5.2. Sydney Metro Victoria Cross North

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ATTACHMENTS:
1. 5.2 Attach Cross Station - Metro WAD Package 01 - Technical Note 01 [**5.2.1** - 31 pages]
2. 5.2 Attach Mclaren - Miller Concept Design [**5.2.2** - 1 page]
3. 5.2 Attach Victoria Cross IAP - Kerbside Usage Concept [**5.2.3** - 1 page]

PURPOSE:

The purpose of this report is to update and seek endorsement from the North Sydney Traffic Committee on the Victoria Cross Interchange Access Plan traffic and parking arrangements for Victoria Cross North station portal at the intersection of Miller Street and McLaren Street, North Sydney that affect local roads and existing parking arrangements.

Updates are also provided on the Sydney Metro website at https://www.sydneymetro.info/

EXECUTIVE SUMMARY:

Consent for the Metro City & South-West (Metro) project was granted by the Department of Planning and Environment on 9 January 2017. The consent can be viewed in full at www.majorprojects.planning.nsw.gov.au.

The project will deliver new railway infrastructure for Sydney, including two new Metro stations within the North Sydney Local Government Area - at Crows Nest and Victoria Cross (North Sydney Centre). Construction commenced in early 2017, with train operations expected to be underway by 2024.

As part of the project planning condition (E92), Sydney Metro must develop an Interchange Access Plan for each station to inform the final design of transport and access facilities and services, including footpaths, cycleways, passenger facilities, parking, traffic and road changes, and integration of public domain and transport initiatives around and at each station.

The Victoria Cross Interchange Access Plan is under development and is expected to be finalised in late June 2022, subject to approval from Department of Planning and Environment (DPE).

In accordance with the various conditions of consent, Sydney Metro and North Sydney Council worked collaboratively over the past year to provide facilities and services for the Victoria Cross North station portal at the corner of Miller Street and McLaren Street, North Sydney.

These facilities and services will be operational upon ‘day one’ of train operations. The changes involve kerb side parking changes on McLaren Street and crossing widenings at Miller Street and McLaren Street intersection (subject to Transport for NSW approval) to cater for Customer access and demand.

As part of these facility and services changes, Sydney Metro and North Sydney Council will review capacity and operation of kiss-and-ride (and taxi) spaces 12 months after metro opening to ensure the capacity accommodates demand.

It is expected Sydney Metro will begin works relating to these changes in early 2023 (TBC), further consultation will be provided to Stakeholders and the Community closer to the anticipated start date.

FINANCIAL IMPLICATIONS:

There are no direct financial implications arising from this report.

RECOMMENDATION:

1.THAT the information concerning Sydney Metro City & South-West Victoria Cross North station portal Interchange Access Plan be received and endorsed.
2.THAT the location and design of the bus shelter is subject to further detailed design review and will be presented to Council for further consideration.
3.THAT Council monitors and reviews the usage of the new bus stops and the existing bus stops between Ridge Street and Berry Street after 12 months from implementation.
4.THAT Council monitor and review usage of the Taxi Rank and Disabled Parking space after 12 months implementation to verify that they meet their intended objectives, and the parking is being utilised in the most effective way.
5.THAT Council’s Tree Management team do not support any plans that will have an impact on the significant Trees in particular the Plane Trees on Miller or Maclaren streets. It would be expected that any designs take into account the retention of all Trees.

LINK TO COMMUNITY STRATEGIC PLAN

The relationship with the Community Strategic Plan is as follows:

2. Our Built Infrastructure
2.1 Infrastructure and assets meet community needs
2.3 Sustainable transport is encouraged
2.4 Improved traffic and parking management

5. Our Civic Leadership
5.2 Council is well governed and customer focused
5.3 Community is informed and consulted

BACKGROUND

Consent for the Metro City & South-West (Metro) project was granted by the Department of Planning and Environment on 9 January 2017. The consent can be viewed in full at www.majorprojects.planning.nsw.gov.au.

The project will deliver new railway infrastructure for Sydney, including two new Metro stations within the North Sydney Local Government Area, at Crows Nest and Victoria Cross (North Sydney Centre). Construction commenced in early 2017, with train operations expected to be underway by 2024.

CONSULTATION REQUIREMENTS

Community engagement will be undertaken in accordance with Council's Community Engagement Protocol.

