WestConnex M4-M5 Link Mainline Tunnels – Modification 7: Northcote Street Cul-de-sac

Modification Report April 2022 **BLANK PAGE**

Transport for NSW

WestConnex M4-M5 Link Mainline Tunnels – Northcote Street Cul-de-sac Modification Report April 2022

Prepared for Transport for New South Wales

Prepared by Acciona Samsung Bouygues Joint Venture (ASBJV)

Introduction

The M4-M5 Link project (the project) is part of the WestConnex program of works that, together with the proposed Sydney Gateway, will facilitate improved connections between western Sydney, Sydney Airport and Port Botany, and south and south-west Sydney, as well as better connectivity between the important economic centres along Sydney's Global Economic Corridor and through local communities.

The project includes the construction and operation of a new multi-lane road link between the M4 Motorway at Haberfield and the M8 Motorway at St Peters, an interchange at Lilyfield and Rozelle (the Rozelle Interchange) and a tunnel connection between Anzac Bridge and Victoria Road, east of Iron Cove Bridge (Iron Cove Link).

Approval for the construction and operation of the project was granted on 17 April 2018 by the NSW Minister for Planning (application number SSI 7485).

The EIS describes construction and operation of the Project in two stages.

- Stage 1 (also commonly referred to as Stage 3A of the WestConnex program of works or as the Mainline Tunnels), as described in the EIS, included construction of the Mainline Tunnels between the M4 Motorway at Haberfield and the M8 Motorway at St Peters. These works commenced in 2018 with the Mainline Tunnels scheduled to open to traffic in 2023.
- Stage 2 (also commonly referred to as Stage 3B of the WestConnex program of works or the Rozelle Interchange), as described in the EIS, included construction of the Rozelle Interchange and Iron Cove Link including connection to the stub tunnels at the Inner West subsurface interchange, connection to the surface road network at Lilyfield and Rozelle. It also included the construction of tunnels, ramps and associated infrastructure as part of the Rozelle Interchange to provide connections to the proposed future Western Harbour Tunnel and Beaches Link project.

Proposed Modification

This report has been prepared to support a modification to the existing project approval for the M4-M5 Link.

Currently, the intersection at Northcote Street and Parramatta Road, Haberfield, is temporarily closed turning it into a 'no through' road, as approved and completed under the M4 East Project Environmental Impact Statement (EIS) (AECOM, GHC 2015). Its continued closure during the construction of the M4-M5 Link Mainline Tunnels Project was approved under the M4-M5 Link EIS (AECOM 2018) (Project EIS). Following the completion of construction, Northcote Street would be reinstated to its original alignment.

The proposed modification relates to Stage 1 of the approved project and involves closing the Northcote Street and Parramatta Road intersection to vehicles, consistent with the current construction-phase arrangement, leaving it in a cul-de-sac arrangement with pedestrian/ cyclist access.

Given the current intersection arrangement will be maintained, the proposal would require minimal work and would generally include:

- Constructing an asphalt pavement.
- Installing fencing, vehicle bollards and swing gates.
- Modification to the existing stormwater drainage (if required).
- Continuing the concrete pedestrian footpath along Parramatta Road.
- Minor landscaping and street furniture.

As this was not included in the Project EIS, a modification is required to seek approval for this change.

Overall, the proposed modification has been identified as having positive impacts within the community by:

- 1. reducing traffic flow through Northcote Street,
- 2. eliminating the potential 'rat-run' between Parramatta Road and Wattle Street, Haberfield,
- 3. offers improved safety outcomes for both vehicles and pedestrians using Northcote Street.

The proposed modification, its justification and assessment of the potential environmental impacts on the proposal, are provided in this report.

Community and stakeholder consultation

The consultation activities carried out for the proposed modification include:

- Stakeholders in the vicinity of the Northcote Street civil and tunnel site between Parramatta Road and Martin Street, Haberfield were provided community notifications to ensure they were aware of the proposed modification and understand how to make a submission;
- Consultation via doorknocks were not possible for the proposed modification due to the Covid-19 outbreak in Greater Sydney;
- Meetings with Inner West Council.

If approved, communication and consultation with stakeholders and the community would continue for the proposed modification and would include providing updates on construction activities and program, responding to enquiries and concerns in a timely manner and minimising potential impacts where possible.

Environmental assessment

Potential environmental impacts associated with the proposed modification have been assessed and compared to the environmental impacts assessed in the EIS. Key environmental impacts for the proposed modification are summarised below.

Traffic and transport

- Based on a traffic assessment undertaken over April and May 2021, the proposed cul-desac arrangement for Northcote Street is not expected to result in any adverse impact on traffic capacity and road network performance with key surrounding intersections continuing to operate satisfactorily during peak periods with no major safety issues presenting.
- A three-tonne limit is in place on Wolseley Street which restricts use of this local street by both Project and non-Project heavy vehicles.

- There is no impact predicted for public transport as Northcote Street is a local road.
- Given the relatively limited use of the interchange by cyclists due to the area not being a part of key commuter routes and the lack of connection to any east/west or north/south bicycle routes, in accordance with the M4-M5 Link EIS, no diversions are required.

Noise and vibration

- The potential construction noise impacts from the proposed modification are expected to be consistent with or less than that approved within the EIS. Impacts are estimated to be minimal, short-term with works undertaken primarily during standard construction hours.
- The proposed modification is unlikely to trigger a road traffic noise level increase as evidenced by the traffic review completed for this modification.
- The proposed modification is unlikely to affect the current outcomes of the M4 East and WCX3A ONVR.

Urban design

- The proposed modification would see the section of Northcote Street handed back to IWC as a public road (albeit closed to cars), with the remaining former Northcote Street civil and tunnel site (C3a) on either side of the road included as residual land to be managed by TfNSW in accordance with the approved M4 East Residual Land Management Plan (RLMP). The Project's RLMP will also be consistent with the M4 East RLMP and satisfy the requirements of the M4 East Legacy Project (as required under the M4 East approval).
- Potential urban design impacts associated with the proposed modification would therefore be effectively managed through the implementation of the management measures for the Project as detailed in the SPIR and CoA.

Land use and property

- Land use and property is not predicted to be impacted during the construction of the proposed modification with access to property maintained.
- The proposed modification would maximise the residual land handed back to TfNSW following the completion of construction. This will be managed in accordance with the approved M4 East RLMP. Land zoning of residual land would be consistent with pre-Project arrangements and be comprised of R2 Low Density Residential and B6 Enterprise Corridor as per the Ashfield LEP 2013.

Flooding and drainage

- Northcote Street is not located on flood prone land with survey confirming a 4% land gradient draining Southeast to North west towards the existing stormwater pits.
- Drainage for the residual land handed back to TfNSW will have adequate capacity for a 10year ARI event to manage stormwater runoff that flows towards Parramatta Road.
- The proposal does not require modification to the existing drainage however future development of residual land will consider potential flooding impacts. This would be subject to separate approvals.

Planning Approval and environmental management measures

No changes to the Planning Approval or the environmental management measures have been proposed to accommodate the proposed modification, other than to refer to this assessment in Planning Approval Conditions A1 and A2.

Contents

Ex	Executive Summaryiv					
Ab	brevi	ations and Glossary	.2			
1 Introduction						
	1.1	Purpose of report	.4			
	1.2	Overview of WestConnex	.4			
	1.3	M4-M5 Link Project	. 6			
	1.4	Modifications to WestConnex M4-M5 Link	. 8			
	1.5	Overview of modification	. 8			
2	Assessment process					
	2.1	Approval framework	10			
	2.2	Environmental planning instruments	10			
	2.3	Other NSW legislation	11			
	2.4	Commonwealth legislation	11			
3	Prop	oosed modification	12			
	3.1	Overview of the proposed modification	12			
	3.2	Approved project	12			
	3.3	Description of the proposed modification	15			
4	Stak	eholder Consultation	23			
	4.1	Overview	23			
	4.2	Community Consultation	23			
	4.3	Council Consultation	25			
5	Envi	ronmental Assessment	26			
	5.1	Scope of environmental assessment	26			
	5.2	Traffic and transport	26			
	5.3	Noise and vibration	31			
	5.4	Urban design	33			
	5.5	Property and land use	33			
	5.6	Flooding and drainage	34			
6	Con	ditions of approval	35			
	6.1	Conditions to be amended or removed	35			
7	Envi	ronmental management measures	37			
8	Con	clusion	38			

Appendices

- Appendix A Secretary's environmental assessment requirements and checklist
- Appendix B Northcote Street Indicative Imagery of Pedestrian Link
- Appendix C Northcote Street Cul-de-sac Traffic Assessment
- Appendix D Inner West Council Bicycle Routes

Tables

Table 5-1 CoA to be amended or	removed	35
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Figures

Figure 1-1 Overview of WestConnex and related projects	5
Figure 1-2 Overview of the M4-M5 Link Project as described in the EIS	7
Figure 3-1 Approved project arrangement at Northcote Street during construction	13
Figure 3-2 Approved project arrangement at Northcote Street during operation	14
Figure 3-3 Proposed alignment of Northcote Street	16
Figure 3-4 Northcote Street land use and zoning	18
Figure 3-5 - Indicative Northcote Street cul de sac design	20
Figure 3-6 Existing 3 tonne vehicle limit on Wolseley Street	21
Figure 3-7 Northcote Street Survey Data	22
Figure 4-1 Notification distribution area for the Northcote Street cul-de-sac	24
Figure 5-1 Locations of surveyed intersections	28
Figure 5-2 Transport for NSW (TfNSW) LoS Criteria	28
Figure 5-3 AM Peak hour results	29
Figure 5-4 PM Peak hour results	29
Figure 5-5 Saturday Peak hour results	29
Figure 5-6 Alternative route to Parramatta Road	31
Figure 5-7 Alternative route from Parramatta Road	31

Abbreviations and Glossary

Acronym	Definition			
ARI	Average Recurrence Interval			
ASBJV	Acciona Samsung Bouygues Joint Venture			
CEMP	Construction Environmental Management Plan			
СоА	NSW Minister for Planning's Conditions of Approval			
CNVIS	Construction Noise and Vibration Impact Statement			
CPAS	Construction Parking and Access Strategy			
CSSI	The Critical State Significant Infrastructure, as described in Schedule 1, the carrying out of which is approved under the terms of the SSI 7485 approval			
DECCW	Former NSW Department of Environment, Climate Change and Water			
DPIE	Department of Planning, Industry and Environment			
EIS	Environmental Impact Statement			
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)			
EPL	Environment Protection Licence			
IWC	Inner West Council			
LEP	Local Environment Plan			
LGA	Local Government Area			
NCA	Noise Catchment Area			
NSW	New South Wales			
NVMP	Noise and Vibration Management Sub-plan			
ONVR	Operational Noise and Vibration Review			
PMF	Probable Maximum Flood			
POEO Act	Protection of the Environment Operations Act 1997 (NSW)			
PREW	Parramatta Road East and West civil sites			
REMM	Revised Environmental Management Measure			
RLMP	Residual Land Management Plan			
RNP	NSW Road Noise Policy			

SEAR	Secretary's Environmental Assessment Requirements		
SEPP	State Environmental Planning Policies		
SPIR	Submissions and Preferred Infrastructure Report		
SSI	State Significant Infrastructure		
SWTC	Scope of Works and Technical Criteria		
TTAMP	Traffic, Transport and Access Management Sub-Plan		

1 Introduction

1.1 Purpose of report

This modification report provides the environmental assessment for the proposed modification to the M4-M5 Link project (the project) in accordance with section 5.25 of the Environmental Planning & Assessment Act 1979 (NSW) (EP&A Act). This report includes:

- An overview of the approved project
- A description of the proposed modification to the approved project
- An assessment of the potential environmental impacts of the proposed modification
- Details of the changes to the conditions of the project approval required by the proposed modification
- Details of the changes to the approved environmental management measures required by the proposed modification
- Justification for the proposed modification.

1.2 Overview of WestConnex

WestConnex is one of the NSW Government's key infrastructure projects. The WestConnex program of works and the proposed Sydney Gateway project will facilitate improved connections between western Sydney, Sydney Airport, Port Botany and south and south-western Sydney, as well as better connectivity between the important economic centres along Sydney's Global Economic Corridor and local communities.

Separate planning applications and assessments have been completed for each of the approved WestConnex projects. NSW Roads and Maritime Services (Roads and Maritime) is the proponent for the program of works.

An overview of the WestConnex program of works is provided in Figure 1-1 and includes:

- **M4 Widening** widening of the existing M4 Motorway from Parramatta to Homebush (open to traffic)
- **M4** extension of the M4 Motorway in tunnels between Homebush and Haberfield via Concord (open to traffic)
- King Georges Road Interchange Upgrade upgrade of the King Georges Road interchange between the M5 West and M5 East at Beverly Hills (open to traffic)
- **M8** duplication of the M5 East from King Georges Road at Beverly Hills with tunnels from Kingsgrove to a new interchange at St Peters (open to traffic)
- M4-M5 Link Mainline Tunnels connecting to the M4 at Haberfield and the M8 at St Peters (approved and under construction)
- M4-M5 Link Rozelle Interchange and Iron Cove Link (approved and under construction).



