
Approach		205	0	216	0.0	0.111	0.2	NA	0.0	0.0	0.00	0.04	0.00	59.3
SouthWest: Londonderry Road														
31	T1	219	0	231	0.0	0.140	0.1	LOS A	0.2	1.6	0.09	0.07	0.09	58.1
32	R2	29	0	31	0.0	0.140	6.2	LOS A	0.2	1.6	0.09	0.07	0.09	56.8
Approach		248	0	261	0.0	0.140	0.8	NA	0.2	1.6	0.09	0.07	0.09	57.8
All Vehicles		487	0	513	0.0	0.140	1.0	NA	0.2	1.6	0.07	0.10	0.07	57.6

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

MOVEMENT SUMMARY

Site: 1 [Londonderry x Vines 2021 PM WD - Weekend (Site Folder: 2021 With Development (Weekend))]

Londonderry Road x Vines Drive
2021: Existing Conditions - With Development
PM Peak: 15:45-14:45
Site Category: Existing Scenario - With Development
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	40	0	42	0.0	0.077	6.2	LOS A	0.3	1.9	0.34	0.63	0.34	52.5
23	R2	34	0	36	0.0	0.077	7.9	LOS A	0.3	1.9	0.34	0.63	0.34	47.2
Approach		74	0	78	0.0	0.077	7.0	LOS A	0.3	1.9	0.34	0.63	0.34	50.7
NorthEast: Londonderry Road														
24	L2	35	0	37	0.0	0.129	2.7	LOS A	0.0	0.0	0.00	0.08	0.00	56.3
25	T1	202	0	213	0.0	0.129	0.0	LOS A	0.0	0.0	0.00	0.08	0.00	59.2
Approach		237	0	249	0.0	0.129	0.4	NA	0.0	0.0	0.00	0.08	0.00	58.7
SouthWest: Londonderry Road														
31	T1	266	0	280	0.0	0.162	0.1	LOS A	0.2	1.4	0.08	0.05	0.08	58.6
32	R2	24	0	25	0.0	0.162	6.4	LOS A	0.2	1.4	0.08	0.05	0.08	57.0
Approach		290	0	305	0.0	0.162	0.6	NA	0.2	1.4	0.08	0.05	0.08	58.3
All Vehicles		601	0	633	0.0	0.162	1.3	NA	0.3	1.9	0.08	0.13	0.08	57.0

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

MOVEMENT SUMMARY

Site: 1 [Londonderry x Vines 2031 AM WOD - Weekend (Site Folder: 2031 Without Development (Weekend))]

Londonderry Road x Vines Drive
2031: Existing Conditions - Without Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	3	0	3	0.0	0.011	6.2	LOS A	0.0	0.3	0.36	0.61	0.36	52.5
23	R2	7	0	7	0.0	0.011	7.4	LOS A	0.0	0.3	0.36	0.61	0.36	47.1
Approach		10	0	11	0.0	0.011	7.0	LOS A	0.0	0.3	0.36	0.61	0.36	49.4
NorthEast: Londonderry Road														
24	L2	12	0	13	0.0	0.120	2.7	LOS A	0.0	0.0	0.00	0.03	0.00	56.7
25	T1	209	0	220	0.0	0.120	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	59.7
Approach		221	0	233	0.0	0.120	0.1	NA	0.0	0.0	0.00	0.03	0.00	59.5
SouthWest: Londonderry Road														
31	T1	242	0	255	0.0	0.138	0.0	LOS A	0.1	0.6	0.03	0.02	0.03	59.3
32	R2	10	0	11	0.0	0.138	6.3	LOS A	0.1	0.6	0.03	0.02	0.03	57.4
Approach		252	0	265	0.0	0.138	0.3	NA	0.1	0.6	0.03	0.02	0.03	59.2
All Vehicles		483	0	508	0.0	0.138	0.4	NA	0.1	0.6	0.03	0.04	0.03	59.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Londonderry x Vines 2031 PM WOD - Weekend (Site Folder: 2031 Without Development (Weekend))]

Londonderry Road x Vines Drive
2031: Existing Conditions - Without Development
PM Peak: 15:45-14:45
Site Category: Existing Scenario - Without Development
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	25	0	26	0.0	0.060	6.3	LOS A	0.2	1.5	0.37	0.64	0.37	52.3
23	R2	29	0	31	0.0	0.060	8.0	LOS A	0.2	1.5	0.37	0.64	0.37	46.9
Approach		54	0	57	0.0	0.060	7.2	LOS A	0.2	1.5	0.37	0.64	0.37	50.1
NorthEast: Londonderry Road														
24	L2	33	0	35	0.0	0.139	2.7	LOS A	0.0	0.0	0.00	0.07	0.00	56.3
25	T1	223	0	235	0.0	0.139	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	59.3
Approach		256	0	269	0.0	0.139	0.3	NA	0.0	0.0	0.00	0.07	0.00	58.9
SouthWest: Londonderry Road														
31	T1	294	0	309	0.0	0.163	0.0	LOS A	0.0	0.3	0.02	0.01	0.02	59.7
32	R2	5	0	5	0.0	0.163	6.5	LOS A	0.0	0.3	0.02	0.01	0.02	57.6
Approach		299	0	315	0.0	0.163	0.1	NA	0.0	0.3	0.02	0.01	0.02	59.6
All Vehicles		609	0	641	0.0	0.163	0.9	NA	0.2	1.5	0.04	0.09	0.04	58.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Londonderry x Vines 2031 AM WD - Weekend (Site Folder: 2031 With Development (Weekend))]

Londonderry Road x Vines Drive
2031: Existing Conditions - With Development
AM Peak: 8:15-9:15
Site Category: Existing Scenario - With Development
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	20	0	21	0.0	0.034	6.2	LOS A	0.1	0.8	0.32	0.60	0.32	52.7
23	R2	14	0	15	0.0	0.034	7.5	LOS A	0.1	0.8	0.32	0.60	0.32	47.4
Approach		34	0	36	0.0	0.034	6.7	LOS A	0.1	0.8	0.32	0.60	0.32	51.1
NorthEast: Londonderry Road														
24	L2	17	0	18	0.0	0.117	2.7	LOS A	0.0	0.0	0.00	0.04	0.00	56.6
25	T1	199	0	209	0.0	0.117	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	59.6
Approach		216	0	227	0.0	0.117	0.2	NA	0.0	0.0	0.00	0.04	0.00	59.3
SouthWest: Londonderry Road														
31	T1	230	0	242	0.0	0.146	0.1	LOS A	0.2	1.7	0.10	0.07	0.10	58.1
32	R2	30	0	32	0.0	0.146	6.3	LOS A	0.2	1.7	0.10	0.07	0.10	56.8
Approach		260	0	274	0.0	0.146	0.9	NA	0.2	1.7	0.10	0.07	0.10	57.8
All Vehicles		510	0	537	0.0	0.146	1.0	NA	0.2	1.7	0.07	0.09	0.07	57.7

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

MOVEMENT SUMMARY

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Londonderry Road x Vines Drive
2031: Existing Conditions - With Development
PM Peak: 15:45-14:45
Site Category: Existing Scenario - With Development
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Vines Drive														
21	L2	42	0	44	0.0	0.082	6.3	LOS A	0.3	2.0	0.35	0.63	0.35	52.4
23	R2	35	0	37	0.0	0.082	8.1	LOS A	0.3	2.0	0.35	0.63	0.35	47.1
Approach		77	0	81	0.0	0.082	7.1	LOS A	0.3	2.0	0.35	0.63	0.35	50.7
NorthEast: Londonderry Road														
24	L2	37	0	39	0.0	0.135	2.7	LOS A	0.0	0.0	0.00	0.08	0.00	56.2
25	T1	212	0	223	0.0	0.135	0.0	LOS A	0.0	0.0	0.00	0.08	0.00	59.2
Approach		249	0	262	0.0	0.135	0.4	NA	0.0	0.0	0.00	0.08	0.00	58.7
SouthWest: Londonderry Road														
31	T1	280	0	295	0.0	0.170	0.1	LOS A	0.2	1.5	0.08	0.05	0.08	58.6
32	R2	24	0	25	0.0	0.170	6.5	LOS A	0.2	1.5	0.08	0.05	0.08	57.0
Approach		304	0	320	0.0	0.170	0.6	NA	0.2	1.5	0.08	0.05	0.08	58.4
All Vehicles		630	0	663	0.0	0.170	1.3	NA	0.3	2.0	0.08	0.13	0.08	57.1