Relates to ECM No: 8844952
Standard or Guideline Used: AS1742.2, 2890.5, Bus Infrastructure Guidelines
Signs & Lines Priority: 2
Precinct and Ward: Stanton Precinct, Cammeraygal
Impact on Bicycles: Bicycle access is improved under the proposed works
Impact on Pedestrians: Pedestrian's access is improved under the proposed works
Impact on Parking: The proposal will result in loss of 21 parking spaces in McLaren Street and Miller Street

Victoria Cross Station WAD Package 01 – Marked Foot Crossing Changes at Miller Street / McLaren Street, North Sydney

WAD Package TECHNICAL NOTE

Project:	Sydney Metro City and Southwest	**Date:**	22/03/2022
Group:	Metro Operations, Customer & Placemaking	**Status:**	Draft
Author:	P Brogan, N Hutapea	**Revision:**	6
Company:	Sydney Metro	**File number:**	N/A
File name:	Victoria Cross Station - Metro WAD Package 01 - Technical Note 01		

Revision	Revision date	Status	Brief reason for update	Name/ position/ company	Author/ Reviewer/ Approver	Signature
0	20/03/2019	Draft	Draft report	C McGeoch	Traffic Advisor, Transport Planning	
1	04/04/2019	Draft	Update report	P Brogan	Traffic Advisor, Transport Planning	
2	31/05/2019	Draft Final	Sidra inputs	P Brogan	Traffic Advisor, Transport Planning	
3	27/06/2019	Draft Final	Insert placemaking vision section 1.2	P Brogan	Traffic Advisor, Transport Planning	
4	20/09/2019	Draft Final	Update analysis to reflect marked foot crossing mods only	P Brogan	Program Mgr, Transport Planning	
5	22/03/2022	Draft Final	Update on marked foot crossing width	N Hutapea	Manager Network Modelling Advisory	
6	22/03/2022	Draft Final	Review Technical Note	G Hitchcox	Senior Manager, Transport Planning	

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Executive Summary Table

Item	WAD Package Assessment Summary	TfNSW Response
1.WAD Package No	Victoria Cross Station WAD Package 01 – signalised pedestrian crossing enhancement at Miller Street / McLaren Street, North Sydney.	
1.1 Consultation	North Sydney Council and the Transport Cluster (including the former RMS) have been consulted through the Victoria Cross Interchange Access Plan process. The previously proposed changes to the marked foot crossings received in principle endorsement from the TfNSW Planning and Program (former RMS) by way of email dated 9 October 2019. The proposed changes to the marked foot crossing on this technical note are consistent with the most recent negotiation with TfNSW Planning and Program as of August 2021.	
2.WAD Package Description	Widening of the marked foot crossings on all approaches at the intersection of Miller Street and McLaren Street, North Sydney. The works will involve pavement line marking removal and re painting, kerb ramp modifications and traffic signal post and lantern relocations that may be needed at the intersection, subject to detailed design.	
3.Rationale	The works are required to better accommodate the safe and efficient movement of all customers. Customer accessibility, safety & crossing capacity benefit through the provision of greater separation of pedestrians and vehicles at the signalised crossing. This simplifies intersection operations, provides more direct efficient access for high volumes of pedestrians and provides for the access needs of school children. The works will also increase crossing capacity in response to forecast increased pedestrian demands.	
4.TfNSW (former RMS) Warrants	See below.	
5.Meeting TfNSW KPI's	See below.	

5.1 Traffic & Pedestrian Demands	Miller Street (b/w McLaren and Berry St), both directions combined: • AM 1,100 veh/h • PM 945 veh/hr (2018). McLaren Street (b/w Pacific Hwy & Miller St), both directions combined (2018): • AM 605 veh/hr • PM 505 veh/hr.	
5.2 Network Efficiency	Sidra intersection analysis has been undertaken by Sydney Metro and is reported below.	
5.3 Pedestrian Safety	The works will provide greater separation between pedestrian and vehicle movement and through these measures will reduce the risk of conflict at the intersection.	
5.4 Intersection Operation	Sidra intersection analysis has been undertaken by Sydney Metro and reported in Sections 5.2 and 5.4.	
5.5 Crashes	One crash at the Miller St / McLaren St intersection in the period year 2016 to year 2020.	
5.6 Regulatory Signage	No changes will be required to regulatory signs at the intersection. Traffic signal pole relocation will be required.	
6.Conclusions	The works are required to enhance pedestrian accessibility, road safety & throughput capacity at the intersection. The works will not adversely impact traffic flow efficiency.	