Figure 1-1 Overview of WestConnex and related projects

1.3 M4-M5 Link Project

Approval for the construction and operation of the project was granted on 17 April 2018 by the NSW Minister for Planning (application number SSI 7485). Figure 1-2 provides an overview of the approved project.

The Environmental Impact Statement (EIS) describes construction and operation of the approved project in two stages.

Stage 1 (also commonly referred to as Stage 3A of the WestConnex program of works or as the Mainline Tunnels), as described in the EIS included:

- Construction of the mainline tunnels between the M4 East Motorway at Haberfield and the New M5 Motorway at St Peters, stub tunnels to the Rozelle interchange (at the Inner West subsurface interchange) and ancillary infrastructure at the Darley Road motorway operations complex (MOC1), which was subsequently removed, and the Campbell Road motorway operations complex (MOC5),
- These works commenced in 2018 with the mainline tunnel anticipated, subject to planning approval, to be opened to traffic in 2022.

Stage 2 (also commonly referred to as Stage 3B of the WestConnex program of works or the Rozelle Interchange), as described in the EIS, included:

- Construction of the Rozelle Interchange and Iron Cove Link including connection to the stub tunnels at the Inner West subsurface interchange, connection to the surface road network at Lilyfield and Rozelle, and construction of tunnels, ramps and associated infrastructure as part of the Rozelle Interchange to provide connections to the proposed future Western Harbour Tunnel and Beaches Link project. Ancillary infrastructure will be provided at the Rozelle West motorway operations complex (MOC2), the Rozelle East motorway operations complex (MOC3) and the MOC4,
- Stage 2 works commenced in 2019 with these components of the project anticipated to be open to traffic in 2023.

A comprehensive description of the approved project, as well as other aspects of the WestConnex program of works, is provided within the EIS and the Submissions and Preferred Infrastructure Report (SPIR).



Figure 1-2 Overview of the M4-M5 Link Project as described in the EIS

1.4 Modifications to WestConnex M4-M5 Link

Following approval on 17 April 2018, Transport for NSW (TfNSW), formerly Roads and Maritime Services, submitted five modifications to the approved project under Section 5.25 of the EP&A Act. These modifications are:

- Modification 1: The modification related to Stage 1 of the approved project and was approved by the NSW Minister for Planning on 25 February 2019.
- Modification 2: The proposed modification related to Stage 2 of the approved project and was determined by the NSW Minister for Planning on 30 September 2020.
- Modification 3: The proposed modification related to Stage 2 of the approved project and was determined by the NSW Minister for Planning on 28 July 2020.
- Modification 4: The proposed modification related to Stage 2 of the approved project and was determined by the NSW Minister for Planning on 28 July 2020.
- Modification 5: The proposed modification related to Stage 1 and 2 of the approved project and was determined by the NSW Minister for Planning on 17 November 2020.
- Modification 6: The proposed modification relates to Stage 2 of the approved project and is still pending determination

A more comprehensive description of each modification is provided at the following webpage: <u>https://www.planningportal.nsw.gov.au/major-projects/project/3611.</u> This proposed modification (the subject of this report) is being assessed separately from the modifications listed above

1.5 Overview of modification

The proposed modification relates to Stage 1 of the approved project and involves leaving Northcote Street in Haberfield, NSW, as a cul-de-sac whilst maintaining pedestrian and cyclist access. The proposal will see Northcote Street left in its current construction-phase configuration of no left-in, left-out access at the Northcote Street and Parramatta Road intersection.

The following points provide an overview of the proposed modification:

- Northcote Street was a former 'through road' connecting Parramatta Road and Ramsay Street prior to the commencement of the WestConnex M4 project. The intersection of Northcote Street and Parramatta Road, inclusive of footpaths, was temporarily closed to facilitate the construction of the M4 East Northcote Street tunnel site (C7) as approved under the M4 East Infrastructure Approval (SSI 6307).
- As detailed in the M4-M5 Link project EIS (Project EIS), Northcote Street civil site was part
 of an optioneering proposal for construction ancillary facilities (otherwise referred to as
 Option C3a) and would be used primarily for parking and laydown. As a result, the
 temporary closure of the Northcote Street and Parramatta Road intersection was carried
 over from the M4 to the Mainline Tunnels Project (the Project). Under Modification 1, the
 site was approved as a 24/7 tunnelling site (Northcote Street civil and tunnel site (C3a)).
- As described in the Project EIS and Modification 1, the intent was to re-open Northcote Street to Parramatta Road at the completion of construction. The proposed modification would see Northcote Street left 'as is' whilst maintaining pedestrian and cyclist access at the intersection at Northcote Street and Parramatta Road. Refer to Figure 3-2 and Figure 3-3. The future development of this land and road reserve will be in accordance with the approved M4 East RLMP and managed by TfNSW and IWC.

In general, the proposed modification has been identified as having positive impacts within the community by:

- Reducing traffic flow through Northcote Street;
- Eliminating a potential 'rat-run' between Parramatta Road and Wattle Street, Haberfield; and
- Offers improved safety outcomes for both vehicles and pedestrians using Northcote Street.

2 Assessment process

2.1 Approval framework

2.1.1 Project approval

The project was declared as State Significant Infrastructure (SSI) and Critical State Significant Infrastructure (critical SSI) and was therefore assessed and approved under Part 5 of the Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act). An EIS was prepared and placed on public exhibition from 18 August to 16 October 2017.

Following the public exhibition, over 13,000 submissions were received from the community and from NSW Government agencies and local councils. A Submissions and Preferred Infrastructure Report (SPIR) was produced to document the responses to the issues raised and to assess design changes in response to the submissions received. The SPIR was lodged with the NSW Department of Planning, Industry and Environment (DPIE) in January 2018.

Planning approval was granted by the NSW Minister for Planning on 17 April 2018 (application number SSI 7485) and was subject to a number of conditions relating to the construction and operation of the project.

TfNSW has since submitted five modifications under Section 5.25 of the EP&A Act (refer to Section 1.4)

2.1.2 Modification application

TfNSW as the Proponent for the project, is proposing to modify project planning approval SSI 7485 under Section 5.25 of the EP&A Act, which states that "the proponent may request the Minister to modify the Minister's approval for State Significant Infrastructure. The Minister's approval for a modification is not required if the infrastructure as modified will be consistent with the existing approval under this Division".

Section 5.25(3) states that "the request for the Minister's approval is to be lodged with the Planning Secretary. The Planning Secretary may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister". Section 5.25(4) states that "the Minister may modify the approval (with or without conditions) or disapprove of the modification".

The proposed modification would require the modification of Conditions of Approval A1 and A2. The proposed changes in the context of the Conditions of Approval are discussed further in Section 6.

2.2 Environmental planning instruments

Section 2.2 of the EIS provides an overview of the environmental planning instruments (EPIs) relevant to the project. This section notes that "*in general, Section 115ZF(2) of the EP&A Act* (now Section 5.22(2)) *excludes the application of environmental planning instruments to SSI projects except as those instruments apply to the declaration of SSI or critical SSI*". Nevertheless, a review of Section 2.2 of the EIS has confirmed that the EPIs relevant to the project remain valid for this modification application and as such it has not been repeated below.

A review of current EPIs identified that two new State Environmental Planning Policies (SEPPs) have been gazetted since lodgement of the EIS for the project. These are the State Environmental Planning Policy (Vegetation in Non Rural Areas) 2017 (Vegetation SEPP) and the State

Environmental Planning Policy (Coastal Management) 2018 (Coastal SEPP). A review of these SEPPs confirmed that the Vegetation SEPP is not relevant for the modification application as no vegetation is likely to be impacted as a result of this proposed modification. The Coastal SEPP is also not relevant as the proposed modification is located on land where the SEPP does not apply.

2.3 Other NSW legislation

Section 2.3 of the EIS provides an overview of the other NSW legislation relevant to the project. A review of Section 2.3 of the EIS has confirmed that the discussion of the other NSW legislation relevant to the project remains valid for this modification application and as such it has not been repeated below. This includes the need for an Environment Protection Licence (EPL) under Chapter 3 of the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act). In accordance with clause 35 of Schedule 1 of the POEO Act, an EPL would be required for construction of the project.

The Roads Act 1993 (NSW) is relevant to the proposed modification as, under Section 72 clause 1(b) notes, "TfNSW may carry out road work on unclassified roads if, in the opinion of TfNSW, the carrying out of the work would be of benefit to classified roads in the vicinity of the road on which the work is being carried out."

All works conducted under Section 72 clause 1(b) would be subject to 'Applications for Consent' under Section 116 of *the Roads Act 1993* (NSW).

2.4 Commonwealth legislation

Section 2.4 of the EIS provides an overview of Commonwealth legislation that is relevant to the project. It considered the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act) and the Airports Act 1996 (Commonwealth).

Consistent with the approved project described in the EIS and SPIR, the nature of the activities associated with the proposed modification means that no matters of national environmental significance are likely to be impacted. As such, the modification application has not been referred to the Australian Government Department of the Environment and Energy for further assessment or approval under the EPBC Act.

The modification works would also not involve any changes to the design and operation of the mainline tunnels including any of the ventilation facilities, and therefore would not affect the air quality assessment in the EIS for the project. As such the modification activities would not be a controlled activity as defined in section 183 of the Airports Act 1996 (Commonwealth).

3 Proposed modification

3.1 Overview of the proposed modification

The proposed modification would see Northcote Street left 'as is' in a cul-de-sac arrangement, whilst maintaining pedestrian and cyclist access at the intersection at Northcote Street and Parramatta Road.

The modification is proposed to:

- Reduce traffic flow on Northcote Street;
- Eliminate a potential 'rat-run' between Parramatta Road and Wattle Street, Haberfield;
- Improve safety outcomes for both local vehicles and pedestrians using Northcote Street.

These benefits are proposed to be recognised with the modified alignment of the Northcote Street and Parramatta Road intersection, and the diversion of traffic to the surrounding road network.

The proposed modification would see the section of Northcote Street handed back to IWC as a public road (albeit closed to cars), with the remaining former Northcote Street civil and tunnel site (C3a) on either side of the road included as residual land to be managed by TfNSW in accordance with the approved M4 East Residual Land Management Plan (RLMP).

3.2 Approved project

The approved project presented in the EIS allows the closure of Northcote Street during construction, with the Northcote Street site occupying around 100 metres of Northcote Street east of Parramatta Road. The initial closure of Northcote Street was completed as part of the site establishment works undertaken as part of the M4 East Infrastructure Approval (SSI 6307) in May 2016. This closure was assessed under the M4 East EIS traffic assessment (Section 7.4.4 of Appendix G, (AECOM, GHD 2015) as having limited impacts to road users given its low traffic volumes and the availability of alternate routes such as Wolseley St and Ash Lane.

The continued use of the M4 East ancillary facility as a civil construction site for the M4-M5 Link Project was approved under the Project EIS (AECOM 2018). Following the determination of Modification 1 on 25 February 2019, the use of the Northcote Street site for tunnelling operations was approved, herein referred to as Northcote Street civil and tunnel site (shown in Figure 3-1).

At the completion of construction, the EIS stated that Northcote Street would be reopened to Parramatta Road and the Northcote Street civil and tunnel site would be handed back as residual land. Residual land would be managed by TfNSW in accordance with the M4 East Residual Land Management Plan (RLMP).

The reinstatement of the Northcote Street and Parramatta Road intersection would provide a left in and left out route for traffic as shown in Figure 3-2.





WestConnex M4-M5 Link Mainline Tunnels

Figure 3-2 Approved project arrangement at Northcote Street during operation

Legend:

Land subject to M4 East RLMP





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3.3 Description of the proposed modification

Two options for Northcote Street are available:

- <u>Option 1</u>: Reinstate Northcote Street and Parramatta Road to a left-in/left-out intersection in accordance with the approved Project EIS.
- <u>Option 2</u>: Leave Northcote Street in its current construction-phase (shown in Figure 3-3) arrangement as a no-through road from Parramatta Road to Ramsay Street.

The reinstatement of the Northcote Street and Parramatta Road intersection as proposed in Option 1, would provide a left-in and left-out route for traffic. This reinstated configuration has the potential to provide a "rat-run" route between Parramatta Road and Wattle Street in Haberfield, with increased traffic volumes negatively impacting on the amenity of the predominately residential street.

Additionally, given the extended duration of the Northcote Street closure, residents in the vicinity of the Project would have acclimatised to the change and any impacts associated with the road initially closing in 2016. The reinstatement of Northcote Street would therefore create another change for the already construction-fatigued community.

To alleviate the community impacts associated with the reopening of Northcote Street described above, the Project propose Option 2 as the preferred option.

The continued closure would see the portion of the Northcote Street, approximately 100m, that is currently part of the Northcote Street civil and tunnel site be handed back to IWC as public road, that is open to pedestrians and cyclist, however closed to cars.