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

Appendix E – Road Safety Audit

SINSW Centre Of Excellence (Richmond)

Road Safety Audit

Detailed Design Stage

27th October 2021

JN22024_Report01 Rev02 - TTW Richmond COE

On Behalf of

Taylor Thomson Whitting

1503C/41-45 Belmore Street
Ryde, NSW, 2112

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admin@amwc-rsa.com
www.amwc-rsa.com
ABN 13 619 698 985

NSW RSA Register Details

Final Signoff Date	27/10/2021
Title of Audit	SINSW Centre Of Excellence (Richmond)
Location of Audit	Richmond
Project Description *(max 300 char)*	The aim of this project is to design and construct a new Centre of Excellence in Agriculture Education at the Western Sydney University Hawkesbury campus in Richmond
Purpose of Audit *(max 300 char)*	The aim of this Road Safety Audit is to assess the detailed design plans of upgrades to existing infrastructure including Vines Drive from Londonderry Rd to Maintenance Ln, intersections, drop-off/pick-up facilities and footpaths
State of Audit	NSW
Stage of Audit	Detailed Design Stage
Client Company	Taylor Thomson Whitting
Client Contact	Michael Babbage
Client Phone	02 9439 7288
Client Email	Michael.Babbage@ttw.com.au
Audit Team Lead	Aaron Walton
Audit Team Member	Mark Keech

Table of Contents

1 Project Description

The aim of this project is to design and construct a new Centre of Excellence in Agriculture Education at the Western Sydney University Hawkesbury campus in Richmond. Works are to include the upgrade of Vines Road, intersection improvements at Londonderry Road and Maintenance Lane, retaining walls, safety barrier, bus bays, pedestrian crossings, signs and linemarking.

The aim of this Road Safety Audit (RSA) is to assess the detailed design plans of upgrades to existing infrastructure including Vines Drive from Londonderry Rd to Maintenance Ln, intersections, drop-off/pick-up facilities and footpaths, in the context of the existing conditions, and the interface between existing and proposed works.

2 Study Area

The general audit location is shown below.

Source – snazzymaps.com

3 Auditable Data

The following data was referenced during the audit:

> SINSW Centre of Excellence (Richmond) (Rev P1 – 08/10/2021)
  - C10-P1, C31-P1, C32-P1, C33-P1, C41-P1, SK11-P1, SK12-P1, SK14-P1, SK15-P1

4 Audit Stage

A Detailed Design Stage Audit was carried out on the 11th of October 2021 including a desktop assessment of the auditable data and a site visit of proposed works during day and night conditions. At the time of the site visit the weather was raining and traffic was light.

The audit was generally undertaken in accordance with 'TfNSW Guidelines for Road Safety Audit Practices (2011)' and 'Austroads: Guide to Road Safety Part 6 and Part 6a (2019)'.

5 Exclusions

At the time of the audit there were no exclusions presented to the audit team.

6 Audit Team

The audit team and client details are shown below.

Table 6-1 Audit Team & Client Details

Role	Name	
Client (Sponsor)	Taylor Thomson Whitting	
Client Contact	Michael Babbage	Associate (Traffic)
Client Email	Michael.Babbage@ttw.com.au	
Lead Auditor	Aaron Walton	RSA-02-0501 - Level 3 Auditor
Lead Auditor Email	admin@amwc-rsa.com	
Team member	Mark Keech	RSA-02-0124 - Level 3 Auditor

7 Audit Program

The audit program details are shown below.

Table 7-1 Audit Program

Activity	**Date**	**Attendees**
Opening Meeting	06/10/2021	Aaron Walton, Michael Babbage
Site Inspection	11/10/2021	Aaron Walton, Mark Keech
Draft Report Internal Review	14/10/2021	RSA Report (Rev00)
Draft Report External Responses	15/10/2021	RSA Report (Rev01)
Completion Meeting	27/10/2021	Aaron Walton, Michael Babbage
Final Report	27/10/2021	RSA Report (Rev02)

8 Audit Risk Assessment Technique

For each of the safety issues identified, the level of risk with each has been determined. The tables below are extracted from Austroads: Guide to Road Safety Part 6 and Part 6a (2019) and have been used in the assessment of risk for this audit.

Table 8-1 Incident Frequency

Frequency	Description
Frequent	Once or more per week
Probable	Once or more per year
Occasional	Once every five or ten years
Improbable	Less often than once every ten years

Table 8-2 Incident Severity

Severity	Description	Examples
Catastrophic	Likely multiple deaths	> High-speed, multi-vehicle crash on freeway. > Car runs into crowded bus stop. > Bus and petrol tanker collide. > Collapse of bridge or tunnel.
Serious	Likely death or serious injury	> High or medium-speed vehicle/vehicle collision. > High or medium-speed collision with a fixed roadside object. > Pedestrian or cyclist struck by a car.
Minor	Likely minor injury	> Some low-speed vehicle collisions. > Cyclist falls from bicycle at low speed. > Left-turn rear-end crash in a slip lane.
Limited	Likely trivial injury or property damage only	> Some low-speed vehicle collisions. > Pedestrian walks into object (no head injury). > Car reverses into post.

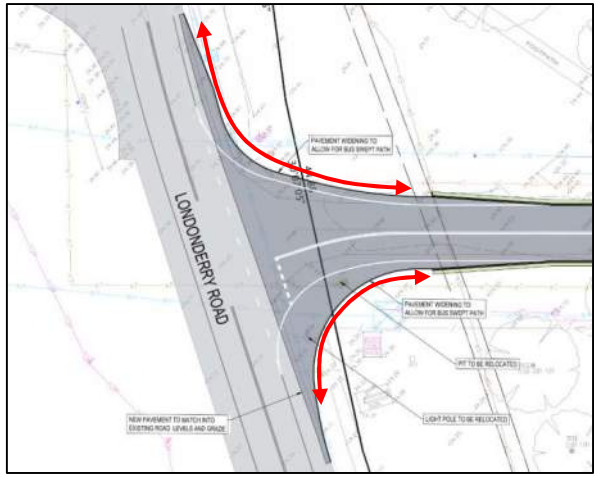
Table 8-3 Resulting Level of Risk Matrix

	Frequent	Probable	Occasional	Improbable
Catastrophic	Intolerable	Intolerable	Intolerable	High
Serious	Intolerable	Intolerable	High	Medium
Minor	Intolerable	High	Medium	Low
Limited	High	Medium	Low	Low

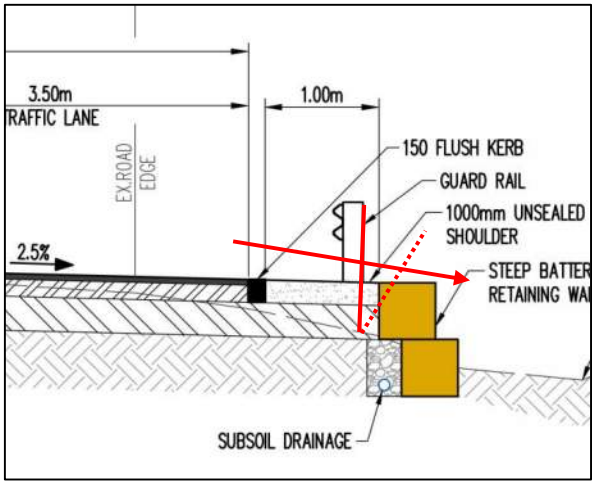
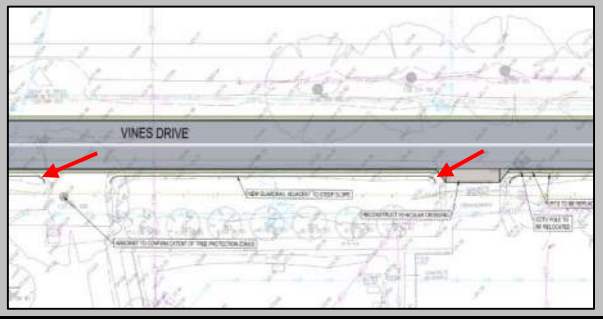
9 Audit Findings