1. WAD Package Proposal

The works involve the following:

- Widening the marked foot crossings on all approaches to the Miller Street and McLaren Street intersection.
- Other possible works listed below.

Figure 1 shows the indicative layout for the Victoria Cross Metro Station north site and the Miller Street / McLaren Street intersection.

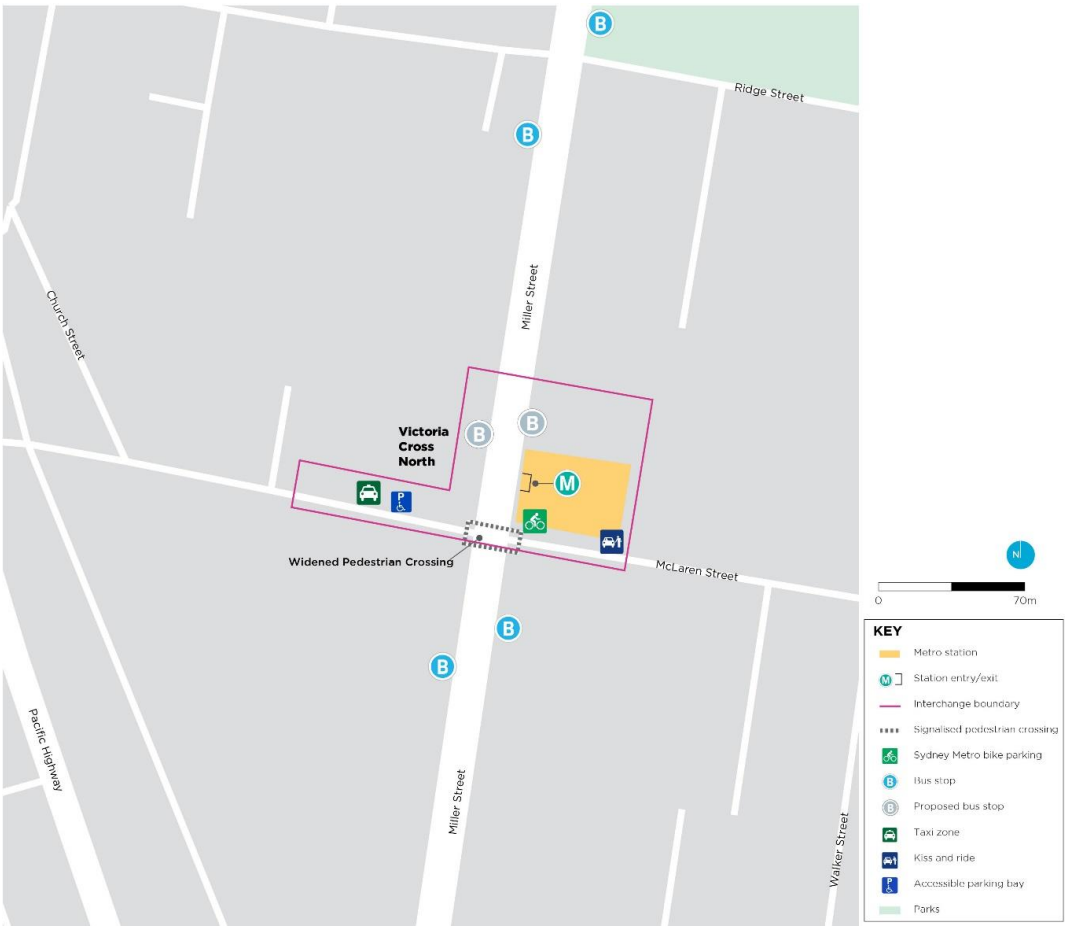


Figure 1. Victoria Cross Station (North) indicative layout

The widening of the marked foot crossings at the Miller Street and McLaren Street intersection are required to enhance pedestrian accessibility, road safety & throughput capacity in response to forecast growth in pedestrian activity through the intersection of Miller Street and McLaren Street. The following works are proposed:

- Pavement line marking removal and re-painting.
- Traffic signal post and lantern relocations that may be needed at the intersection, subject to detailed design.
- Kerb ramp modifications, subject to detailed design.