Minor adjustments to the existing drainage may be required to satisfy the design requirements for Local Roads stipulated in the Scope of Works and Technical Criteria (SWTC) Appendix B.7 where drainage capacity must be suitable for a 10-year Average Recurrence Interval (ARI) event. The design of the residual land will also be in accordance with the Minister's Conditions of Approval (CoA) for the approved Project regarding local impacts to stormwater runoff and potential flooding impacts. It should be noted that, as confirmed with a stormwater asset engineer from IWC, the site is not located in a flood prone area with no flooding issues identified.

Minor amendments to kerbing and footpaths are required to ensure suitable pedestrian access. It was also confirmed, in consultation with IWC, that minor landscaping would be completed.

The remaining land comprising the Northcote Street civil and tunnel site will be handed back to TfNSW as permanent pavement in preparation for future development proposed under the M4 East approved RLMP. Future development would be subject to separate development assessment and approval.

Consistent with the EIS, pre-Project land zoning of B6 Enterprise Corridor and R2 Low Density Residential land zoning will be maintained and therefore align with the land use and development objectives of the area.



WestConnex M4-M5 Link Mainline Tunnels

Figure 3-3 Proposed alignment of Northcote Street

Legend:

Land subject to M4-M5 Link Mainline Tunnels RLMP





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3.3.1 Land Use

The proposed modification is located within a highly urbanised environment between Wattle Street and Wolseley Street in Haberfield, and is part of the greater Inner West Council Local Government Area (LGA).

The Ashfield Local Environmental Plan 2013 (Ashfield LEP) defines the land use zoning for this LGA and has zoned Northcote Street, inclusive of Northcote Street civil and tunnel site, as B6 Enterprise Corridor and R2 Low Density Residential as shown in Figure 3-4. This area is also listed in the Ashfield LEP as the 'Haberfield Heritage Conservation Area' and identified as having local heritage significance.

The objective of these zones is to promote businesses along main roads (i.e. Parramatta Road) and provide housing needs for the community within a low density residential environment. The land on which the modification is proposed is also subject to the Parramatta Road Corridor Urban Transformation Strategy (UrbanGrowth NSW 2016).

Sensitive receivers that surround the Northcote Street site comprise of residences, commercial properties such as car mechanics, and a place of worship.

There are no additional receivers identified in the Project EIS that will be impacted by the proposed modification.



WestConnex M4-M5 Link Mainline Tunnels

Figure 3-4 Northcote Street land use and zoning

Legend:

Northcote Street civil and tunnel site Ancillary Facility

B6 Enterprise Corridor

R2 Low Density Residential

SP2 Infrastructure



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3.3.2 Key features of the design

Constructability

If approved, the proposed modification would be delivered by Acciona Samsung Bouygues Joint Venture (ASBJV), which is a consortium comprising Acciona Infrastructure Projects Australia, Samsung C&T Corporation and Bouygues Construction Australia. ASBJV has been engaged by the Asset Trustee to design and construct the M4-M5 Link Mainline Tunnels project.

Key construction activities

As Northcote Street is already established as a 'no-through' road at the Parramatta Road intersection there would be minimal construction works associated with the proposed modification, if approved.

Construction work would include but not be limited to:

- Construction of asphalt pavement
- Installation of boundary fencing
- Installation of vehicle bollards and swing gates
- Recommissioning of existing stormwater drainage
- Modification to the existing stormwater drainage (if required)
- Construction of concrete pedestrian footpath along Parramatta Road
- Minor landscaping and street furniture

Refer to Figure 3-5 for an indicative design.

An artistic impression has been generated to show the indicative site concept plan of the proposed pedestrian link between Parramatta Road and Northcote Street. Refer to Appendix B Figure 1.

Finer indicative hard and soft landscaping details including planter box species been included in Appendix B Figure 2 and Figure 3 to provide greater visual aid of the proposed modification.

All species identified in these figures have been developed in consultation with IWC and are native to the Inner West.



These works will coincide with the indicative demobilisation program for the Northcote Street civil and tunnel site commencing in Q2 2022. Once demobilisation is complete, the site, excluding the road corridor which will be handed back to IWC, will be handed back to TfNSW for future development in accordance with the M4 East RLMP.

Access and local road usage

The proposed modification would not require additional property or land acquisition, as this was undertaken for the Northcote Street civil and tunnel site under the M4 East Project approval (SSI 6307).

Project construction vehicles will continue to use Northcote Street civil and tunnel site access and egress points established on Parramatta Road and Wattle Street as shown, in Figure 3-1, for the duration of the proposed construction.

Unless approved in the Project's Traffic, Transport and Access Management Plan (TTAMP), local roads will not be used by Project heavy vehicles. In addition, an existing three tonne vehicle limit, as imposed by Council, restricts the movement of heavy vehicles (both Project and non-Project) on Wolseley Street, between Parramatta Road and Ramsay Street as shown in Figure 3-6.



Figure 3-6 Existing 3 tonne vehicle limit on Wolseley Street

Drainage

Design contour information and survey data reviews show that the section of Northcote Street where the cul-de-sac is proposed has a 4% fall from southeast to northwest towards Parramatta Road.

Surface water will therefore naturally drain towards the proposed pavement surface of the residual land and discharge into the recommissioned drainage pits and network on Parramatta Road (refer to Figure 3-7).

To ensure the design has adequate capacity for a 10- year ARI event, in line with the design requirements for local roads, a swale drain is proposed for construction. This will capture any

overland flow from Northcote Street in a major storm event, noting that, as confirmed with a stormwater asset engineer from IWC, the site is not located in a flood prone area with no flooding issues identified



Consultation with the Inner West Council is in progress to finalise the design.

Figure 3-7 Northcote Street Survey Data

Utilities

Utility and service relocation investigations were completed for the Northcote Street civil and tunnel site during the site establishment phase of the Project. It is therefore not anticipated that any additional utility and service works would be required as a result of the proposed modification.

In the event that utility relocations are required, these will be undertaken in accordance with the approved Utilities Management Strategy and Construction Environmental Management Plan (CEMP).

4 Stakeholder Consultation

4.1 Overview

The project has undertaken preliminary consultation with DPE regarding the proposed modification. Consultation has also been undertaken with local residents, businesses and the Inner West Council on the proposed change. The IWC Local Traffic committee were also briefed on the proposed modification in September 2021.

4.2 Community Consultation

A notification outlining the proposal to leave Northcote Street in its current arrangement as a 'nothrough' road was distributed on 25 August 2021. The community was provided four weeks to respond, with feedback on the proposed change requested by 5pm 17 September 2021.

The notification was distributed to all properties on the following streets in Haberfield, as shown in Figure 4-1:

- Wolseley Street 31 residential properties, 1 commercial
- Northcote Street 49 residential properties
- Wattle Street 20 residential properties, 1 place of worship
- Ramsay Street 11 residential properties
- Cove Street 16 residential properties
- Martin Street 10 residential properties

Emails were sent to residents on Wolseley Street and Northcote Street on 16 September 2021 reminding them to submit feedback and extending the deadline for submissions until Monday 20 September 2021.

Consultation via doorknocks were not possible for the proposed modification due to the Covid-19 outbreak in Greater Sydney.



Figure 4-1 Notification distribution area for the Northcote Street cul-de-sac

Feedback summary

Responses from 62 residents were received via email and phone calls. Of those submissions, 41 came from Northcote Street, 13 from Wolsey Street, one from Cove Street, two from Wattle St and five from unknown addresses.

Feedback was generally supportive with 46 submissions in support and 16 submissions against the proposed modification.

Those in support of the Northcote Street cul-de-sac primarily came from Northcote Street with a petition signed by 24 households provided to ASBJV supporting the change. A letter of support was also received from the Inner West Councillor Vittoria Raciti.

Response against the proposed modification came primarily from residents on Wolseley Street and Cove Street due to concerns that the extended closure of Northcote Street could increase traffic on nearby roads. Respondents requested that any change on Northcote Street be mirrored on Wolseley Street to also restrict access from Parramatta Road.

Other observations received from the community on the broader traffic network included:

- The current no right turn arrangement from Ramsey Street southbound onto Wattle Street westbound promotes traffic to utilise Wolseley St to access Parramatta Road and Fredrick Street
- Heavy traffic at the Ramsay Street and Wattle Street intersection could promote rat-running on other local roads such as Wolseley Street

4.3 Council Consultation

An initial briefing on the proposal to continue the Northcote Street closure was held with Inner West Council (IWC) on the 10 of August 2021. At the meeting, the context of the proposal, preliminary concept design and approval process was tabled and presented by ASBJV.

No feedback was received on the initial briefing however further consideration regarding green space and future land use as per the approved RLMP were taken on notice.

It was raised by IWC that further discussions with the IWC traffic committee were required.

It should be noted that under Section 38B *Roads Act 1993,* the condition to advertise a proposed road closure to council for a submission period of 28 days is not required.

Northcote Street will remain a Public Road, albeit closed to traffic flows, and will be handed back to IWC zoned as a Public Road with continued pedestrian and cyclist access.

Subsequent feedback provided by and ongoing consultation with IWC has been undertaken throughout the design development for the residual land, including the provision of IWC's Standard Design Drawings.

5 Environmental Assessment

An environmental assessment of the proposed modification to Stage 1 of the project has been undertaken. The assessment identifies potential issues and provides a comparison with the impacts assessed in the EIS and SPIR for the approved project The assessment has been prepared to address the relevant Secretary's Environmental Assessment Requirements (SEARS) (AECOM 2017) for the modification as detailed in Appendix A – Secretary's Environmental Assessment Requirements (SEARS).

5.1 Scope of environmental assessment

The Project EIS (AECOM 2017) details the potential environmental impacts of the approved project and provides proposed environmental management measures to avoid or reduce potential environmental impacts during construction and operation of the M4-M5 Link Project. The Submissions and Preferred Infrastructure Report (SPIR) (AECOM 2018) includes revised environmental management measures (REMMs) to manage potential impacts and issues raised during the submissions process.

Management measures are also provided in the Minister's Instrument of Approval, and comprise administrative conditions, specific environmental conditions, environmental monitoring and auditing, compliance monitoring and tracking, community information, consultation and involvement, and environmental management. Should additional management measures be required for this modification, the Minster's CoA would need to be amended, as required.

The focus of this modification is the construction of a cul-de-sac at the Northcote Street Parramatta Road intersection. As such, only potential environmental impacts associated with the proposal have been assessed. These include:

- Traffic and transport;
- Noise and vibration;
- Urban design;
- Property and land use; and
- Flooding and drainage.

The aforementioned environmental issues of the proposed modification are addressed throughout this Section. Environmental issues that would not result in a change to the impact assessed in the M4-M5 Link Project EIS or subsequent Modifications are not discussed in this report.

5.2 Traffic and transport

5.2.1 Construction traffic impacts

Construction vehicle movements associated with the proposed Northcote Street works will be managed in accordance with the Project TTAMP and utilise the established access and egress points on Parramatta Road and Wattle St.

The Project TTAMP incorporates management measures relevant to traffic management from the EIS (Chapter 8 and Appendix H (*Technical working paper: Traffic and transport*) AECOM 2017) and SPIR.

As works will coincide with the Northcote Street civil and tunnel site demobilisation there will be no additional construction traffic impacts as a result of the proposed modification.

5.2.2 Operational traffic impacts

5.2.2.1 Traffic Impact Assessment

The Northcote Street Cul-de-sac would see no vehicle access to and from Parramatta Road. This is consistent with current construction traffic configuration that has been in place since 2015.

While a targeted traffic assessment on the initial Northcote Street temporary closure to vehicle traffic was not included within the M4 East EIS, it did note in Section 7.4.4 that "the bulk of road and lane closures are anticipated to have a limited impact on road users as they primarily impact local roads with low traffic volumes and/or those streets where land acquisition is taking place. Alternative routes could therefore be utilised with minimal impacts."

Further, an assessment to determine the Level of Service (LoS) of the surrounding network during the construction phase was conducted. TfNSW uses LoS as a measure of performance for all intersection types during weekday peak AM and PM and Saturday peak hours. The LoS ranges from LoS A to LoS F which is related to the average intersection delays experience by traffic travelling through the intersection. This assessment concluded that intersections surrounding Northcote Street had a low LoS (LoS E, F).

Under the M4-M5 Link MOD1, which approved the continued use of Northcote Street compound and the associated temporary closure of Northcote Street, traffic impacts were assessed using existing construction impact traffic models for the M4 East and M4-M5 link projects on the surrounding road network. This concluded that minimal to no change in LoS during M4-M5 link construction was likely.

To evaluate the long-term impacts of this proposed modification, a similar qualitative approach was taken to assess the traffic and safety impacts and ascertain the performance of key intersections in the absence of pre closure data. Refer to Appendix C.

Traffic survey data was collected at the following key intersections around the Northcote Street civil and tunnel site, as requested by IWC (refer to Figure 5-1):

- Parramatta Road/ Wolseley Street
- Ramsay Street/ Wolseley Street
- Ramsay Street/ Northcote Street
- Wattle Street/ Ash Lane.



Figure 5-1 Locations of surveyed intersections

The data was collected during a one-week period over April and May 2021 prior to the Greater Sydney COVID-19 lockdown to ascertain the existing performance and LoS of these intersections during peak AM and PM periods with the Northcote Street temporarily closed to vehicle traffic. Refer Figure **5-2**.