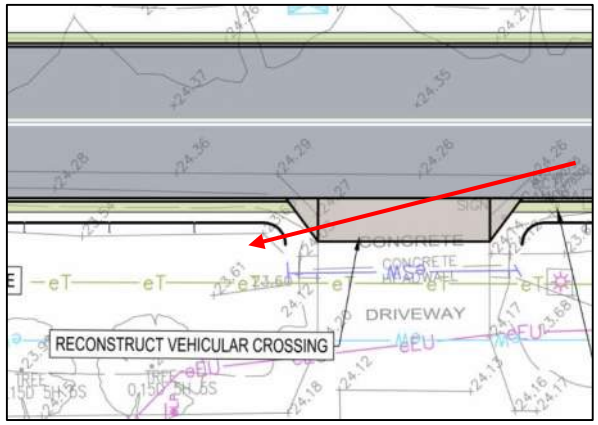
Table 9-1 Audit Findings

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
1. Intersection Delineation Londonderry Road	There is no delineation on the terminating leg of the T-intersection. There is a risk at night or during adverse weather that a motorist may not sight the intersection point and approach the intersection at high speed (accelerating after exiting the 40 zone) with insufficient time to decelerate to a stop before entering the through lane resulting in side impact collisions from through vehicles. 	Improbable	Minor	Medium	Signage and line marking plan to be developed for this area, including retro-reflective pavement markers (RRPMs), T-intersection advance warning signage, and T-intersection terminating signage (<<< >>>).
2. Drainage Londonderry Road	The proposed widening works at the Londonderry Road intersection creates a road formation cut profile and no drainage infrastructure is proposed. There is a risk that water may pond into the through travel lanes of a 60 km/h zone resulting in aquaplaning incidents. There is a risk that ponding water may damage the pavement surface creating vehicle/motorcycle destabilisation incidents resulting in run-off-road or head-on collisions, particularly when negotiating a corner. There is a risk that water flows may erode the edge of the pavement creating a vertical drop that may snag an errant vehicle resulting in vehicle roll incidents.	Probable	Serious	Intolerable	Existing blocked pipe to be replaced and improved as part of intersection works which should reduce ponding. A drainage channel to bring water off the roadway will also be considered in the detailed design. Pavement and/or kerb design to be reviewed to avoid erosion.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
					
					
					

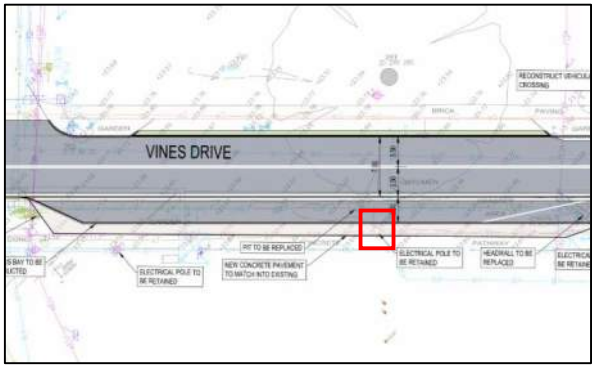
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
3. Overhanging Branches Extent of Works	There are low and overhanging branches throughout the extent of works. There is a risk that a branch may fall on a vehicle or fall into the travel lane and be impacted by a vehicle resulting in injury to vehicle occupants. There is a risk that a vehicle may impact overhanging branches causing them to fall onto the vehicle or into the travel lane and be impacted by another vehicle resulting in injury to vehicle occupants.  	Improbable	Minor	Medium	Height clearances and tree conditions under review with arborist, it is anticipated that pruning will be required to various trees. Some residual overhang of trees is expected as part of the urban design of the space and to retain tree canopy coverage of the area. Ongoing review and maintenance may be required by WSU.

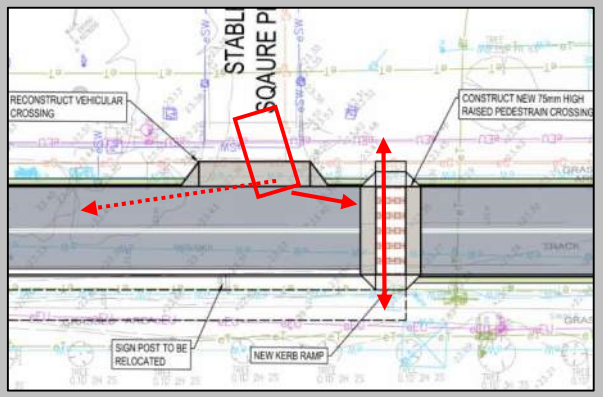
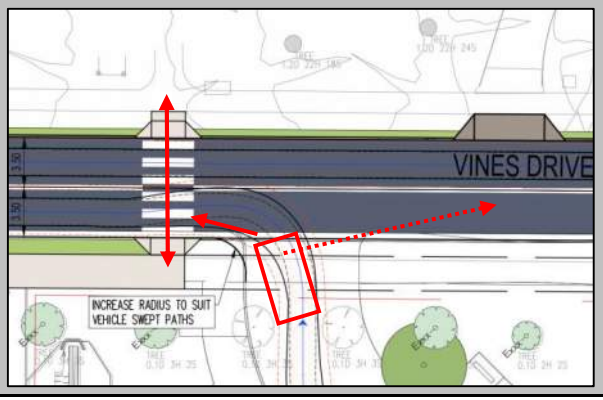
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
4. Barrier Post Support Extent of Works	There is insufficient support provided behind the barrier post. There is a risk that an errant vehicle may not be contained by the barrier resulting in a vehicle reaching a hazard, snag/roll incidents and injury to occupants. 	Improbable	Serious	Medium	Road sections will be designed to provide the required support distance behind guard rails; design to manufacturer requirements once a barrier product is selected.
5. Barrier Terminals Extent of Works	There are no barrier terminals provided. There is a risk that an errant vehicle may impact the exposed end of a barrier rail resulting in spearing of a barrier rail into a vehicle cabin and vehicle occupant. 	Probable	Serious	Intolerable	Terminal treatments to be provided; consider replacing barriers with a suitable swale/runoff treatment where appropriate.

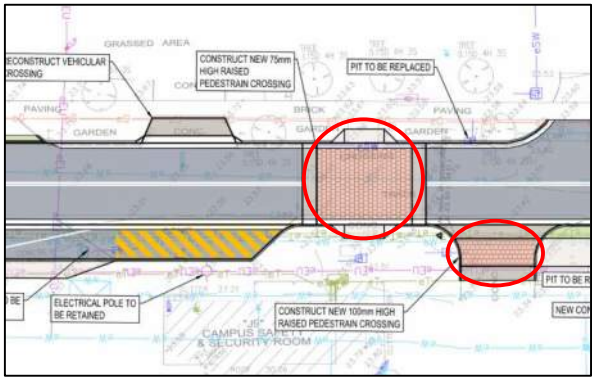
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
6. Barrier Extents Extent of Works	It is unclear to the audit team if the barrier point of need is met, particularly where short breaks are provided in the barrier system. There is no hazard free zone provided at barrier end points. There is a risk that an errant vehicle may impact a hazard behind a barrier end resulting in injury to vehicle occupants. 	Occasional	Minor	Medium	Swale area to be reviewed to remove points of need and delete barrier where possible.
7. Large Rocks Extent of Works	There are large rocks adjacent to the travel lane throughout the extent of works. There is a risk that an errant vehicle may impact a non-frangible hazard resulting in vehicle damage or injury to vehicle occupants. 	Occasional	Minor	Medium	To be reviewed with WSU and deleted where possible.