The works will exclude the following:

- Tree removal and/or replanting
- Light pole adjustments or relocation
- Signage changes and/or pole relocations
- Controller and CCTV upgrades.
- Detector removal and/or relocations
- Utilities adjustments and relocations

A concept sketch of the modified marked foot crossings proposal is shown at **Appendix A**.

The works are not required to facilitate Metro construction and are end state related.

1.1. Consultation

Consultation has occurred with TfNSW Greater Sydney and North Sydney Council and other agencies in the context of the Interchange Access Plan process. The previously proposed changes to the marked foot crossings received in principle endorsement from the TfNSW Planning and Program (former RMS) by way of email dated 9 October 2019. The proposed changes to the marked foot crossing on this technical note are consistent with the most recent negotiation with TfNSW Planning and Program as of August 2021.

1.2. North Sydney CBD Place Making Vision

The Transport Cluster is currently working with the Greater Sydney Commission, NSW Government Architect Office and North Sydney Council to develop the preferred place making vision for North Sydney CBD. The vision will guide transport planning and investment in the North Sydney CBD – and interconnected areas – over the next 20 years and beyond. The vision will support and facilitate the outcomes envisaged by the Greater Sydney Region Plan and Future Transport 2056. The delivery of the vision is cognisant of two major projects within the locality, these being the Sydney Metro City and South West and Western Harbour Tunnel Beaches Link (WHTBL) projects.

The vision will address the strategic multi-modal (physical and operational) changes required to enable the precinct to grow and support its role as part of the Eastern Harbour City. The vision includes a staged approach to the possible closure of Miller Street between Berry Street and the Pacific Highway to general traffic. The staged approach may include the initial introduction of selected turn bans at the Berry Street and Pacific Highway intersections and enhancements to pedestrian crossing facilities and controls. This may be followed by partial closures, initially narrowing of the road carriageway, then the introduction of bus only access, and ultimately its full closure to all traffic at some point following the commencement of Metro operations in 2024.

TfNSW will also further investigate improved pedestrian amenity and safety, improved access for cyclists to and through the CBD, convenient interchanges between bus and rail services, and management of kerbside access to support business activity across the day, including night-time activation.

The WAD works proposed in this technical note represent and enable an initial staged approach in the delivery of this longer-term vision for the North Sydney CBD. The WAD works, once approved, are designed to complement and not to preclude the delivery of other works required in the staged delivery of the longer-term vision.

Sydney Metro and its contractors will continue to collaborate with Transport for NSW, North Sydney Council and other stakeholders to facilitate planned growth and the delivery of an integrated transport solution for North Sydney.

2. Rationale

The works are required to better accommodate the safe and efficient movement of all customers. Figure 2 shows the existing marked pedestrian crossings at the intersection of Miller Street and McLaren Street.