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

Figure 5-2 Transport for NSW (TfNSW) LoS Criteria

The modelling during the AM and PM weekday and Saturday peak periods concluded a level of service of LoS C and above at each intersection. Refer to Figure 5-3 **Figure 5-4** and Figure 5-5.
Intersection		Queue Length				
	Control	Surveyed Average (veh)	Modelled Average (veh)	Modelled 95 th Percentile (m)	Average Delay (sec)	LoS
Parramatta Rd - Wolseley St	Priority	0.63	0.7	12.3	22	В
Ramsay St - Wolseley St	Priority	0.07	0.0	0.6	37	С
Ramsay St - Northcote St	Priority	0.03	0.0	0.3	27	В
Wattle St - Ash Ln	Priority	0.02	0.0	0.3	9	A

Figure 5-3 AM Peak hour results

Intersection		Queve Length				
	Control	Surveyed Average (veh)	Modelled Average (veh)	Modelled 95 th Percentile (m)	Average Delay (sec)	LoS
Parramatta Rd - Wolseley St	Priority	1.48	1,5	26,1	26	В
Ramsay St - Wolseley St	Priority	187	0.1	0.2	40	С
Ramsay St - Northcote St	Priority	0.02	0.0	0.3	26	В
Wattle St - Ash Ln	Priority	0.07	0.0	0.6	9	A

Figure 5-4 PM Peak hour results

Intersection		Queue Length				
	Control	Surveyed Average (veh)	Modelled Average (veh)	Modelled 95 th Percentile (m)	(sec)	LoS
Parramatta Rd - Wolseley St	Priority	1.65	1.7	29.9	42	С
Ramsay St - Wolseley St	Priority	0.00	0.0	0.6	41	С
Ramsay St - Northcote St	Priority	0.03	0.0	0.1	23	В
Wattle St - Ash Ln	Priority	0.03	0.0	0.4	9	А

Figure 5-5 Saturday Peak hour results

More specifically, the LoS at the Wolseley St/ Parramatta Road intersection is classified as LoS B and the Wolseley St/ Ramsay St intersection is classified as LoS C confirming that the surrounding road network operates satisfactory with the existing Northcote Street closure to vehicle traffic.

The assessment also analysed crash history data between 2015 and 2019 where no major safety issues were identified as a result of the current construction-phase closure.

Irrespective of the lack of traffic data associated with the initial temporary Northcote Street closure for both the M4 East EIS approval and MOD 1; based on the traffic assessment conducted for the purpose of this modification it is clear that, with the wider overarching changes to the road network on Wattle Street, the continued closure of vehicle access to Northcote Street does not impede the LoS of the surrounding intersections. In fact, the LoS of these intersections have been assessed to have improved (LoS B,C).

Traffic modelling concludes that, with Northcote Street in its current configuration, key surrounding intersections operate satisfactorily during peak periods with no major safety issues presenting. The continued use of Northcote Street in this configuration is not expected to result in any adverse impact on traffic capacity and road network performance during operation of the Project.

5.2.2.2 Road Access and Public Transport

Road users would need to use an alternative access route to and from Parramatta Road as shown in Figure 5-6 and Figure 5-7. These alternate routes are unlikely to result in any discernible traffic impact considering all key intersections and surrounding roads are operating optimally. It can be assumed that it is highly unlikely, based on this information, that emergency services will experience delays on the surrounding roads and since Northcote Streets temporary closure in 2015, there have been no concerns or issues raised by the stakeholder.

Further, the improved Wattle Street intersection at both Parramatta Road and Ramsay Street would also provide a benefit to the operation of the surrounding network and is considered when assessing the unlikely impact on emergency services.

As Northcote Street is a local road and is not considered a public transport route there is no impact predicted for public transport.

Pedestrian and cyclist access impacts were not widely assessed for the initial closure of Northcote Street under the M4 East EIS. Given that Northcote Street was not connected to any identified cyclist network, it is expected that use of Northcote by cyclists would have been relatively limited prior to the establishment of Northcote Street construction compound by the M4 East project. Consistent with Section 8.3 of the M4-M5 Link EIS, no diversions were required as part of the continuing use of the Northcote construction compound.

Inner West Council (IWC) identifies bicycle routes for the Local Government Area (LGA), with routes delineated as Heavy Traffic/ Cycle Path on Road, Mixed Traffic/ Light Traffic or Off Road/ Shared path (refer Appendix D). The nearest identified bicycle route providing east/west connectivity is Henley Marine Parade, that connects to either Waratah Street or the Bay run/ Dobroyd Parade. The nearest bicycle route providing north/south connectivity is Church Street, that connects into Croydon Road in the north and Alt Street in the South.

Northcote Street is not connected to any east/west or north/south bicycle routes. The proposed design for this modification does not prevent bicycle users the ability to dismount and utilise the pedestrian link from Northcote Street to Parramatta Road, however its it not being promoted as a bicycle route or connection.



Figure 5-6 Alternative route to Parramatta Road



Figure 5-7 Alternative route from Parramatta Road

5.3 Noise and vibration

5.3.1 Construction noise and vibration impacts

Noise and vibration impacts associated with the M4-M5 Link Project were assessed in Chapter 10 and Appendix J (*Technical working paper: Noise and vibration*) of the EIS. Northcote Street is located within the Noise Catchment Area (NCA) 02 as identified in the Project EIS and as described in the approved Noise and Vibration Management Sub-Plan (NVMP) as part of the CEMP to manage and minimise noise and vibration impacts.

These noise impacts were further assessed under the site-specific Construction Noise and Vibration Impact Statement (CNVIS). Receivers in NCA02 are subject to noise impacts from construction works at the Northcote Street civil and tunnel site including civil surface works, tunnelling, spoil handling and haulage from the site.

The EIS assessed the impacts associated with the reinstatement and opening of Northcote Street to traffic as part of the site rehabilitation and landscaping works for Northcote Street Civil and Tunnel Site.

The highest predicted noise levels were associated with activities requiring the use of excavators with breakers and diamond saws. It is expected that the potential noise impacts from the proposed modification are consistent with or less than the approved site rehabilitation and landscaping works given the need for plant and equipment with similar sound power levels.

The EIS further identified that there were no highly noise affected residential receivers during this activity.

Impacts are estimated to be short-term, with works undertaken primarily during standard construction hours behind the existing site boundary noise hoarding.

All works will be managed in accordance with the Project's NVMP with any potential out of hours works undertaken in accordance with Environmental Protection Licence (EPL) and Out of Hours Work Protocol.

5.3.2 Operational noise and vibration impacts

An operational road traffic noise assessment was undertaken to determine if the proposed modification resulted in an increase of road traffic noise on the nearby Wolseley Street and Ash Lane.

Given the absence of data prior to the closure of Northcote Street, implemented by the M4 East Project, a qualitative assessment was conducted.

This assessment considered that prior to the closure of Northcote Street, Northcote and Wolseley Street shared similar characteristics. Both are local roads that have through left-in east-bound access from Parramatta Road to Ramsay Street, and left-in/ right-in westbound access from Ramsay Street to Parramatta Road. Considering their similarities, the assessment assumes both local roads experienced similar traffic volumes prior to the Northcote Street closure.

The proposed modification to leave Northcote Street in a cul-de-sac arrangement would likely result in a reduction of through traffic at the Northcote Street and Ramsay Street intersection. Therefore, this would decrease traffic noise within this area.

While the closure of Northcote Street may result in a minimal increase in through traffic on Wolseley Street and to a lesser degree Ash Lane, despite Northcote and Wolseley Street sharing similar characteristic pre-closure, the traffic impact assessment identified that traffic volumes have remained low. As such, and also considering the regional context of the improved Wattle Street intersection at both Parramatta Road and Ramsay Street, it is unlikely to cause any future project related traffic noise level increases.

The proposed modifications would not affect the ability of the project to meet the operational noise goals identified in the EIS, Submissions Report and conditions of approval.

5.4 Urban design

Urban design, landscape character and visual amenity for the Project were assessed in Chapter 13, Appendix L (Technical working paper: Urban design) and Appendix O (Technical working paper: Landscape and visual impact) of the EIS (AECOM 2017).

As approved in the EIS, parts of the construction footprint that are not required for operational infrastructure will be handed back to TfNSW.

The proposed modification would hand back the entire Northcote Street civil and tunnel site in its current arrangement with the Northcote Street and Parramatta Road intersection as a cul-de-sac whilst maintaining pedestrian and cyclist through access. An artistic impression has been generated to show the indicative site concept plan, inclusive of the visual and public amenity, of the proposed pedestrian link between Parramatta Road and Northcote Street. This imagery can be found in Appendix B.

This offers greater future development and design potential to complement the objectives of the existing land zoning and Parramatta Road Corridor Urban Transformation Strategy (UrbanGrowth NSW 2016). Any future developments conducted under this strategy would be subject to separate development assessment and approval.

Residual land at Northcote Street will be managed in accordance with the approved M4 East RLMP and managed by TfNSW and IWC.

Potential urban design impacts associated with the proposed modification would therefore be effectively managed through the implementation of the management measures for the Project as detailed in the SPIR and CoA.

5.5 **Property and land use**

Land use and property impacts as a result of the M4-M5 Link Tunnels project were assessed in Chapter 12 of the EIS.

As detailed in Section 3.3.2, property and land acquisition for the Northcote Street civil and tunnel site (C3a) was previously completed by the M4 East Project. Therefore, the proposed modification would have no direct property impacts. Site access and egress points are also established on Parramatta Road and Wattle St meaning access from alternate roads during site demobilisation is unlikely and existing property access will be maintained. In the event that property access will be temporarily restricted as part of the modification, consultation would be carried out with the landowner or tenant to coordinate access and provide alternate arrangements.

The proposed modification would maximise the residual land handed back to TfNSW following the completion of construction. Land zoning of residual land would be consistent with pre-Project arrangements and be comprised of R2 Low Density Residential and B6 Enterprise Corridor as per the Ashfield LEP 2013.

Future development of residual land would be in accordance with the M4 East RLMP and the Parramatta Road Corridor Urban Transformation Strategy (UrbanGrowth NSW 2016). Therefore, maintaining an employment focus along main roads such as Parramatta Road, encouraging appropriately scaled residential development and providing increased connectivity for pedestrians and cyclists. Also, where air quality permits, opportunities will be investigated by TfNSW for future residual land development to positively contribute to community uses, public recreation uses and/or affordable or social housing.

Potential land use and property impacts associated with the proposed modification would be effectively managed through the implementation of the approved environmental management measures for the Project as summarised in the SPIR and CoA.

5.6 Flooding and drainage

Impacts on flooding and drainage associated with the M4-M5 Link Tunnels project were discussed in Section 17 and Appendix Q (*Technical working paper: Surface water and flooding*) of the EIS (AECOM 2017).

Given the Northcote Street civil and tunnel site is located outside the Probable Maximum Flood (PMF) extent for mainstream flooding and overland flow, no flood impacts on adjacent properties are anticipated. Confirmation was also received from the stormwater asset engineer for Inner West Council that the site is not located on flood prone land.

Notwithstanding, drainage for the residual land handed back to TfNSW will have adequate capacity for a 10-year ARI event to manage stormwater runoff that flows towards Parramatta Road.

Future development of residual land will also consider potential flooding impacts within the context of climate change. This would be subject to separate approvals.

6 Conditions of approval

This section outlines the CoA relevant to the Project, as described in Section 1, that would need to be amended as a result of the proposed modification.

A review of the CoA was undertaken to identify the conditions that would require either amendment or deletion as part of the proposed modification.

6.1 Conditions to be amended or removed

Table 6-1 presents the proposed changes to the CoA for the project. These changes are required to Schedule 1 (description of critical State Significant Infrastructure (CSSI)) and Schedule 2 (CoA). Proposed amendments are shown in bold text and deletions shown as strikethrough text.

The proposed changes would ensure that the CoA are consistent with the proposed modification.

Table 6-1 CoA to be amended or removed

No.	Description of CSSI or CoA	Action and reason
A1	 The CSSI must be carried out in accordance with the terms of this approval and generally in accordance with the description of the CSSI in the WestConnex M4-M5 Link Environmental Impact Statement – Volumes 1A-C and 2A-J (dated August 2017) (the EIS) as amended by: (a) the WestConnex M4-M5 Link Submissions and Preferred Infrastructure Report (dated January 2018) (the SPIR); (b) the WestConnex M4-M5 Link Mainline Tunnel Modification Report (dated September 2018) (Modification 1 Report) as amended by the WestConnex M4-M5 Link Mainline Tunnel Modification 1 Report) as amended by the WestConnex M4-M5 Link Mainline Tunnel Modification 1 Report) as amended by the WestConnex M4-M5 Link Rozelle Interchange Iron Cove Ventilation Underground Modification Report (dated November 2019) as amended by the WestConnex M4-M5 Link Rozelle Interchange Iron Cove Ventilation Underground Modification Response to Submissions Report (dated March 2020); (d) the WestConnex M4-M5 Link Rozelle Interchange Glebe Island Construction Ancillary Facility Modification Report (dated June 2020); (e) the WestConnex M4-M5 Link Rozelle Interchange The Crescent overpass and active transport links Modification 2 Report) as amended by the (i) WestConnex M45-M5 Link Rozelle Interchange The Crescent overpass and active transport links Design amendment report (dated April 2020) (Modification 2 Amendment Report), (ii) WestConnex M45-M5 Link Rozelle 	Add this proposed modification to CoA A1.