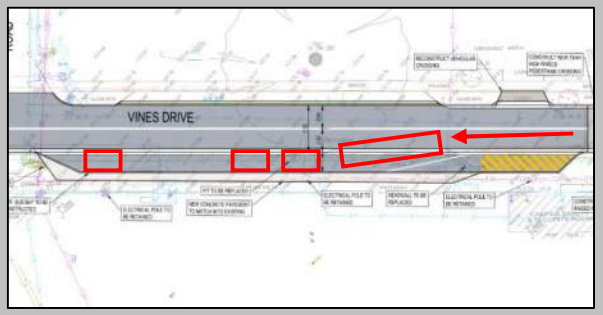
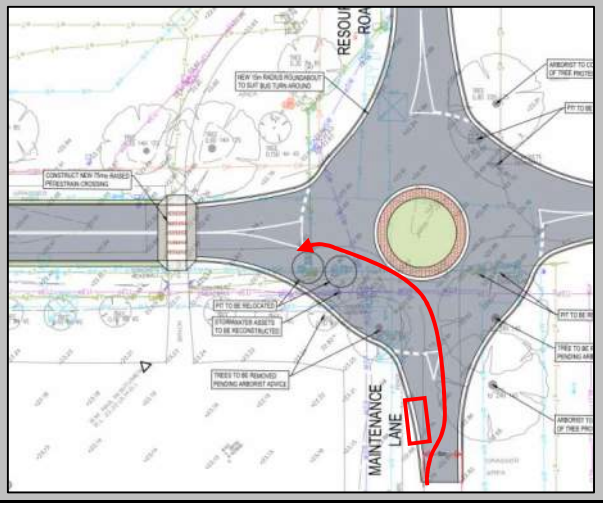
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
8. Intersection Controls Extent of Works	The existing line marking and signage at intersection points is faded/damaged, particularly Horticulture Road. It is unclear to the audit team on the requirement to replace an intersection control with a vehicle crossing, tying into an existing road and leaving part of the intersection control signage and line marking in place. Incomplete arrangements may increase driver confusion. There is a risk at night or during adverse weather that a motorist may not sight the intersection point and approach the intersection with insufficient time to decelerate to a stop before entering the through lane resulting in side impact collisions from through vehicles.  	Probable	Minor	High	All new signs and line marking to new work.

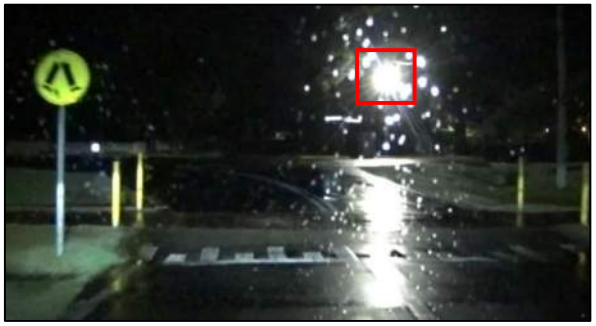
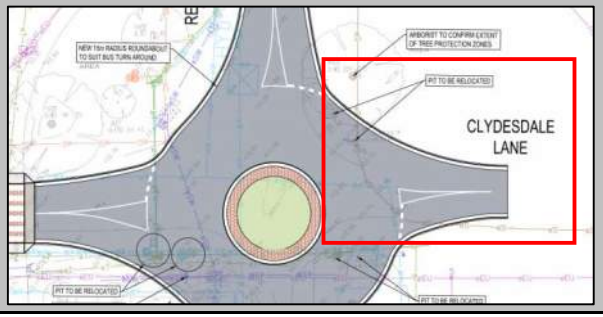
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
9. Ponding water Extent of works	On site it was observed that pavement water was ponding against raised pedestrian crossings, against the raised grassed verge, at blocked drains and at pavement depressions throughout the site. Specific locations include Vines Drive at Yarramundi Road and side road opposite Yarramundi Road. There is a risk that ponding water may damage the pavement surface creating vehicle/motorcycle destabilisation incidents resulting in run-off-road or head-on collisions. There is a risk that water flows may erode the edge of the pavement resulting in vehicle snag/roll incidents.  	Occasional	Minor	Medium	Stormwater strategy to be finalised in detailed design.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
10. Existing Pole Bus Zone	There is an existing pole to be retained at the back of kerb in the proposed bus zone. There is a risk that a bus entering the bay may impact the pole, resulting in vehicle damage, or that the falling pole may impact a waiting/passing pedestrian. There is a risk that the pole may restrict access to the bus doors, including mid/rear doors, and particularly for elderly, ambulant, disabled passengers attempting to enter/exit the bus.  	Occasional	Limited	Low	Pole to be relocated if possible (TBC by RCC/WSU).

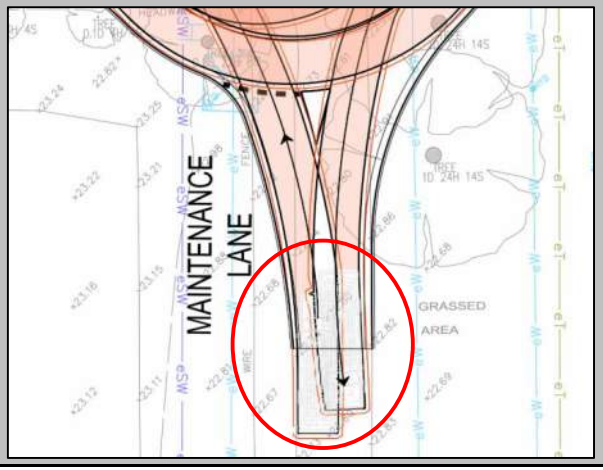
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
11. Pedestrian Crossing Proximity Extent of Works	There are pedestrian crossings proposed adjacent to intersection points throughout the extent of works. There is a risk that a motorist exiting the intersection may focus on vehicles approaching from the right and not sight a pedestrian entering the crossing from the left resulting in pedestrian-vehicle collisions. This risk is increased given an inconsistent application of pedestrian crossing infrastructure such as approach signage from all directions, line marking, and raised thresholds. This risk is increased where vehicle and pedestrian volumes are increasing.  	Occasional	Serious	High	Distance from intersections/driveways to be increased where possible, or pedestrian crossings to be deleted if demand is low to avoid confusion.

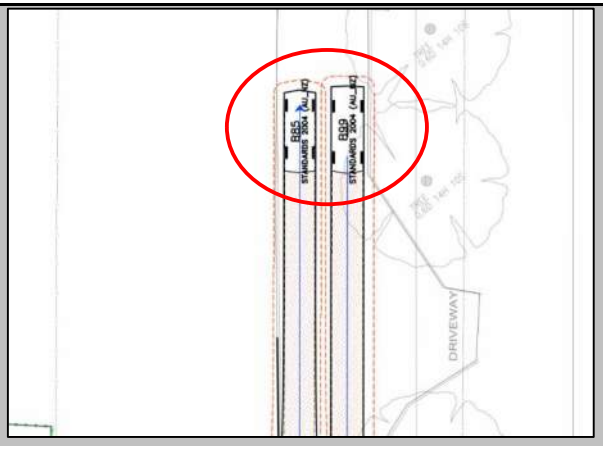
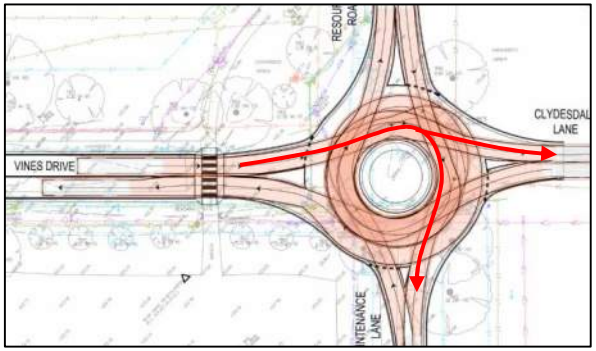
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
12. Pedestrian Crossing Sight Extent of Works	There are multiple pedestrian crossings, both existing and proposed, without line marking, signage and lighting. The legal requirement for a motorist to give-way at a pedestrian crossing that is not line marked and only sign posted in one direction is not clear. An inconsistent approach to pedestrian facilities may increase driver confusion/frustration, and decrease pedestrian compliance. There is a risk that an approaching motorist may not anticipate a pedestrian stepping out into the travel lane resulting in pedestrian-vehicle collisions.  	Improbable	Serious	Medium	Consistency of crossing treatments is under review. Any crossings in the final design will have line marking and signage in both directions.