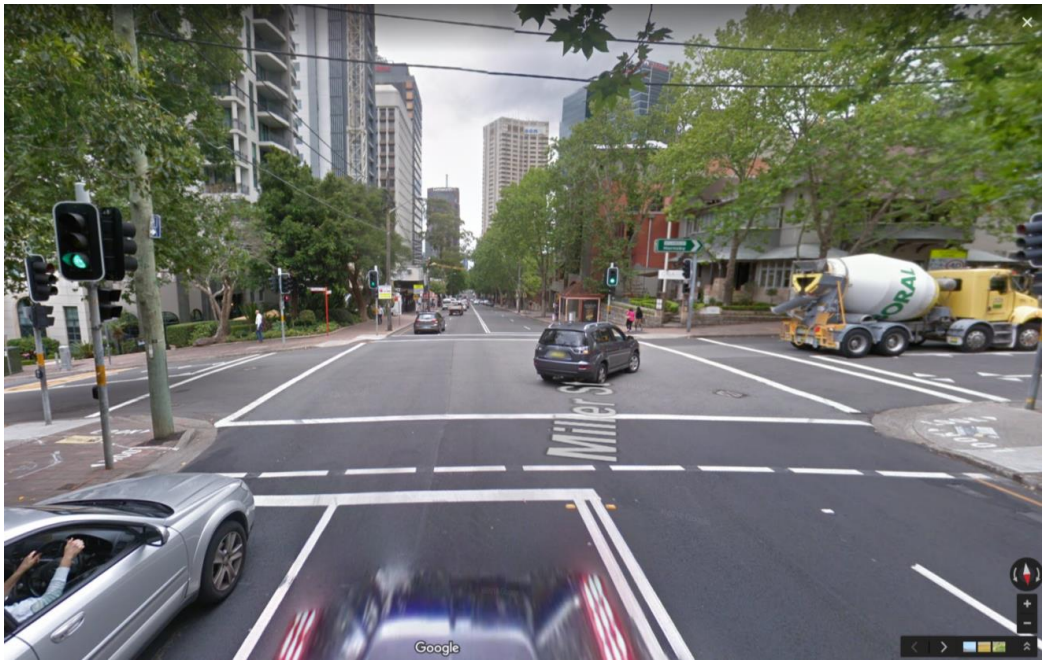


Figure 2 - Looking south at the existing marked foot crossings at the Miller Street / McLaren Street intersection (Google Maps).

The WAD package works are required for the following reasons:

1. Accessibility – pedestrian movement across Miller Street and also McLaren Street will increase over time with the introduction of the Victoria Cross Metro Station and as a consequence of planned growth in the North Sydney CBD. The works will facilitate improved access to and from the Metro station and serve general existing and forecast CBD pedestrian movement.
2. Safety – The works will provide greater separation between pedestrian and vehicle movement and through these measures will reduce the risk of conflict at the intersection.
3. Capacity - The works will increase capacity at the intersection by increasing the spatial throughout capacity for pedestrians while reducing delay resulting from conflict.

The works require delivery via the Works Authorisation Deed (WAD) because they will impact traffic signal layout and infrastructure at the Miller Street / McLaren Street intersection.

3. TfNSW (former RMS) Warrants

A proposal to widen an existing marked foot crossing at a signalised intersection does not require assessment against the TfNSW (former RMS) warrants. Section 6.3 of the (former RMS) Traffic Signal Design document states that "*the standard width of a marked foot crossing at an intersection is 3.6 metres measured to the outside edge of the dashed paint lines. However, where large flows of pedestrians use the crossing (more than two ranks per cycle in either direction during peak periods) or large numbers of pedestrians arrive in platoons (eg: near railway stations or schools), wider crossings may be used. Wider crossings should be 4.5m, 6m or 10 m in width shown on the design layout*."

The forecast Victoria Cross Metro station patronage demands documented in the 2017 EIS Victoria Cross and Artarmon Substation Modification report for the northern entrance are as follows:

- AM period passenger entries: 1,050 ped/hr (2036)
- AM period passenger exits: 1,250 ped/hr (2036)

Estimates of 2036 Metro related additional pedestrian demands via the Miller Street / McLaren Street and Miller Street / Berry Street intersections have been prepared on the basis of the Sydney Metro (Metron 2056 demand) percentage distributions shown at **Appendix B**. A sensitivity test higher range has also been assumed in each case. This provides estimates of pedestrian crossings at key intersections shown in Table 1.

Table 1- Estimated pedestrian crossing flows at Miller Street / McLaren Street, 2036 AM peak hour

Location	Estimated crossing flow
Miller St / McLaren St (northern crossing of Miller St)	1,200-1,500 ped/hr
Miller St / McLaren St (eastern crossing of McLaren St)	2,500-3,000 ped/hr
Miller St / McLaren St (southern crossing of Miller St)	600-1,200 ped/hr
Miller St / McLaren St (western crossing of McLaren St)	600-1,200 ped/hr

4. Key WAD assumptions

The key assumptions for Victoria Cross WAD Package 01 are as follows:

1. The northern (Miller Street) marked foot crossing is 2.8 metres wide and is proposed to be widened to 4.5 metres.
2. The eastern (McLaren Street) marked foot crossing is 4.5 metres wide and is proposed to be widened to 5.0 metres. Sydney Metro previously proposed to widen this marked foot crossing to 6.0 metres. However, it would require tree removal to facilitate the traffic light pole relocation. North Sydney Council (NCS) advised that the tree removal is not in line with the leafy tree strategy for North Sydney. Therefore, the marked foot crossing is proposed to be widened to 5.0 metres.
3. The southern (Miller Street) marked foot crossing is 3.3 metres wide and is proposed to be widened to 4.5 metres.
4. The western (McLaren Street) marked foot crossing is 3.0 metres wide and is proposed to be widened to 3.6 metres.
5. Signal cycle and phase times at the intersection will continue to be linked with adjacent intersections under control of SCATS.
6. The existing footpath and kerb extents at the intersection will be modified. Kerb ramp modifications will be required.
7. SCATS linking of signal times for the intersection to the proposed signalised mid-block pedestrian crossing across Miller Street to the south of the Miller Street / Berry Street intersection is yet to be defined.
8. The extent of post and lantern relocations that may be needed to facilitate the works will be subject to detailed design.
9. The works will not require telephone pole relocations but may require controller and CCTV modifications.
10. It is anticipated that the changes will occur immediately prior to Metro Station opening in 2024. The changes will remain in place post 2024.
11. Clearways apply northbound along Miller Street between 3:00 – 7:00pm. Clearways apply southbound along Miller Street between 6:00am – 10:00am. Short term parking is permitted in the kerbside lanes outside these times.

The key assumptions adopted in the Sidra analysis (which apply to all Victoria Cross WAD packages) are as follows:

12. The SIDRA network study area developed for the technical appraisal is consistent with and covers the intersections of:
    - Pacific Highway / Berry Street
    - Berry Street / Miller Street
    - McLaren Street / Miller Street
    - Miller Street / (proposed) mid-block crossing. It is noted that Sydney Metro is currently reviewing the proposed provision of mid-block crossing along Miller St. The outcome will be provided in Victoria Cross Station – Metro Package 03 – Technical Note 1.

13. Network traffic peaks hours are AM (8:00-9:00) and PM (17:00-18:00).
    a. Volumes of the intersections of Pacific Highway/Berry Street, Berry Street / Miller Street and Miller Street / McLaren Street were reviewed to identify the peak hour from surveys undertaken in 2018.

b. Northbound and southbound traffic volumes at the Miller Street mid-block crossing location were estimated based on the traffic counts at the Miller Street / Berry Street intersection.

14. Growth in the network was estimated based on SCATS detector loop count data collected for May 2015 period and May 2018 period at the Pacific Highway / Berry Street, Berry Street / Miller Street and Miller Street / McLaren Street intersections.
    a. The annual traffic growth rates were approximately -2.8 per cent (negative) for AM peak and 1.0 per cent (positive) for PM peak hour. An average growth of 0.5% per annum was applied to PM peak hour volumes to extrapolate the traffic volumes to assess the 2036 scenarios. No growth rate was applied to the AM peak hour volumes.

15. According to SCATS signal data, signalised intersections of the Pacific Highway / Berry Street, Berry Street / Miller Street are currently operating with an average cycle time between 110 and 120 seconds during the AM and PM peak. Miller Street / McLaren Street intersection is currently operating at 80 seconds cycle time. It was advised that all sites mentioned above are linked to the intersection of Pacific Highway / Miller Street (TCS 630) as a subsystem which has a maximum cycle time of 120 seconds. Therefore a 120 seconds cycle time was adopted for all future scenarios.

16. Mid-block crossing is assumed to be coordinated with the Miller Street / Berry Street intersection (TCS 874) at an offset time calculated in SIDRA.

17. The mid-block crossing is assumed to operate with a 'double cycle' (i.e. introduced twice during the nominal cycle time of the road network). Phase time given for the pedestrian phase is 19 to 22 seconds to provide (a minimum of 13 seconds green time and 6 seconds clearance time).

18. Pedestrian volumes at the proposed mid-block pedestrian crossing in Miller Street are estimated at 770 ped/hr and 700 ped/hr for the AM and PM peak periods, respectively.

19. For the purpose of assessing the impact of the additional marked foot crossing width at the Miller Street / Berry Street intersection (eastern approach), the Berry Street eastbound traffic inter-green time was assumed to be increased by 1 second. This was to take account of the increased crossing distance between the departure stop line to the furthest point of conflict with pedestrians in the next signal phase.

5. Meeting the TfNSW KPI's

Section 5 demonstrates how the WAD package meets the TfNSW KPI's of safety and traffic flow efficiency. This has been done with reference to the following criteria:

- Traffic and pedestrian demand
- Network efficiency
- Pedestrian safety
- Intersection operation
- Crashes
- Regulatory signage

Each of these is discussed in the sections below.