Interchange Modification The Crescent overpass and active transport links Response to Submissions Report (dated April 2020) (Modification 2 RtS), and (iii) WestConnex M45-M5 Link Rozelle Interchange Modification The Crescent overpass and active transport links Response to Submissions on the Design amendment report (dated June 2020) (Modification 2 Amendment RtS); and

- (f) the WestConnex M4-M5 Link Rozelle Interchange Modification Request Letter (dated October 2020); and
- (g) the WestConnex M4-M5 Link Mainline Tunnel Northcote Street Modification Report (dated XXX) as amended by the WestConnex M4-M5 Link Mainline Tunnel Modification Response to Submissions (dated XXX)

7 Environmental management measures

Chapter 29 of the EIS for the project summarised the identified environmental management measures that would be adopted to avoid or reduce potential environmental impacts. These measures were revised in Part E of the Submissions and Preferred Infrastructure Report (SPIR) after consideration of the issues raised during the EIS public exhibition period.

The environmental assessment detailed in Section 5 indicated that potential impacts for the environmental issues would be effectively managed through the implementation of the approved revised environmental management measures (REMMs) for the project as summarised in the SPIR. As such, the proposed modification would not require any changes or additions to the environmental management measures.

8 Conclusion

The proposed modification has been developed as a result of the identification of safety and community benefits during the final design stage.

The proposed modification would see a reduction in traffic flow through Northcote Street, minimising the potential 'rat-run' between Parramatta Road and Wattle Street and offer an improved safety outcome for both vehicles and pedestrians using Northcote Street. The proposed modification comes with general community support based on the consultation conducted to date.

It has been assessed that there is minimal to no additional environmental impacts associated proposed modification due to the minor construction work required given its current configuration.

Whilst the final design of Northcote Street is at the discretion of TfNSW in consultation and agreeance with IWC, leaving Northcote Street in its current configuration offers the potential for a larger residual land area to be optimally designed to complement the objectives of the existing land zoning and Parramatta Road Corridor Urban Transformation Strategy (UrbanGrowth NSW 2016).

The proposed modification would be carried out as part of the broader WestConnex M4-M5 Link Mainline Tunnels Project during the site demobilisation and finishing works stage. Therefore, the modification would adopt all of the management measure committed to in the M4-M5 Link EIS, SPIR and CoA.

As such, the proposed modification is considered to be justified.



Secretary's environmental assessment requirements and checklist

Desired performance outcomes	SEAR	Where assessed
1. Transport and traffic Network connectivity, safety and efficiency of the transport system in the vicinity of the project are managed to minimise	 The Proponent must assess construction transport and traffic (vehicle, pedestrian and cyclists) impacts, including, but not necessarily limited to: (a) a considered approach to route identification and scheduling of transport movements, particularly outside standard construction hours; 	Section 5.2.1 Refer to Appendix C for the Northcote Street Traffic Assessment
transport system customers is maintained. Impacts on network	(b) the number, frequency and size of construction related vehicles (passenger, commercial and heavy vehicles, including spoil management movements);	Section 5.2.1
service are effectively	(c) construction worker parking;	Section 5.2.1
managed. Works are compatible with existing infrastructure and future	(e) access constraints and impacts on public transport, pedestrians and cyclists	Section 5.2.2.
transport corridors.	(f) the need to close, divert or otherwise reconfigure elements of the road, cycle and pedestrian network associated with construction of the project. Where the closure, diversion or reconfiguration are temporary, provide an estimate of the duration of the altered access arrangements; and	Section 5.2.2.
	 The Proponent must model and/or the operational transport impacts of the project including, but not necessarily limited to: (a) forecast travel demand and traffic volumes (expressed in terms of total numbers and heavy and light vehicle numbers) for the project and the surrounding road, cycle and public transport network, including potential shifts of traffic movements on alternate routes outside the proposal area (such as toll avoidance) and impact of permanent street closures directly attributable to the SSI; 	Section 5.2.2. Refer to Appendix C for the Northcote Street Traffic Assessment
	(b) travel time analysis;	
	(c) performance of key interchanges and intersections by undertaking a level of service analysis at key locations, for peak periods;	
	(g) impacts on cyclists and pedestrian access and safety, including on known routes and future proposals	
	(i) property and business access and on street parking.	
	The assessment must provide an explanation for the scope of the modelled area, including justification of the nominated boundaries.	

4. Noise and Vibration – Amenity Construction noise and vibration (including airborne noise, ground borne noise and blasting) are effectively managed to minimise adverse impacts on acoustic amenity.	1. The Proponent must assess construction and operational noise and vibration impacts in accordance with the relevant NSW noise and vibration guidelines. The assessment must address the redistribution of traffic and include consideration of impacts to sensitive receivers (on affected floors of residential buildings), include consideration of sleep disturbance and, as relevant, the characteristic of noise and vibration (for example, low frequency noise)	Section 5.3	
Increases in noise emissions and vibration	2. An assessment of construction noise and vibration impacts which must address:	Section 5.3.1	
affecting nearby properties and other sensitive receivers during operation of the project are effectively	(a)the nature of construction activities (including transport, tonal or impulsive noise generating works and the removal of operation noise barriers, as relevant);	Section 3.3.2 Refer to section 5.3.1 for	
amenity and well-being o the community.	(b) the intensity and duration of noise and vibration impacts (both air and ground-borne);	construction noise and	
	(c) the nature, sensitivity and impact to receivers;	impacts	
	(d) the need to balance timely conclusion of noise and vibration generating works with periods of receiver respite, and other factors that may influence the timing and duration of construction activities (such as traffic management);		
	(e) the potential for works outside standard construction hours, including estimated duration and timing, predicted levels, exceedances and number of potentially affected receivers and justification for the activity in terms of the Interim construction Noise Guideline (DECCQ, 2009)		
	(f) potential noise and vibration mitigation measures, including timing of implementation;		
7. Urban Design	The Proponent must:	Section 5.4	
The project design complements the visual amenity, character and quality of the surrounding environment.	(d) consider resulting residual land treatments, and demonstrate how the proposed hard and soft urban design elements of the proposal would be consistent with the existing and desired future character of the area traversed or affected by the proposal;	Appendix B	
The project contributes to the accessibility and connectivity of communities.	(e) identify opportunities to utilise surplus or residual land, particularly for the provision of community space (passive and recreational) and utilise key structures (such as ventilation outlets) for multiple uses i.e. integration with other structures;		

 9. Socio-economic, land use and property The project minimises adverse social and economic impacts and capitalises on opportunities potentially available to affected communities. The project minimises impacts on property and business and achieves appropriate integration with adjoining land uses, including maintenance of 	2. The Proponent must assess impacts from construction and operation on potentially affected property (including Crown lands), businesses, recreational users and land and water users, including property acquisitions/adjustments, access amenity, relevant statutory rights, and community severance and barrier impacts resulting from the project.	Section 5.5
	4. The design and siting of project elements should be located in such a way that functional, contiguous areas of residual land are maximised. The design and siting must consider appropriate land use interfaces (ie White Bay) and the social and economic impacts of proposed land uses against alternate land uses.	Section 5.5
properties and community facilities, and minimisation of displacement of existing land use activities, dwellings and infrastructure.	5. Where air quality allows, residual land must be designed to positively contribute to additional community uses, public recreation uses and/or affordable or social housing. Passively landscaped areas should not be the default use for residual land.	Section 5.5
 12. Flooding The project minimises adverse impacts on existing flooding characteristics. Construction and operation of the project avoids or minimises the risk of, and adverse impacts from, infrastructure flooding, flooding hazards, or dam failure. 	 The Proponent must assess and (model where required) the impacts on flood behaviour during construction and operation for a full range of flood events up to the probable maximum flood (taking into account sea level rise and storm intensity due to climate change) including: (b) any detrimental increases in the potential flood affectation of the project infrastructure and other properties, assets and infrastructure; (c) consistency (or inconsistency) with applicable Council floodplain risk management plans; (d) compatibility with the flood hazard of the land; (e) compatibility with the hydraulic functions of flow conveyance in flood ways and storage areas of the land; (i) any impacts the development may have on the social and economic costs to the community as consequence of flooding; 	Section 5.6
	2. The assessment should take into consideration any flood studies undertaken by local government councils, as available.	Section 5.6



Northcote Street Indicative Imagery of Pedestrian Link



WestConnex M4-M5 Link Tunnels



AERIAL VIEW LOOKING NORT



TYPICAL SECTION

VIEW FROM NORTHCOTE STREET



Figure 2: Indicative Northcote Street Landscaping Design - Plan View



WestConnex M4-M5 Link Tunnels



AERIAL VIEW LOOKING NORTH

VIEW FROM NORTHCOTE STREET



Figure 3: Indicative landscape design for Northcote Street Pedes trian Link



Northcote Street Cul-de-Sac Traffic Assessment



Our Ref: 21140

30 July 2021



RE: WESTCONNEX STAGE 3A NORTHCOTE STREET TRAFFIC ASSESSMENT

As requested, please find herein The Transport Planning Partnership (TTPP) traffic assessment for the proposed permanent closure of Northcote Street at Parramatta Road. Northcote Street has been closed at Parramatta Road since 2015 as part of WestConnex project works.

Project Background

The WestConnex project comprises the widening and extension of the New M4, duplication of the New M5 and connection of the two motorways to provide an underground link between M4 and M5 motorways between Haberfield and St Peters.

In 2015, a temporary construction site was installed on Northcote Street, at its intersection with Parramatta Road to facilitate WestConnex Stage 3A works. Consequently, Northcote Street was closed at Parramatta Road, as shown in Figure 1 and Figure 2.

It is now proposed to permanently close Northcote Street to Parramatta Road, as per current traffic conditions.



Figure 1: Site Location



Source: nearmap Australia (imagery dated 31 May 2021)

Figure 2: Northcote Street Road Closed

Source: nearmap Australia via Google Street View



Traffic Survey Data

TTPP collected classified intersection count and vehicle queue length surveys across a oneweek period from 28 April 2021 to 4 May 2021 at the following intersections:

- Parramatta Rd / Wolseley St
- Ramsay St / Wolseley St
- Ramsay St / Northcote St
- Wattle St / Ash Ln

The locations of the above intersections are shown in Figure 3.

Figure 3: Location of Surveyed Intersections



A summary of the daily traffic profiles at the above intersections across a 14-hour period between 6:00am and 8:00pm are provided in Figure 4 to Figure 7.



Figure 4: Parramatta Rd / Wolseley St Weekly Traffic Profile



The Transport Planning Partnership Suite 402, 22 Atchison Street ST LEONARDS NSW 2065





Figure 5: Ramsay St / Wolseley St Weekly Traffic Profile



Figure 6: Ramsay St / Northcote St Weekly Traffic Profile





Figure 7: Wattle St / Ash Ln Weekly Traffic Profile





Traffic Modelling

Intersection capacity analysis has been undertaken using SIDRA Network 9.0 modelling software to ascertain the existing performance at the above listed intersections (see Figure 3) with the Northcote Street currently closed at Parramatta Road during the respective weekday AM and PM and Saturday peak periods at each intersection. These traffic models have been calibrated based on the surveyed queue lengths.

Level of Service Criteria

TfNSW uses level of service as a measure of performance for all intersection types operating under prevailing traffic conditions. The level of service ranges from LoS A to LoS F which is directly related to the average intersection delays experienced by traffic travelling through the intersection. LoS A to LoS D are considered to provide acceptable performance with LoS A providing better performance than LoS D. LoS D is the long-term desirable level of service. LoS E and LoS F are considered to provide unsatisfactory intersection performance.

At signalised intersections, the average delay is the volume weighted average of all movements. For roundabouts and priority (give way and stop sign) controlled intersections, the average delay relates to the worst movement.

Table 1 shows the criteria that SIDRA Intersection adopts in assessing the LoS.

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

Table	1:	Transport	for	NSW	LoS	Criteria
IGNIC		nanspon	101	11011	LOO	Chicha



Traffic Modelling Results

A summary of the weekday AM, PM and Saturday midday peak traffic modelling results is provided in Table 2, Table 3 and Table 4 respectively, with full movement summarises provided in Attachment One. A comparison of the surveyed queue length against the modelled queue is also provided below, with full queue length survey data provided in Attachment Two.