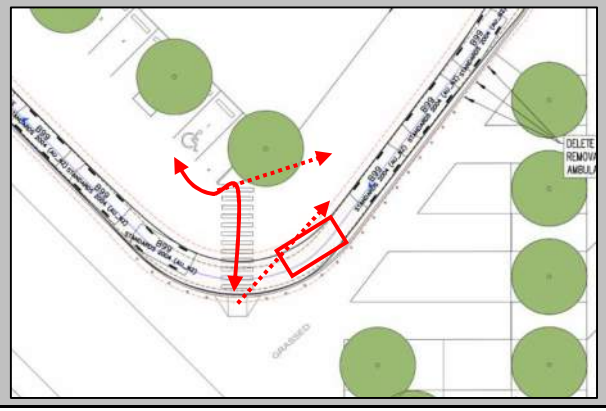
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
13. Signage Extent of Works	There is insufficient signage provided throughout the extent of works including roundabouts (no stopping, give way), pedestrian crossings, bus stop/contractor parking restrictions, DO-PU parking restrictions. There is a risk that a motorist may park/stop in a location that restricts through vehicles or pedestrian paths resulting in side-swipe collisions or pedestrian-vehicle collisions. There is a risk that a motorist may not sight approaching intersections, configurations, hazards due to parked vehicles resulting in run-off-road, side-impact or side swipe collisions.  	Probable	Minor	High	Kerbside parking signage to be provided to all areas. Bus restrictions will be nominated. No Stopping restrictions at the roundabout and other relevant locations will be nominated.

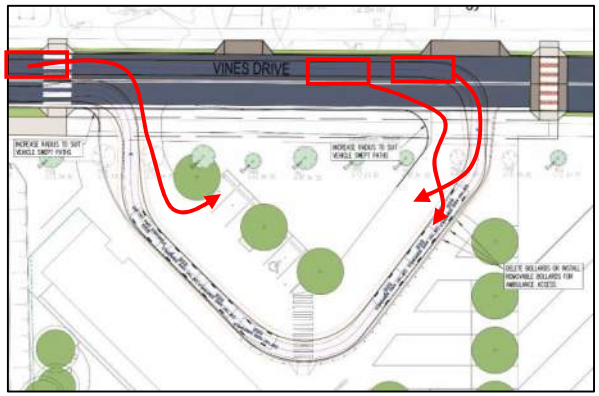
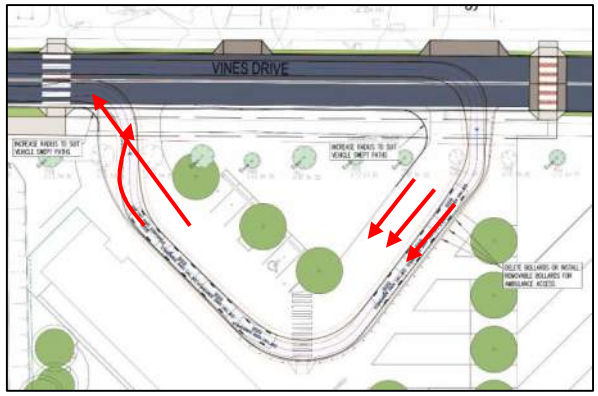
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
14. Lighting Roundabout	There is no proposed lighting at the proposed roundabout. At the existing curve there is an existing flood light on a pole set back in a paddock that is directed into an eastbound driver's eyes. There is a risk at night or during adverse weather that a motorist may not sight the intersection configuration resulting in impacts with roadside infrastructure, pedestrians, or other vehicles circulating the roundabout. 	Probable	Minor	High	Lighting anticipated to be provided at roundabout and pedestrian crossing locations, to be reviewed and confirmed by lighting/electrical consultant.
15. Survey Clydesdale Lane	There is no survey provided at the Clydesdale Lane leg on the roundabout. The proposed alignment of the leg appears to be offset from Vines Drive and from the existing Clydesdale Lane. The proposed width does not match the existing width. There is a risk that staggered alignments and incomplete works may resulting in run-off-road incidents. 	Probable	Limited	Medium	Further survey is being undertaken, final design will suit surveyed configuration.

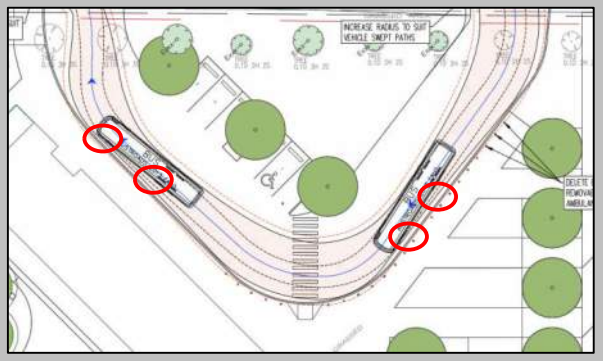
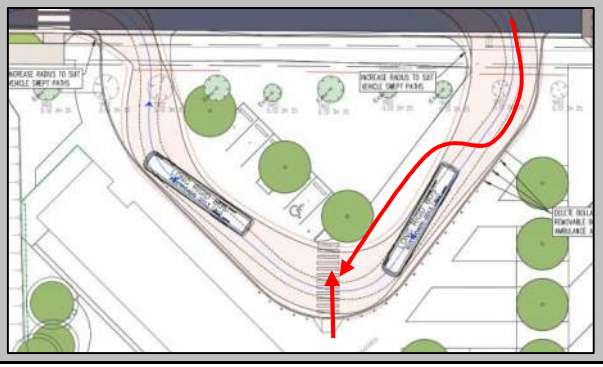
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
16. Infrastructure Clydesdale Lane	There is existing infrastructure at the intersection of Clydesdale Lane including a brick hydrant enclosure, stay pole, and CCTV pole. There is a risk that a pedestrian or motorist may impact hazards in pedestrian paths, clear zones, or in the travel lane.  	Frequent	Minor	Intolerable	Existing infrastructure to be relocated as part of roundabout works.

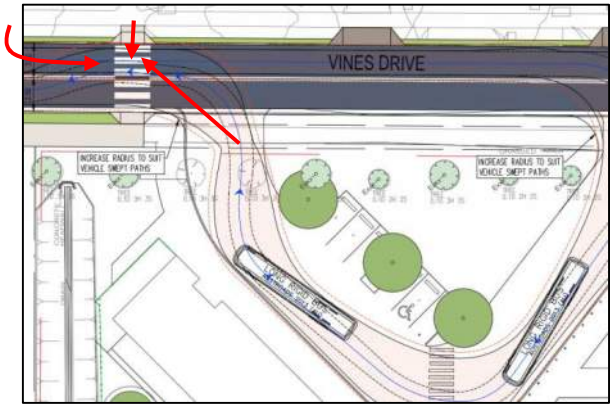
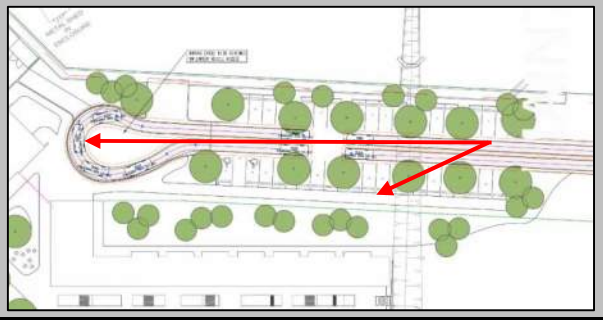
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
					
17. Width Maintenance Lane	The turning path plan for the roundabout shows 2-way traffic colliding at the Maintenance Lane splitter island, however the Maintenance Lane Carpark turning path plan indicates there is sufficient width for 2-way traffic. There is a risk that the existing width on Maintenance Lane may not be sufficient for 2-way traffic resulting in side-swipe or head-on collisions with oncoming traffic, run-off-road incidents, or collisions with roadside infrastructure, hazards or pedestrians. 	Frequent	Minor	Intolerable	Treatment for two-way traffic along Maintenance Lane is under review. Traffic movements are generally expected to be one-way (e.g. arrivals in the morning, departures in the afternoon) so limited two-way traffic is expected. A priority system can be designed, and will ensure sufficient space for vehicles off the circulating area of the roundabout.