		Queue Length			Average Delay	
Intersection	Control	Surveyed Average (veh)	Modelled Average (veh)	Modelled 95 th Percentile (m)	(sec)	LoS
Parramatta Rd - Wolseley St	Priority	0.63	0.7	12.3	22	В
Ramsay St - Wolseley St	Priority	0.07	0.0	0.6	37	С
Ramsay St - Northcote St	Priority	0.03	0.0	0.3	27	В
Wattle St - Ash Ln	Priority	0.02	0.0	0.3	9	A

Table 2: AM Peak Hour SIDRA Results

Table 3: PM Peak Hour SIDRA Results

Intersection		Queue Length			Average Delay	
	Control	Surveyed Average (veh)	Modelled Average (veh)	Modelled 95 th Percentile (m)	(sec)	LoS
Parramatta Rd - Wolseley St	Priority	1.48	1.5	26.1	26	В
Ramsay St - Wolseley St	Priority	-	0.1	0.2	40	С
Ramsay St - Northcote St	Priority	0.02	0.0	0.3	26	В
Wattle St - Ash Ln	Priority	0.07	0.0	0.6	9	A

Table 4: SAT Peak Hour SIDRA Results

		Queue Length			Average Delay	
Intersection	Control	Surveyed Average (veh)	Modelled Average (veh)	Modelled 95 th Percentile (m)	(sec)	LoS
Parramatta Rd - Wolseley St	Priority	1.65	1.7	29.9	42	С
Ramsay St - Wolseley St	Priority	0.00	0.0	0.6	41	С
Ramsay St - Northcote St	Priority	0.03	0.0	0.1	23	В
Wattle St - Ash Ln	Priority	0.03	0.0	0.4	9	A

Based on the above traffic modelling assessment, the key surrounding intersections currently operate well at LoS C or better during peak periods. This indicates that the surrounding road network operates satisfactory with the existing Northcote Street closure at Parramatta Road in place.



On this basis, the permanent closure of Northcote Street at Parramatta Road could not be expected to result in any adverse impact on the surrounding road network from a traffic capacity perspective.

Crash Data Analysis

TTPP has reviewed crash history data in the immediate vicinity of the site and four assessed intersections as shown in Figure 3, for a period of five years, between 2015 and 2019. It is noted that Northcote Street was closed at Parramatta Road during this period.

A total of six crashes were recorded during this period; throughout the five-year crash period, the breakdown of crashes has occurred as follows:

- 2019 2 crashes (0 casualties, 2 injured)
- 2018 0 crashes (0 casualties, 0 injured)
- 2017 1 crash (0 casualties, 0 injured)
- 2016 1 crashes (0 casualties, 3 injured)
- 2015 2 crashes (0 casualties, 2 injured)

A summary of the crash types between 2015 and 2019 is shown in Table 5, with the associated crash data map illustrated in Figure 8.

Table 5: Summary of Crash Data

Crash Type	Crash Description	No. of recorded crashes			
Vehicles from adjacent direction	Right near (RUM 13)	1			
Vehicles from opposing direction	Other opposing (RUM 29)	1			
Vehicles from same direction	Rear end (RUM 30)	2			
Off noth on straight	Left off carriageway into object / parked vehicle (RUM 71)	1			
On pain, on straight	Out of control on carriageway (RUM 74)	1			
То	6				





Figure 8: Crash Location Map

Source: Transport for NSW, Crash and Casualty Statistics

From a road safety perspective, the road closure on Northcote Street at Parramatta Road will improve overall road safety at this intersection by eliminating vehicle movements to/from Northcote Street at Parramatta Road. It is however noted that under these traffic conditions, additional traffic would be diverted onto the surrounding road network.

However, based on a review of the existing alternative routes to/from Parramatta Road, TTPP is of the view that suitable routes are available and could not expected to result in any detrimental safety impact at these locations. This is further discussed below.

It is also noted that there have only been six crashes recorded at the four assessed intersections (i.e. where traffic may be diverted to) across a five-year period, all of which resulted in no casualties. The severity of these crashes were generally minor, with two out of the six crashes resulting in moderate injury.

Northcote Street Road Closure

As indicated above, Northcote Street has been closed off at Parramatta Road since 2015. All vehicles previously using Northcote Street to access Parramatta Road would need to use alternative routes as shown in Figure 9.



Figure 9: Alternative Route to Parramatta Road



Figure 10: Alternative Route from Parramatta Road



Based on the above assessment, TTPP is of the view that the proposed permanent closure of Northcote Street is unlikely to result in any discernible traffic impacts based on the following:

• The road closure has been in effect since 2015, with no adverse traffic impacts on the surrounding road network. There are also suitable alternative routes to travel to/from Parramatta Road.



- The traffic modelling results indicate that the key surrounding intersections currently operate satisfactory during peak periods with the Northcote Street closure in place.
- Crash history data indicates that there have been six crashes recorded near the four assessed intersections across a five-year period between 2015 and 2019 (i.e. when the Northcote Street closure was in place). The severity of these crashes was generally minor, with two out of the six crashes resulting in moderate injury. On this basis, no major safety issues were identified during the Northcote Street temporary road closure at Parramatta Road.

We trust the above is to your satisfaction. Should you have any queries regarding the above or require further information, please do not hesitate to contact the undersigned on 8437 7800.

Yours sincerely,

Wayne Johnson Director



Attachment One

SIDRA Movement Summarises

MOVEMENT SUMMARY

V Site: 1 [1. PAR-WOL (Site Folder: EX AM)]

Tuesday 0615-0715 Site Category: (None) Give-Way (Two-Way)

Vehi	Vehicle Movement Performance													
Mov ID	Turn	INP VOLL [Total	PUT IMES HV 1	DEM FLO [Total	AND WS HV 1	Deg. Satn	Aver. Delay	Level of Service	AVERAC OF Q [Veh.	GE BACK UEUE Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		veh/h	veh/h	veh/h	%	v/c	sec		veh	m			,	km/h
East: Wolseley St														
4	L2	97	3	108	3.1	0.390	22.4	LOS B	0.7	5.0	0.83	1.00	1.09	43.0
Appro	oach	97	3	108	3.1	0.390	22.4	LOS B	0.7	5.0	0.83	1.00	1.09	43.0
North	: Parra	amatta R	d											
7	L2	5	0	5	0.0	0.410	5.7	LOS A	0.0	0.0	0.00	0.00	0.00	58.1
8	T1	2146	197	2259	9.2	0.410	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
Appro	oach	2151	197	2264	9.2	0.410	0.2	NA	0.0	0.0	0.00	0.00	0.00	59.7
All Vehic	les	2248	200	2372	8.9	0.410	1.2	NA	0.7	5.0	0.04	0.05	0.05	58.6

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.

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MOVEMENT SUMMARY

V Site: 2 [2. RAM-WOL (Site Folder: EX AM)]

Wednesday 0745-0845 Site Category: (None) Give-Way (Two-Way)

Vehicle Movement Performance														
Mov	Turn					Deg.	Aver.	Level of	AVERAG	SE BACK	Prop. E	Effective	Aver.	Aver.
D		VOLU [Total	JMES HV/1	FLU [Total]	WS Ц\/1	Sath	Delay	Service	UF Q	UEUE Diet 1	Que	Stop	NO. Cycles	Speed
		veh/h	veh/h	veh/h	%	v/c	sec		veh	m		Trate	Cycles	km/h
South: Ramsay		nsay St												
1	L2	20	0	21	0.0	0.238	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	58.0
2	T1	808	32	851	4.0	0.238	0.1	LOS A	0.1	0.6	0.03	0.02	0.03	59.6
3	R2	13	0	14	0.0	0.238	9.2	LOS A	0.1	0.6	0.05	0.02	0.05	57.9
Appr	oach	841	32	885	3.8	0.238	0.4	NA	0.1	0.6	0.03	0.02	0.03	59.5
East:	Martir	n St												
4	L2	15	0	16	0.0	0.017	7.4	LOS A	0.0	0.2	0.43	0.60	0.43	52.2
5	T1	1	0	1	0.0	0.036	29.2	LOS C	0.0	0.3	0.89	0.95	0.89	37.6
6	R2	3	0	3	0.0	0.036	37.2	LOS C	0.0	0.3	0.89	0.95	0.89	37.2
Appr	oach	19	0	20	0.0	0.036	13.2	LOS A	0.0	0.3	0.52	0.67	0.52	48.2
North	n: Ram	say St												
7	L2	5	0	5	0.0	0.223	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	58.2
8	T1	566	28	596	4.9	0.223	1.1	LOS A	0.5	3.4	0.15	0.08	0.16	58.2
9	R2	75	1	79	1.3	0.223	11.2	LOS A	0.5	3.4	0.51	0.25	0.52	53.2
Appr	oach	646	29	680	4.5	0.223	2.4	NA	0.5	3.4	0.19	0.10	0.20	57.5
West	: Wols	eley St												
10	L2	18	1	19	5.6	0.022	7.7	LOS A	0.0	0.3	0.44	0.62	0.44	51.8
11	T1	1	0	1	0.0	0.026	28.6	LOS C	0.0	0.2	0.88	0.95	0.88	37.9
12	R2	2	0	2	0.0	0.026	37.3	LOS C	0.0	0.2	0.88	0.95	0.88	37.5
Appr	oach	21	1	22	4.8	0.026	11.5	LOS A	0.0	0.3	0.50	0.66	0.50	49.2
All Vehic	cles	1527	62	1607	4.1	0.238	1.5	NA	0.5	3.4	0.11	0.07	0.11	58.3

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.

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MOVEMENT SUMMARY

V Site: 3 [3. RAM-NOR (Site Folder: EX AM)]

Wednesday 0745-0845 Site Category: (None) Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Level o Delay Service		AVERAGE BACK OF QUEUE		Prop. Effe Que	Effective Stop	Aver. No.	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] m		Rate	Cycles	km/h
Sout	h: Ram	nsay St												
1	L2	6	0	6	0.0	0.235	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	58.2
2	T1	844	33	888	3.9	0.235	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Appr	oach	850	33	895	3.9	0.235	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
North: Ramsay St														
8	T1	606	35	638	5.8	0.173	0.1	LOS A	0.0	0.3	0.01	0.00	0.01	59.8
9	R2	4	0	4	0.0	0.173	11.1	LOS A	0.0	0.3	0.03	0.01	0.03	58.0
Appr	oach	610	35	642	5.7	0.173	0.2	NA	0.0	0.3	0.01	0.00	0.01	59.8
West	: North	ncote St												
10	L2	7	0	7	0.0	0.008	7.5	LOS A	0.0	0.1	0.44	0.58	0.44	52.1
12	R2	2	0	2	0.0	0.013	26.6	LOS B	0.0	0.1	0.85	0.92	0.85	40.8
Appr	oach	9	0	9	0.0	0.013	11.7	LOS A	0.0	0.1	0.53	0.66	0.53	49.1
All Vehic	cles	1469	68	1546	4.6	0.235	0.2	NA	0.0	0.3	0.01	0.01	0.01	59.7

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.

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Project: C:\Users\Charbel\Desktop\Misc\21140 WestConnex\Project2.sip9
V Site: 4 [4. WAT-ASH (Site Folder: EX AM)]

Friday 0600-0700 Site Category: (None) Give-Way (Two-Way)

Vehi	cle M	ovemen	t Perfor	rmance										
Mov ID	Turn	INP VOLU [Total	PUT IMES HV]	DEM, FLO [Total	AND WS HV]	Deg. Satn	Aver. Delay	Level of Service	AVERAG OF Q [Veh.	GE BACK UEUE Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
North	: Ash I	ven/n	ven/n	ven/n	%	V/C	sec	_	ven	m	_	_	_	KM/N
7	12	7	0	7	0.0	0.010	94		0.0	0.1	0 59	0.68	0 59	50.7
-		-	0	-	0.0	0.010	3.4	LOOA	0.0	0.1	0.55	0.00	0.00	50.7
Appro	bach	1	0	/	0.0	0.010	9.4	LOSA	0.0	0.1	0.59	0.68	0.59	50.7
West	: Wattl	e St												
11	T1	1467	164	1544	11.2	0.425	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
Appro	bach	1467	164	1544	11.2	0.425	0.2	NA	0.0	0.0	0.00	0.00	0.00	59.7
All Vehic	les	1474	164	1552	11.1	0.425	0.2	NA	0.0	0.1	0.00	0.00	0.00	59.6

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.

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V Site: 1 [1. PAR-WOL (Site Folder: EX PM)]

Tuesday 1630-1730 Site Category: (None) Give-Way (Two-Way)

Vehi	cle M	ovemen	t Perfor	mance										
Mov ID	Turn	INP VOLU [Total veh/h	PUT IMES HV] veh/h	DEM FLO [Total veh/h	AND WS HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAC OF Q [Veh. veh	GE BACK UEUE Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East:	Wolse	eley St												
4	L2	162	2	180	1.2	0.611	26.4	LOS B	1.5	10.5	0.86	1.13	1.51	41.0
Appro	bach	162	2	180	1.2	0.611	26.4	LOS B	1.5	10.5	0.86	1.13	1.51	41.0
North	: Parra	amatta Ro	d											
7	L2	23	0	24	0.0	0.345	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	58.0
8	T1	1866	39	1964	2.1	0.345	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Appro	bach	1889	39	1988	2.1	0.345	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
All Vehic	les	2051	41	2168	2.0	0.611	2.4	NA	1.5	10.5	0.07	0.10	0.13	57.5

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.

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V Site: 2 [2. RAM-WOL (Site Folder: EX PM)]

Thursday 1645-1745 Site Category: (None) Give-Way (Two-Way)

Vehi	Vehicle Movement Performance Nov Turn INPUT DEMAND Deg. Aver. Level of AVERAGE BACK Prop. Effective Aver. Aver.													
Mov	Turn	INF	TUT	DEM	AND	Deg.	Aver.	Level of	AVERA	GE BACK	Prop. E	ffective	Aver.	Aver.
ID		VOLU Total		FLO Total		Satn	Delay	Service		UEUE Dict 1	Que	Stop	No.	Speed
		veh/h	veh/h	veh/h	пvј %	v/c	sec		veh	m		Nale	Cycles	km/h
Sout	h: Ram	nsay St												
1	L2	19	2	20	10.5	0.237	5.7	LOS A	0.0	0.0	0.00	0.03	0.00	57.5
2	T1	830	18	874	2.2	0.237	0.1	LOS A	0.0	0.3	0.01	0.02	0.01	59.7
3	R2	6	0	6	0.0	0.237	9.0	LOS A	0.0	0.3	0.02	0.01	0.02	58.1
Appr	oach	855	20	900	2.3	0.237	0.3	NA	0.0	0.3	0.01	0.02	0.01	59.7
East:	Martir	n St												
4	L2	4	0	4	0.0	0.005	7.8	LOS A	0.0	0.1	0.47	0.58	0.47	51.9
5	T1	1	0	1	0.0	0.068	30.7	LOS C	0.1	0.6	0.90	0.96	0.90	36.4
6	R2	6	0	6	0.0	0.068	39.7	LOS C	0.1	0.6	0.90	0.96	0.90	36.0
Appr	oach	11	0	12	0.0	0.068	27.3	LOS B	0.1	0.6	0.74	0.82	0.74	40.6
North	n: Ram	say St												
7	L2	6	0	6	0.0	0.267	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	58.2
8	T1	516	7	543	1.4	0.267	0.4	LOS A	0.5	3.4	0.04	0.05	0.05	59.2
9	R2	146	2	154	1.4	0.267	11.4	LOS A	0.5	3.4	0.66	0.72	0.72	50.0
Appr	oach	668	9	703	1.3	0.267	2.9	NA	0.5	3.4	0.18	0.20	0.19	56.9
West	: Wols	eley St												
10	L2	19	0	20	0.0	0.023	7.5	LOS A	0.0	0.2	0.43	0.61	0.43	52.1
11	T1	1	0	1	0.0	0.047	30.2	LOS C	0.1	0.4	0.89	0.95	0.89	36.9
12	R2	4	0	4	0.0	0.047	38.5	LOS C	0.1	0.4	0.89	0.95	0.89	36.6
Appr	oach	24	0	25	0.0	0.047	13.6	LOS A	0.1	0.4	0.53	0.68	0.53	47.9
All Vehic	cles	1558	29	1640	1.9	0.267	1.8	NA	0.5	3.4	0.10	0.11	0.10	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.

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V Site: 3 [3. RAM-NOR (Site Folder: EX PM)]

Wednesday 1715-1815 Site Category: (None) Give-Way (Two-Way)

Vehi	cle M	ovemen	t Perfor	mance										
Mov ID	Turn	INF VOLU	PUT JMES	DEM. FLO	AND WS	Deg. Satn	Aver. Delay	Level of Service	AVERAG OF QI	E BACK	Prop. Que	Effective Stop	Aver. No.	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] m		Rate	Cycles	km/h
Sout	n: Ram	nsay St												
1	L2	20	0	21	0.0	0.244	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	58.0
2	T1	873	13	919	1.5	0.244	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Appr	oach	893	13	940	1.5	0.244	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
North	n: Ram	say St												
8	T1	574	9	604	1.6	0.161	0.1	LOS A	0.0	0.3	0.02	0.01	0.02	59.8
9	R2	5	0	5	0.0	0.161	11.4	LOS A	0.0	0.3	0.04	0.01	0.04	57.9
Appr	oach	579	9	609	1.6	0.161	0.2	NA	0.0	0.3	0.02	0.01	0.02	59.7
West	: North	ncote St												
10	L2	5	0	5	0.0	0.006	7.5	LOS A	0.0	0.1	0.44	0.57	0.44	52.1
12	R2	2	0	2	0.0	0.013	26.2	LOS B	0.0	0.1	0.85	0.92	0.85	41.0
Appr	oach	7	0	7	0.0	0.013	12.8	LOS A	0.0	0.1	0.56	0.67	0.56	48.4
All Vehic	les	1479	22	1557	1.5	0.244	0.3	NA	0.0	0.3	0.01	0.01	0.01	59.7

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.

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V Site: 4 [4. WAT-ASH (Site Folder: EX PM)]

Wednesday 1615-1715 Site Category: (None) Give-Way (Two-Way)

Vehi	cle M	ovemen	t Perfor	mance										
Mov ID	Turn	INP VOLU [Total	UT IMES HV]	DEM/ FLO [Total	AND WS HV]	Deg. Satn	Aver. Delay	Level of Service	AVERAG OF QI [Veh.	E BACK UEUE Dist]	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North	orth: Ash Ln													
7	L2	17	0	18	0.0	0.023	8.8	LOS A	0.0	0.3	0.57	0.69	0.57	51.2
Appro	bach	17	0	18	0.0	0.023	8.8	LOS A	0.0	0.3	0.57	0.69	0.57	51.2
West	Wattl	e St												
11	T1	1367	37	1439	2.7	0.375	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Appro	bach	1367	37	1439	2.7	0.375	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
All Vehic	les	1384	37	1457	2.7	0.375	0.2	NA	0.0	0.3	0.01	0.01	0.01	59.6

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.

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V Site: 1 [1. PAR-WOL (Site Folder: EX SAT)]

Saturday 1000-1100 Site Category: (None) Give-Way (Two-Way)

Vehi	cle M	ovemen	t Perfor	mance										
Mov ID	Turn	INP VOLU [Total veh/h	PUT IMES HV] veh/h	DEM/ FLO [Total veh/h	AND WS HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAC OF Q [Veh. veh	GE BACK UEUE Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East:	Wolse	eley St												
4	L2	127	4	141	3.1	0.703	41.6	LOS C	1.7	12.0	0.92	1.21	1.81	35.0
Appro	bach	127	4	141	3.1	0.703	41.6	LOS C	1.7	12.0	0.92	1.21	1.81	35.0
North	: Parra	amatta Ro	d											
7	L2	19	0	20	0.0	0.378	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	58.0
8	T1	2039	66	2146	3.2	0.378	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Appro	bach	2058	66	2166	3.2	0.378	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
All Vehic	les	2185	70	2307	3.2	0.703	2.7	NA	1.7	12.0	0.06	0.08	0.11	57.2

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.

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V Site: 2 [2. RAM-WOL (Site Folder: EX SAT)]

Saturday 945-1045 Site Category: (None) Give-Way (Two-Way)

Vehi	Vehicle Movement Performance Mov Turn INPUT DEMAND Deg. Aver. Level of AVERAGE BACK Prop. Effective Aver. Aver.													
Mov	Turn	INF	DT	DEM	AND	Deg.	Aver.	Level of	AVERA	GE BACK	Prop. E	Effective	Aver.	Aver.
JD		VOLU [Total	JMES HV/1	FLU [Total]	vvS ы\/1	Sath	Delay	Service	UF Q	UEUE Diet 1	Que	Stop	NO. Cycles	Speed
		veh/h	veh/h	veh/h	%	v/c	sec		veh	m		Nate	Cycles	km/h
Sout	h: Ram	nsay St												
1	L2	16	0	17	0.0	0.204	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	58.1
2	T1	696	15	733	2.2	0.204	0.2	LOS A	0.1	0.6	0.03	0.02	0.03	59.5
3	R2	12	0	13	0.0	0.204	10.0	LOS A	0.1	0.6	0.07	0.02	0.07	57.7
Appr	oach	724	15	762	2.1	0.204	0.5	NA	0.1	0.6	0.03	0.02	0.03	59.5
East:	Martir	n St												
4	L2	20	0	21	0.0	0.025	8.0	LOS A	0.0	0.3	0.48	0.64	0.48	51.8
5	T1	1	0	1	0.0	0.110	31.7	LOS C	0.1	1.0	0.92	0.97	0.92	33.4
6	R2	8	1	8	12.5	0.110	49.5	LOS D	0.1	1.0	0.92	0.97	0.92	32.9
Appr	oach	29	1	31	3.4	0.110	20.3	LOS B	0.1	1.0	0.61	0.74	0.61	44.0
North	n: Ram	say St												
7	L2	7	0	7	0.0	0.271	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	58.2
8	T1	680	8	716	1.2	0.271	1.0	LOS A	0.6	4.4	0.14	0.09	0.15	58.3
9	R2	112	3	118	2.7	0.271	10.3	LOS A	0.6	4.4	0.52	0.30	0.55	53.1
Appr	oach	799	11	841	1.4	0.271	2.4	NA	0.6	4.4	0.19	0.12	0.21	57.5
West	: Wols	eley St												
10	L2	18	0	19	0.0	0.020	7.1	LOS A	0.0	0.2	0.40	0.59	0.40	52.4
11	T1	1	0	1	0.0	0.029	30.7	LOS C	0.0	0.3	0.89	0.95	0.89	36.8
12	R2	2	0	2	0.0	0.029	40.5	LOS C	0.0	0.3	0.89	0.95	0.89	36.5
Appr	oach	21	0	22	0.0	0.029	11.4	LOS A	0.0	0.3	0.47	0.64	0.47	49.3
All Vehio	cles	1573	27	1656	1.7	0.271	1.9	NA	0.6	4.4	0.13	0.09	0.14	57.9

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.

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V Site: 3 [3. RAM-NOR (Site Folder: EX SAT)]

Saturday 945-1045 Site Category: (None) Give-Way (Two-Way)

Vehi	cle M	ovemen	t Perfor	mance										
Mov ID	Turn	INP VOLU [Total veh/h	PUT JMES HV] veh/h	DEM/ FLO [Total veh/h	AND WS HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAC OF Q [Veh. veh	GE BACK UEUE Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Sout	n: Ram	nsay St												
1	L2	9	0	9	0.0	0.197	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	58.1
2	T1	706	20	743	2.8	0.197	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.8
Appr	oach	715	20	753	2.8	0.197	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
North	n: Ram	say St												
8	T1	672	10	707	1.5	0.189	0.1	LOS A	0.1	0.4	0.02	0.01	0.02	59.8
9	R2	7	1	7	14.3	0.189	10.7	LOS A	0.1	0.4	0.04	0.01	0.04	57.2
Appr	oach	679	11	715	1.6	0.189	0.3	NA	0.1	0.4	0.02	0.01	0.02	59.7
West	: North	ncote St												
10	L2	5	0	5	0.0	0.005	7.0	LOS A	0.0	0.1	0.39	0.56	0.39	52.4
12	R2	1	0	1	0.0	0.006	23.0	LOS B	0.0	0.1	0.83	0.83	0.83	42.5
Appr	oach	6	0	6	0.0	0.006	9.7	LOS A	0.0	0.1	0.47	0.60	0.47	50.4
All Vehic	les	1400	31	1474	2.2	0.197	0.2	NA	0.1	0.4	0.01	0.01	0.01	59.7

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.

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V Site: 4 [4. WAT-ASH (Site Folder: EX SAT)]

Saturday 915-1015 Site Category: (None) Give-Way (Two-Way)

Vehi	cle M	ovemen	t Perfor	mance										
Mov ID	Turn	INP VOLU [Total veh/h	UT IMES HV] veh/h	DEM/ FLO [Total veh/h	AND WS HV] %	Deg. Satn	Aver. Delay sec	Level of Service	AVERAG OF QI [Veh. veh	E BACK UEUE Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North	: Ash I	Ln							For					
7	L2	12	0	13	0.0	0.016	8.9	LOS A	0.0	0.2	0.57	0.68	0.57	51.1
Appro	bach	12	0	13	0.0	0.016	8.9	LOS A	0.0	0.2	0.57	0.68	0.57	51.1
West	Wattl	e St												
11	T1	1394	47	1467	3.4	0.384	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
Appro	bach	1394	47	1467	3.4	0.384	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.7
All Vehic	les	1406	47	1480	3.3	0.384	0.2	NA	0.0	0.2	0.00	0.01	0.00	59.7

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.

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Attachment Two

Queue Length Survey



Table 6 presents the various peak days and hours for each intersection across the surveyed period.

Intersection ID	Intersection	Weekday AM Peak Hour Period	Weekday PM Peak Hour Period	Weekend Peak Hour Period
2	Parramatta Rd / Wolseley St	TUE: 0615-0715	FRI: 1645-1745	SAT: 1000-1100
5	Ramsay St / Wolseley St	WED: 0745-0845	THU: 1645-1745	SAT: 0945-1045
7	Ramsay St / Northcote St	WED: 0745-0845	WED: 1715-1815	SAT: 0945-1045
8	Wattle St / Ash Ln	FRI: 0600-0700	WED: 1615-1715	SAT: 0915-1015

Table 6: Peak Hour Periods

Queue length surveys were undertaken for each minute, on the minute for the relevant minor approach at each intersection. This data is shown in Table 7 to



Table 10.