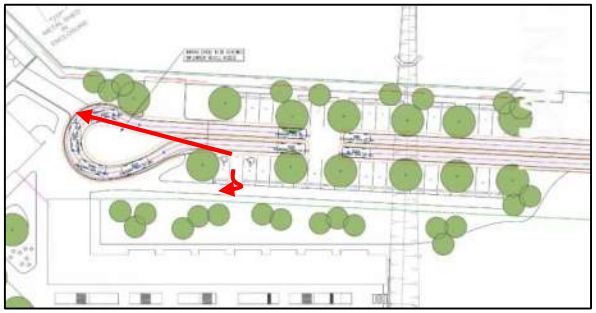
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
					
18. Vehicle Restrictions Roundabout	There are roads with no through route, turn around areas, or termination warnings provided at decision points. There are no vehicle restrictions provided where large vehicle turning paths are not provided to confirm access is achievable. There is a risk that a vehicle may enter a restricted road and undertake unsafe movements such as long reversing, U-turns, multiple point turns, or mounting pedestrian areas to exit out of the road resulting in pedestrian-vehicle collisions, collisions with other vehicles or roadside infrastructure. 	Occasional	Minor	Medium	Vehicle restriction signage will be reviewed and considered with the university, however large vehicles may be required to service the surrounding facilities. No Through Road signage may be suitable.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
					
19. Pedestrian Crossing DO-PU	The pedestrian crossing inside the DO-PU area has no lighting, no signage, no kerb ramp on the northern side, a tree blocking sight from the northern side and requires a pedestrian to cross 2 lanes of approaching traffic. There is a risk that an approaching motorist may not sight a pedestrian stepping out into the travel lane resulting in pedestrian-vehicle collisions. There is a risk that a parked vehicle may restrict sight between a through vehicle and a pedestrian resulting in pedestrian-vehicle collisions. 	Probable	Serious	Intolerable	Zebra crossing to be deleted to avoid confusion, signage and line marking for PUDO vehicles and tree to be reviewed.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
20. Delineation DO-PU	There is insufficient delineation provided to advise motorists of the proposed entry/access points, lane configuration and parking areas. There is a risk that a motorist may not comprehend the proposed arrangement and attempt unsafe manoeuvres including U-turns, 3 point turns, long reversing movements, angled parking or stopping in unsafe locations resulting in pedestrian-vehicle collisions, vehicle sideswipe collisions or impacts with roadside infrastructure.  	Probable	Minor	High	Signage and line marking plan under development. One-way circulating system including 'No Entry' signage will be provided. Wide driveway (multiple lanes across) are required to facilitate bus/coach movements but can be line marked to a narrower access for typical car usage.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
21. Large Vehicle Angle DO-PU	The provided turn paths for the large vehicle in the DO-PU facility indicates the vehicle cannot pull up parallel to the kerb, particularly at mid/rear doors. There is a risk that large vehicle may pull up a significant distance from the kerb and require a pedestrian to step across a wide gap or step down onto the road and up to the bus/kerb resulting in trip-fall injuries. There is a risk that a stopped bus may partially block the through lane, encouraging a motorist to travel around the bus in close proximity to a pedestrian crossing, resulting in pedestrian-vehicle collisions.  	Probable	Limited	Medium	Acknowledged that some blockages may occur for the largest vehicles. Buses to be encouraged to use Vines Drive bus stop wherever possible. Buses may be required to manoeuvre to be parallel / closer to the kerb.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
22. Large Vehicle Turning DO-PU	The provided turning paths show a large vehicle requiring oncoming travel lanes to exit the DO-PU area in close proximity to intersections and pedestrian crossings. It is unclear to the audit team of the proposed timing of small vehicles and large vehicles using the DO-PU area. There is a risk that a turning vehicle may impact a pedestrian or an oncoming/turning/queued vehicle. 	Occasional	Minor	Medium	Frequency of buses is expected to be very low, and not at times when car usage for the drop-off and pick-up area is occurring. Acknowledged that large vehicles may need to use the full carriageway of Vines Drive; visibility in this area is generally good. Pedestrian crossing to be deleted to avoid conflict of priority.
23. Pedestrian Access Southern Parking	It is unclear to the audit team of the proposed pedestrian access from parking spaces to facilities, particularly for the northern side. There is a risk that a pedestrian may travel along vehicle lanes resulting in pedestrian-vehicle collisions. 	Improbable	Minor	Low	Footpath is provided along southern side of car park. Some pedestrian activity through the car park aisle may occur.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
24. Disabled Access Southern Parking	It is unclear to the audit team of disabled access from disabled parking spaces to facilities, particularly at kerbs and paths. There is a risk that a disabled pedestrian may trip/fall at the kerb or may attempt to access the path at another location and enter the circulating aisle/ access road resulting in pedestrian-vehicle collisions. 	Improbable	Minor	Low	Flush path or kerb ramp to be provided from accessible spaces.

10 Formal Statement

We, the undersigned, declare that we have reviewed the site and data listed in this report and identified the safety and operational deficiencies above.

It should be noted that while every effort has been made to identify potential safety hazards, no guarantee could be made that every deficiency has been identified.

A project sponsor is under no obligation to accept the findings outlined in this audit report. This report simply provides the opportunity to review potential safety issues highlighted by the auditors.

This audit will be recorded on the NSW Register of Road Safety Auditors and the project sponsor should expect email notification from the register to confirm the audit has been carried out.

We recommend that points of concern be investigated, and necessary corrective actions undertaken.

Aaron Walton
Level 3 Road Safety Auditor
Team Leader

Mark Keech
Level 3 Road Safety Auditor
Team Member

Appendix F – Proposed Concept Design of Vines Drive

This drawing is copyright and is the property of TAYLOR THOMSON WHITTING (NSW) Pty Ltd and must not be used without authorisation.

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C01

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

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Rev	Description	Eng	Draft	Date
P2	PRELIMINARY	DM	DM	29.10.21
P1	PRELIMINARY	DM	DM	27.10.21

Principal
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PH: (02) 9902 4700

Engineer
TTW Structural Civil Traffic Façade
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Project
HAWKESBURY CENTRE OF EXCELLENCE - VINES DRIVE WIDENING

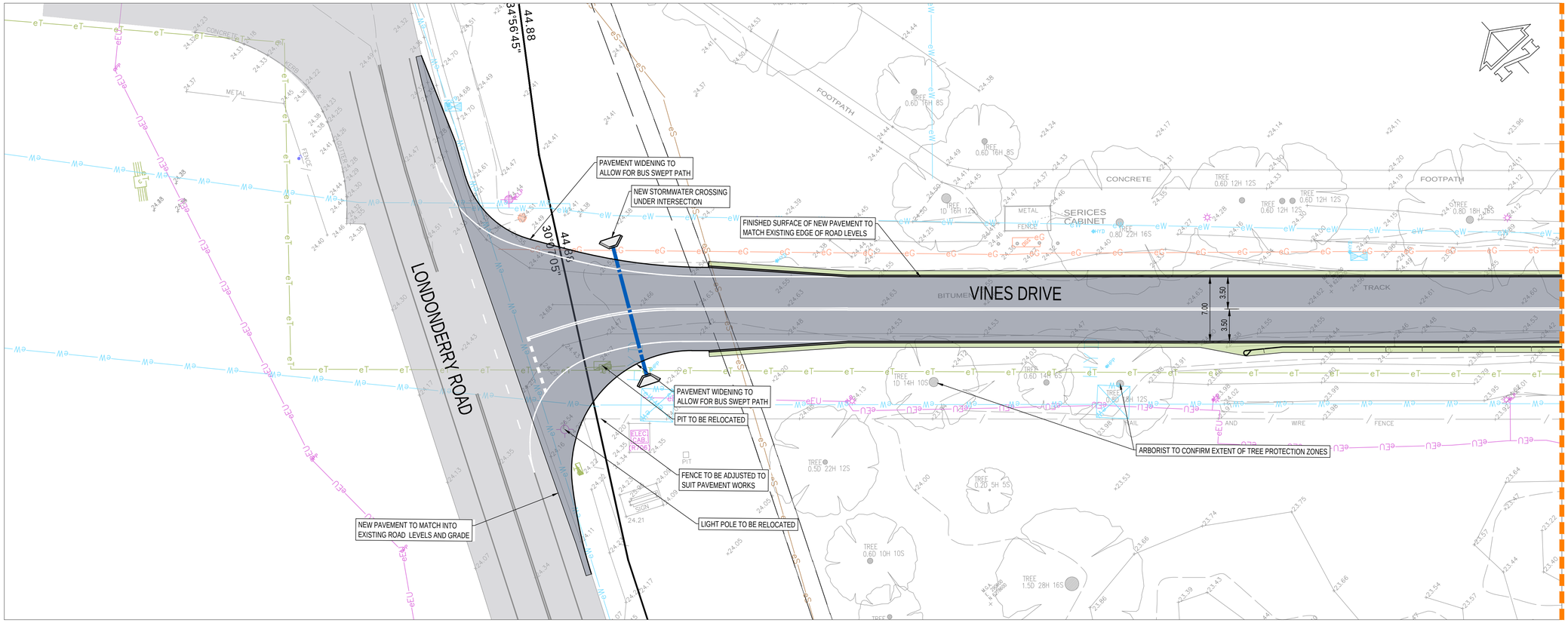
Sheet Subject
GENERAL ARRANGEMENT OVERVIEW PLAN