TUESDAY	0615-0715	FRIDAY 1	645-1745	SATURDAY	1000-1100
Time	Queue (veh)	Time	Queue (veh)	Time	Queue (veh)
6:15	1	16:45	3	10:00	0
6:16	0	16:46	3	10:01	10
6:17	0	16:47	0	10:02	3
6:18	2	16:48	10	10:03	2
6:19	0	16:49	2	10:04	10
6:20	1	16:50	0	10:05	3
6:21	0	16:51	2	10:06	0
6:22	1	16:52	3	10:07	2
6:23	3	16:53	0	10:08	0
6:24	0	16:54	2	10:09	2
6:25	1	16:55	1	10:10	2
6:26	2	16:56	0	10:11	1
6:27	2	16:57	1	10:12	1
6:28	1	16:58	0	10:13	1
6:29	0	16:59	0	10:14	4
6:30	1	17:00	0	10:15	0
6:31	1	17:01	0	10:16	0
6:32	0	17:02	0	10:17	0
6:33	0	17:03	3	10:18	0
6:34	0	17:04	0	10:19	0
6:35	0	17:05	3	10:20	1
6:36	0	17:06	0	10:21	0
6:37	0	17:07	10	10:22	0
6:38	0	17:08	1	10:23	0
6:39	2	17:09	1	10:24	0
6:40	0	17:10	0	10:25	0
6:41	2	17:11	3	10:26	0
6:42	1	17:12	2	10:27	10
6:43	1	17:13	2	10:28	2
6:44	0	17:14	2	10:29	1
6:45	0	17:15	1	10:30	0
6:46	3	17:16	2	10:31	1
6:47	0	17:17	0	10:32	0
6:48	0	17:18	3	10:33	3
6:49	0	17:19	0	10:34	0
6:50	1	17:20	0	10:35	0
6:51	0	17:21	0	10:36	0
6:52	0	17:22	0	10:37	10
6:53	0	17:23	1	10:38	0
6:54	3	17:24	1	10:39	1
6:55	1	17:25	3	10:40	1
6:56	0	17:26	0	10:41	10

Table 7: Queue Length Survey – Parramatta Rd / Wolseley St (Wolseley St Queues)



TUESDAY	0615-0715	FRIDAY 1	645-1745	SATURDAY	1000-1100
Time	Queue (veh)	Time	Queue (veh)	Time	Queue (veh)
6:57	0	17:27	0	10:42	0
6:58	0	17:28	0	10:43	0
6:59	0	17:29	0	10:44	2
7:00	0	17:30	0	10:45	2
7:01	0	17:31	1	10:46	0
7:02	1	17:32	0	10:47	1
7:03	0	17:33	3	10:48	3
7:04	0	17:34	0	10:49	3
7:05	0	17:35	3	10:50	3
7:06	0	17:36	0	10:51	0
7:07	0	17:37	2	10:52	1
7:08	0	17:38	0	10:53	0
7:09	2	17:39	2	10:54	1
7:10	3	17:40	0	10:55	0
7:11	1	17:41	0	10:56	0
7:12	1	17:42	10	10:57	1
7:13	0	17:43	1	10:58	0
7:14	0	17:44	2	10:59	1
Average	0.63	Average	1.48	Average	1.65

Table 8: Queue Length Survey - Ramsay St / Wolseley St (Wolseley St Queues)

WEDNESDAY 0745-0845		THURSDAY 1645-1745		SATURDAY 0945-1045	
Time	Queue (veh)	Time	Queue (veh)	Time	Queue (veh)
7:45	0	16:45	0	9:45	0
7:46	0	16:46	0	9:46	0
7:47	0	16:47	0	9:47	0
7:48	0	16:48	0	9:48	0
7:49	0	16:49	0	9:49	0
7:50	1	16:50	0	9:50	0
7:51	0	16:51	1	9:51	0
7:52	0	16:52	0	9:52	0
7:53	0	16:53	0	9:53	0
7:54	0	16:54	0	9:54	0
7:55	0	16:55	0	9:55	0
7:56	0	16:56	0	9:56	0
7:57	0	16:57	0	9:57	0



WEDNESDAY 0745-0845		THURSDAY 1645-1745		SATURDAY 0945-1045	
Time	Queue (veh)	Time	Queue (veh)	Time	Queue (veh)
7:58	0	16:58	0	9:58	0
7:59	0	16:59	0	9:59	0
8:00	0	17:00	0	10:00	0
8:01	0	17:01	0	10:01	0
8:02	0	17:02	0	10:02	0
8:03	0	17:03	0	10:03	0
8:04	0	17:04	0	10:04	0
8:05	0	17:05	0	10:05	0
8:06	0	17:06	0	10:06	0
8:07	0	17:07	0	10:07	0
8:08	0	17:08	0	10:08	0
8:09	0	17:09	0	10:09	0
8:10	0	17:10	0	10:10	0
8:11	0	17:11	0	10:11	0
8:12	0	17:12	0	10:12	0
8:13	1	17:13	0	10:13	0
8:14	0	17:14	0	10:14	0
8:15	0	17:15	0	10:15	0
8:16	0	17:16	0	10:16	0
8:17	0	17:17	0	10:17	0
8:18	0	17:18	0	10:18	0
8:19	0	17:19	0	10:19	0
8:20	0	17:20	0	10:20	0
8:21	0	17:21	0	10:21	0
8:22	0	17:22	1	10:22	0
8:23	0	17:23	0	10:23	0
8:24	0	17:24	0	10:24	0
8:25	0	17:25	0	10:25	0
8:26	0	17:26	0	10:26	0
8:27	0	17:27	0	10:27	0
8:28	2	17:28	0	10:28	0
8:29	0	17:29	1	10:29	0
8:30	0	17:30	0	10:30	0
8:31	0	17:31	0	10:31	0
8:32	0	17:32	0	10:32	0
8:33	0	17:33	1	10:33	0
8:34	0	17:34	0	10:34	0
8:35	0	17:35	0	10:35	0
8:36	0	17:36	0	10:36	0
8:37	0	17:37	0	10:37	0
8:38	0	17:38	0	10:38	0
8:39	0	17:39	0	10:39	0
8:40	0	17:40	0	10:40	0
8:41	0	17:41	1	10:41	0
8:42	0	17:42	1	10:42	0



WEDNESDAY 0745-0845		THURSDAY 1645-1745		SATURDAY 0945-1045	
Time	Queue (veh)	Time	Queue (veh)	Time	Queue (veh)
8:43	0	17:43	0	10:43	0
8:44	0	17:44	0	10:44	0
Average	0.07	Average	0.10	Average	0.00

Table 9: Queue Length Survey - Ramsay St / Northcote St (Northcote St Queues)

WEDNESDAY 0745-0845		WEDNESDAY 1715-1815		SATURDAY 945-1045	
Time	Queue (veh)	Time	Queue (veh)	Time	Queue (veh)
7:45	0	17:15	0	9:45	0
7:46	0	17:16	0	9:46	0
7:47	0	17:17	0	9:47	0
7:48	0	17:18	0	9:48	0
7:49	0	17:19	0	9:49	0
7:50	0	17:20	0	9:50	0
7:51	0	17:21	0	9:51	0
7:52	0	17:22	0	9:52	0
7:53	0	17:23	0	9:53	0
7:54	0	17:24	0	9:54	0
7:55	0	17:25	0	9:55	0
7:56	0	17:26	0	9:56	0
7:57	0	17:27	0	9:57	0
7:58	0	17:28	0	9:58	0
7:59	0	17:29	0	9:59	0
8:00	0	17:30	0	10:00	0
8:01	0	17:31	0	10:01	0
8:02	0	17:32	0	10:02	0
8:03	0	17:33	0	10:03	0
8:04	0	17:34	0	10:04	1
8:05	0	17:35	0	10:05	0
8:06	0	17:36	0	10:06	0
8:07	0	17:37	0	10:07	0
8:08	0	17:38	0	10:08	0
8:09	0	17:39	0	10:09	0
8:10	0	17:40	0	10:10	0
8:11	0	17:41	0	10:11	0
8:12	0	17:42	0	10:12	0
8:13	0	17:43	0	10:13	0
8:14	0	17:44	0	10:14	0
8:15	0	17:45	1	10:15	0
8:16	0	17:46	0	10:16	0
8:17	0	17:47	0	10:17	0
8:18	0	17:48	0	10:18	0
8:19	0	17:49	0	10:19	0
8:20	0	17:50	0	10:20	0



WEDNESDAY 0745-0845		WEDNESDAY 1715-1815		SATURDAY 945-1045	
Time	Queue (veh)	Time	Queue (veh)	Time	Queue (veh)
8:21	0	17:51	0	10:21	0
8:22	0	17:52	0	10:22	0
8:23	0	17:53	0	10:23	0
8:24	0	17:54	0	10:24	0
8:25	1	17:55	0	10:25	0
8:26	0	17:56	0	10:26	0
8:27	0	17:57	0	10:27	1
8:28	0	17:58	0	10:28	0
8:29	0	17:59	0	10:29	0
8:30	0	18:00	0	10:30	0
8:31	0	18:01	0	10:31	0
8:32	0	18:02	0	10:32	0
8:33	0	18:03	0	10:33	0
8:34	0	18:04	0	10:34	0
8:35	0	18:05	0	10:35	0
8:36	0	18:06	0	10:36	0
8:37	0	18:07	0	10:37	0
8:38	0	18:08	0	10:38	0
8:39	0	18:09	0	10:39	0
8:40	1	18:10	0	10:40	0
8:41	0	18:11	0	10:41	0
8:42	0	18:12	0	10:42	0
8:43	0	18:13	0	10:43	0
8:44	0	18:14	0	10:44	0
Average	0.03	Average	0.02	Average	0.03



FRIDAY 0600-0700		WEDNESDAY 1615-1715		SATURDAY 0915-1015	
Time	Queue (veh)	Time	Queue (veh)	Time	Queue (veh)
6:00	0	16:15	0	9:15	0
6:01	0	16:16	1	9:16	0
6:02	0	16:17	0	9:17	0
6:03	0	16:18	0	9:18	1
6:04	0	16:19	0	9:19	0
6:05	0	16:20	0	9:20	0
6:06	0	16:21	0	9:21	0
6:07	0	16:22	1	9:22	0
6:08	0	16:23	0	9:23	0
6:09	0	16:24	0	9:24	0
6:10	0	16:25	0	9:25	0
6:11	0	16:26	0	9:26	0
6:12	0	16:27	0	9:27	0
6:13	0	16:28	0	9:28	0
6:14	0	16:29	0	9:29	0
6:15	0	16:30	0	9:30	0
6:16	0	16:31	1	9:31	0
6:17	0	16:32	0	9:32	0
6:18	0	16:33	0	9:33	0
6:19	0	16:34	0	9:34	0
6:20	0	16:35	0	9:35	0
6:21	0	16:36	0	9:36	0
6:22	0	16:37	0	9:37	0
6:23	0	16:38	0	9:38	0
6:24	0	16:39	0	9:39	0
6:25	0	16:40	0	9:40	0
6:26	0	16:41	0	9:41	0
6:27	0	16:42	0	9:42	0
6:28	0	16:43	0	9:43	0
6:29	1	16:44	0	9:44	1
6:30	0	16:45	0	9:45	0
6:31	0	16:46	0	9:46	0
6:32	0	16:47	0	9:47	0
6:33	0	16:48	0	9:48	0
6:34	0	16:49	0	9:49	0
6:35	0	16:50	0	9:50	0
6:36	0	16:51	0	9:51	0
6:37	0	16:52	0	9:52	0
6:38	0	16:53	0	9:53	0
6:39	0	16:54	0	9:54	0
6:40	0	16:55	0	9:55	0
6:41	0	16:56	0	9:56	0
6:42	0	16:57	0	9:57	0

Table 10: Queue Length Survey - Wattle St / Ash Ln (Ash Ln Queues)



FRIDAY 0600-0700		WEDNESDAY 1615-1715		SATURDAY 0915-1015	
Time	Queue (veh)	Time	Queue (veh)	Time	Queue (veh)
6:43	0	16:58	0	9:58	0
6:44	0	16:59	0	9:59	0
6:45	0	17:00	0	10:00	0
6:46	0	17:01	1	10:01	0
6:47	0	17:02	0	10:02	0
6:48	0	17:03	0	10:03	0
6:49	0	17:04	0	10:04	0
6:50	0	17:05	0	10:05	0
6:51	0	17:06	0	10:06	0
6:52	0	17:07	0	10:07	0
6:53	0	17:08	0	10:08	0
6:54	0	17:09	0	10:09	0
6:55	0	17:10	0	10:10	0
6:56	0	17:11	0	10:11	0
6:57	0	17:12	0	10:12	0
6:58	0	17:13	0	10:13	0
6:59	0	17:14	0	10:14	0
Average	0.02	Average	0.07	Average	0.03



Inner West Council Bicycle Routes