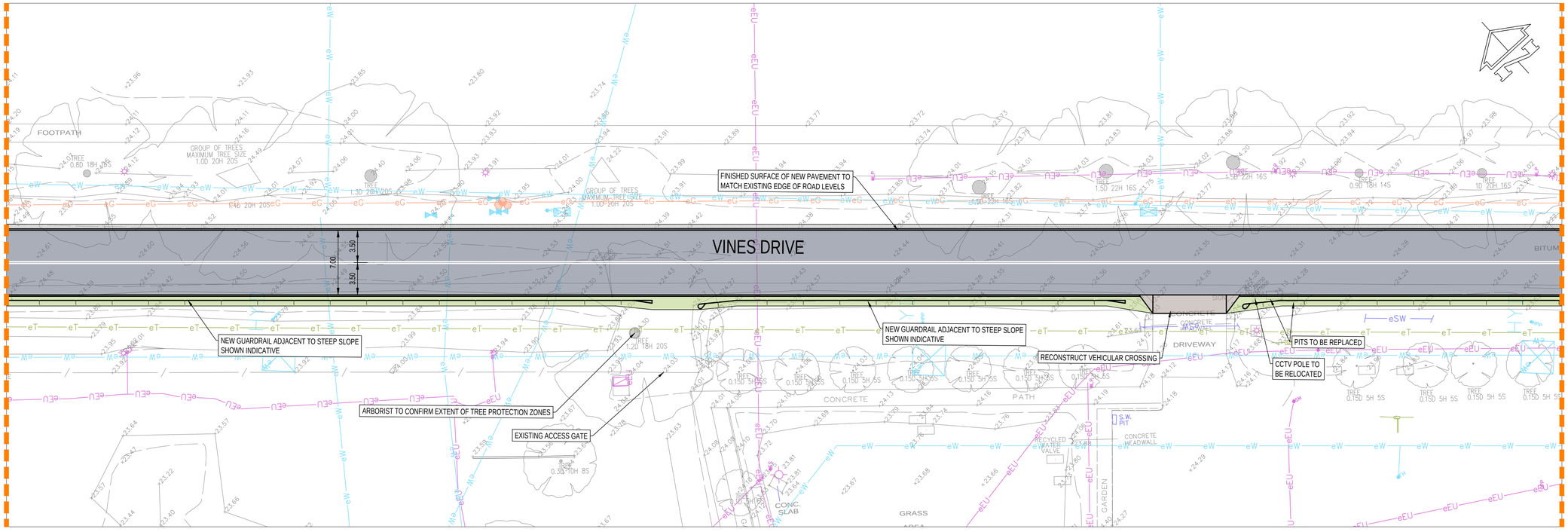
Scale : A1	Drawn	Authorised
SCALE 1:1250	JH	SB

Job No	Drawing No	Revision
211091	C30	P2

Plot File Created: Oct 29, 2021 - 9:30am

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C01





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PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

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Rev	Description	Eng	Draft	Date
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P3	PRELIMINARY	DM	DM	21.10.21
P2	PRELIMINARY	DM	DM	15.10.21
P1	PRELIMINARY	DM	DM	08.10.21

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Project
HAWKESBURY CENTRE OF EXCELLENCE - VINES DRIVE WIDENING

Sheet Subject
GENERAL ARRANGEMENT PLAN SHEET 1

Scale : A1	Drawn	Authorised
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Job No	Drawing No	Revision
211091	C31	P4

Plot File Created: Oct 29, 2021 - 9:30am

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C01

FOR CONTINUATION REFER PREVIOUS SHEET

FOR CONTINUATION REFER BELOW

HORTICULTURE ROAD

RECONSTRUCT VEHICULAR CROSSING

FINISHED SURFACE OF NEW PAVEMENT TO MATCH EXISTING EDGE OF ROAD LEVELS

RECONSTRUCT VEHICULAR CROSSING

VINES DRIVE

BITUMEN 7.00 3.50 3.50

TRACK

BRICK PAVING

GARDEN

GRASSED AREA

NEW GUARDRAIL ADJACENT TO STEEP SLOPE SHOWN INDICATIVE

CCTV POLE TO BE RELOCATED

PITS TO BE REPLACED

NEW KERB RAMP

PIT TO BE REPLACED

PIT TO BE REPLACED

NEW GUARDRAIL ADJACENT TO STEEP SLOPE SHOWN INDICATIVE

CONSTRUCT NEW 75mm HIGH RAISED PEDESTRAIN CROSSING

PIT TO BE REPLACED

RECONSTRUCT VEHICULAR CROSSING

HYDRANT BOOSTER

FOR CONTINUATION REFER ABOVE

YARRAMUNDI ROAD

FINISHED SURFACE OF NEW PAVEMENT TO MATCH EXISTING EDGE OF ROAD LEVELS

NEW PIT AND PIPE STORMWATER INFRASTRUCTURE

RECONSTRUCT VEHICULAR CROSSING

CONSTRUCT NEW 75mm HIGH RAISED PEDESTRAIN CROSSING

PIT TO BE REPLACED

VINES DRIVE

BITUMEN 7.00 3.50 3.50 3.00

GRASSED AREA

GARDEN

BRICK PAVING

PIT TO BE REPLACED

PIT TO BE RETAINED

RECONSTRUCT VEHICULAR CROSSING

HYDRANT BOOSTER

NEW BUS BAY TO BE CONSTRUCTED

EXISTING BUS SHELTER TO BE RETAINED. ADDITONAL BUS SHELTERS TO BE CONSTRUCTED

BUILDING N34

ELECTRICAL POLE TO BE RETAINED

NEW CONCRETE PAVEMENT TO MATCH INTO EXISTING

PIT TO BE REPLACED

ELECTRICAL POLE TO BE RELOCATED

HEADWALL TO BE REPLACED

ELECTRICAL POLE TO BE RETAINED

TOP OF NEW KERB TO MATCH INTO EXISTING FOOTPATH LEVELS

UPGRADE EXISTING GRATED INLET PIT

CONSTRUCT NEW 100mm HIGH RAISED PEDESTRAIN CROSSING

SIGNS TO BE RELOCATED

PITS TO BE REPLACED

2.00

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1:250 A1 1:500 A3

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

FileName: C32.dwg - USER: dunnorm - Plot File Created: Oct. 29, 2021 - 9:30am

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date
P4	PRELIMINARY	DM	DM	29.10.21
P3	PRELIMINARY	DM	DM	21.10.21
P2	PRELIMINARY	DM	DM	15.10.21
P1	PRELIMINARY	DM	DM	08.10.21

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Engineer
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612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Project
HAWKESBURY CENTRE OF EXCELLENCE - VINES DRIVE WIDENING

Sheet Subject
GENERAL ARRANGEMENT PLAN SHEET 2

Scale : A1	Drawn	Authorised
1:250	JH	SB

Job No	Drawing No	Revision
211091	C32	P4

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THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C01

FOR CONTINUATION REFER PREVIOUS SHEET

FOR CONTINUATION REFER NEXT SHEET

VINES DRIVE

STABLE SQAURE PLACE

PROPOSED PEDESTRIAN CROSSING INDICATIVE SHOWN

RECONSTRUCT VEHICULAR CROSSING

PIT TO BE REPLACED

RECONSTRUCT VEHICULAR CROSSING

PROPOSED PEDESTRAIN CROSSING SHOWN INDICATIVE

RECONSTRUCT ON-GRADE PEDESTRAIN CROSSING

PITS TO BE REPLACED

NEW CONCRETE FOOTPATH

PIT TO BE REPLACED

SIGNS TO BE RELOCATED

NEW KERB RAMP

NEW FOOTPATH CONNECTION

NEW PIT AND PIPE STORMWATER INFRASTRUCTURE

SIGN POST TO BE RELOCATED

NEW KERB RAMP

SWALE DIVERSION TO PIPED SYSTEM

RECONSTRUCT VEHICULAR CROSSING TO SUIT

NEW KERB RAMP

PROPOSED CENTRE OF EXCELLENCE DEVELOPMENT SITE

"J4" SINGLE STOREY BRICK BUILDING

J18 SINGLE STOREY WEATHERBOARD BUILDING

"J2" GLASS HOUSE

GLASS HOUSE "J1"

GRASSED AREA

BITUMEN

TRACK

CONCRETE PATHWAY

CONCRETE HEADWALL

DRIVEWAY

CARPARK

KERB & GUTTER

CONCRETE

POST

WIRE

FENCE

HYD

WATER TANK

WATER TANK

0 2.5 5 7.5 10 12.5 15 17.5 20m

1:250 A1 1:500 A3

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

FileName: C33.dwg – USER: duncanm – Plot File Created: Oct 29, 2021 - 9:30am

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date
P4	PRELIMINARY	DM	DM	29.10.21
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P2	PRELIMINARY	DM	DM	15.10.21
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Project
HAWKESBURY CENTRE OF EXCELLENCE - VINES DRIVE WIDENING

Sheet Subject
GENERAL ARRANGEMENT PLAN SHEET 3

Scale : A1	Drawn	Authorised
1:250	JH	SB

Job No	Drawing No	Revision
211091	C33	P4

Plot File Created: Oct 29, 2021 - 9:30am

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C01

FOR CONTINUATION REFER PREVIOUS SHEET

VINES DRIVE

RESOURCES ROAD

CLYDESDALE LANE

MAINTENANCE LANE

D.P.1051798

2

RECONSTRUCT ON-GRADE PEDESTRAIN CROSSING

FINISHED SURFACE OF NEW PAVEMENT TO MATCH EXISTING EDGE OF ROAD LEVELS

CONSTRUCT NEW 75mm RAISED PEDESTRAIN CROSSING

NEW KERB RAMP

RECONSTRUCT VEHICULAR CROSSING

MATCH INTO EXISTING ROAD PAVEMENT

PIT TO BE RELOCATED

NEW 15m RADIUS ROUNDABOUT TO SUIT BUS TURN AROUND

NEW PIT AND PIPE STORMWATER INFRASTRUCTURE

TREE TO BE REMOVED

PIT TO BE RELOCATED

HYDRANT TO BE RELOCATED

PIT TO BE RELOCATED

STORMWATER ASSETS TO BE RECONSTRUCTED

TREE TO BE REMOVED PENDING ARBORIST ADVICE

TREES TO BE REMOVED PENDING ARBORIST ADVICE

ROAD WIDENING TO ALLOW FOR TWO-WAY TRAFFIC

ARBORIST TO CONFIRM EXTENT OF TREE PROTECTION ZONES

MATCH INTO EXISTING ROAD PAVEMENT

EXISTING PAVEMENT TO BE RETAINED OR PROVIDE MILL & RESHEET

EXISTING NARROW ROAD TO FUNCTION AS SHARED TRAFFIC LANE

"J4" SINGLE STOREY BRICK BUILDING

"J2" GLASS HOUSE

FOR CONTINUATION REFER NEXT SHEET

0 2.5 5 7.5 10 12.5 15 17.5 20m

1:250 A1 1:500 A3

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

FileName: C34.dwg – USER: duncanm – Plot File Created: Oct 29, 2021 - 9:30am

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date
P4	PRELIMINARY	DM	DM	29.10.21
P3	PRELIMINARY	DM	DM	21.10.21
P2	PRELIMINARY	DM	DM	15.10.21
P1	PRELIMINARY	DM	DM	08.10.21

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Project
HAWKESBURY CENTRE OF EXCELLENCE - VINES DRIVE WIDENING

Sheet Subject
GENERAL ARRANGEMENT PLAN SHEET 4

Scale : A1	Drawn	Authorised
1:250	JH	SB

Job No	Drawing No	Revision
211091	C34	P4

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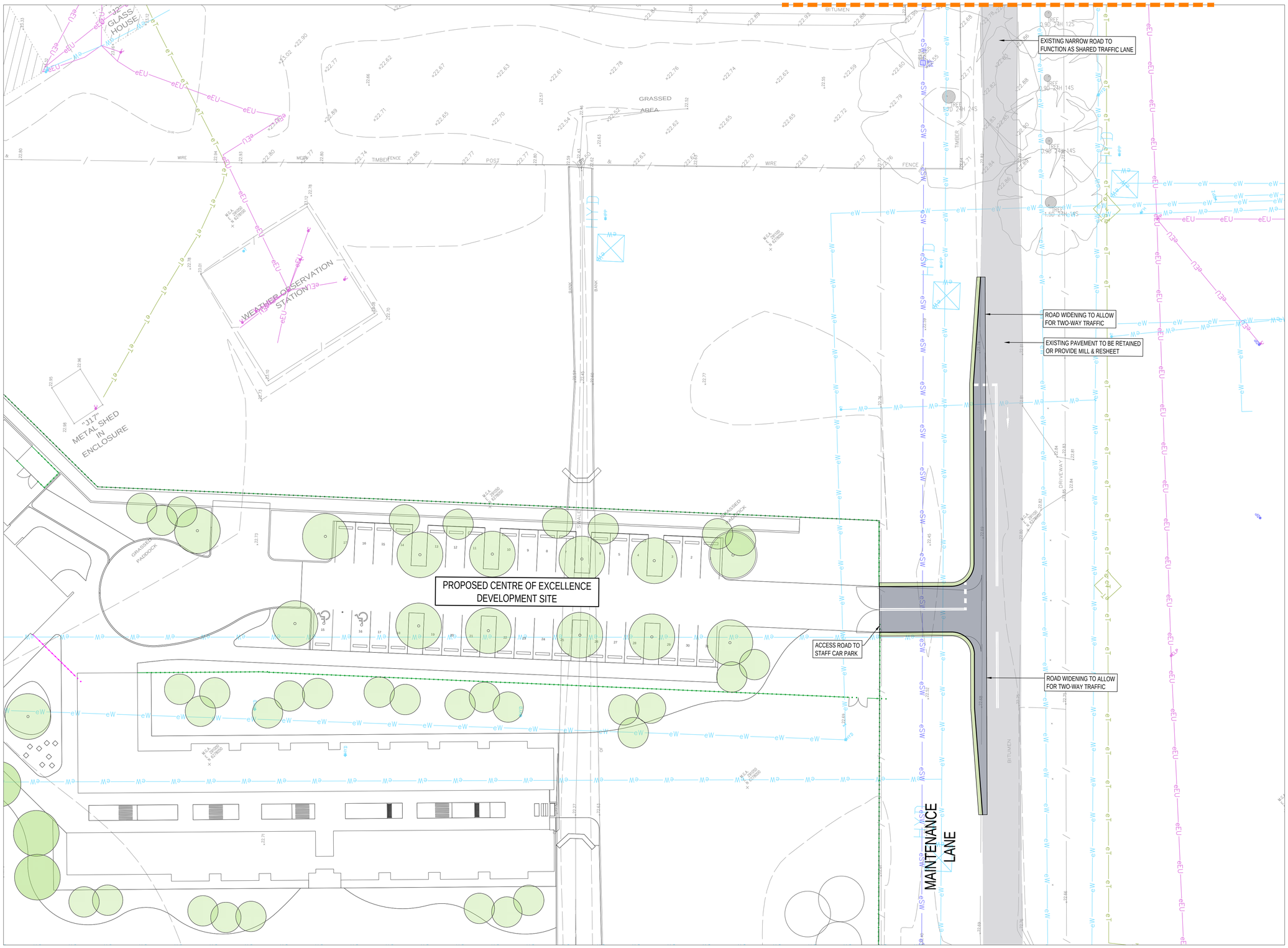
FOR CONTINUATION REFER PREVIOUS SHEET



PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

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P2	PRELIMINARY	DM	DM	15.10.21
P1	PRELIMINARY	DM	DM	08.10.21

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Project
HAWKESBURY CENTRE OF EXCELLENCE - VINES DRIVE WIDENING

Sheet Subject
GENERAL ARRANGEMENT PLAN SHEET 5

Scale : A1	Drawn	Authorised
AS SHOWN	JH	SB

Job No	Drawing No	Revision
211091	C35	P4

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