5.1. Traffic and Pedestrian Demand

Traffic count data for local streets in North Sydney are presented in the 2016 Sydney Metro City and Southwest Chatswood to Sydenham Environmental Impact Statement (EIS). In 2015, peak period vehicle flows were as shown in Table 2.

Table 2 - Peak hour traffic volumes, veh/hr 2015

Location	AM	PM
Miller Street (between McLaren & Berry Sts) southbound	630	530
Miller Street (between McLaren & Berry Sts) northbound	470	500
McLaren Street (between Pacific Hwy & Miller St) eastbound	240	190
McLaren Street (between Pacific Hwy & Miller St) westbound	290	250

Pedestrian volumes at the Miller Street / McLaren Street intersection have been forecast to inform design development of the Victoria Cross Metro Station. Forecast pedestrian movements at the Miller Street / McLaren Street intersection, related to the Metro station and also 'background' movements related to other non-station uses and developments in North Sydney, for the 2036 AM peak hour are shown at **Appendix C**. Some 5,300 pedestrian movements are forecast at the intersection in the AM peak hour in 2036.

5.2. Network Efficiency

5.2.1. Model Calibration

Sydney Metro has undertaken the Sidra analysis having regard to the requirements of the (former RMS) Traffic Modelling Guidelines, 2013. The analysis outlined in this WAD Package technical note makes use of traffic counts undertaken in April 2018. The calibration process of the SIDRA models was undertaken by adopting SCATS signal control data captured on the same date as the traffic count surveys. Site observations were undertaken during the AM and PM peaks to check existing traffic movement, intersection layout and traffic signal operations. After the initial modelling results for the 2018 Base models were produced, on site traffic behaviour and vehicle queuing observations were undertaken to verify that the traffic volumes and queues were a reasonable representation of average weekday traffic activity on this part of the network. A separate model calibration report has not been prepared.

5.2.2. Overview

Sidra intersection analysis has been undertaken for five (5) scenarios as follows:

S1: 2018 existing

S2: 2036 Future base

S3: 2036 Metro (S2 with a provision of signalised mid-block on Miller Street)

S4: 2036 Widened pedestrian crossing (S3 with the widened marked foot crossings at the intersections of Miller St / Berry St and Miller St / McLaren St)

S4 Upgrade S4 with a kerb on street parking restriction along Miller Street northbound between the Pacific Highway and Berry Street in the AM peak hour.

A cumulative overview of the forecast network implications of the Sidra scenarios is provided below. Refer to **Appendix C**. Under existing (2018 traffic) conditions the Miller Street / Berry Street intersection operates at LoS C in both peaks. The Miller Street / McLaren Street intersection operates at LoS B in both peaks. The Pacific Highway / Berry Street intersection operates at LoS A in both peaks. Under 2036 traffic conditions minimal change is forecast at each of the intersections.

The analysis indicates that the introduction of the signalised mid-block crossing in Miller Street does not have adverse impacts upon network operations, however, as is the case under existing conditions, queues in Miller Street may extend up to the adjacent Pacific Highway / Miller Street intersection in the AM peak hour (refer to **Figure 3**). The distance along Miller Street between the mid block crossing and the Pacific Highway is about 80 metres. All intersections including the Miller Street mid-block crossing are forecast to operate at a satisfactory level of service, achieving LoS D or better for both AM and PM peak hours.

The Miller Street / Berry Street intersection is forecast to operate at LoS D or better in both peaks with the introduction of the marked foot crossing changes. Northbound queues generated from this intersection is forecast to extend through the proposed signalised marked foot crossing in Miller Street in the AM peak hour.

5.3. Pedestrian Safety

The works will provide greater separation between pedestrian and vehicle movement and reduce the risk of conflict at the intersection. The proposed works would provide more direct efficient access for high volumes of pedestrians and provide for the access needs of school children.

5.4. Intersection Operation

5.4.1. Pacific Highway / Berry Street

The intersection is forecast to operate at LoS A under existing conditions. This is forecast to change to LoS B in all future scenarios. The changes to the marked foot crossings have negligible impact upon intersection operation at this location. **Figures E1 and E2** in **Appendix E** show that under 2036 traffic conditions traffic queues on the Pacific Highway increase slightly but that the introduction of the mid block crossing in Miller Street and the widening marked foot crossings have little impact of queues in 2036.

5.4.2. Miller Street / Berry Street

The intersection is forecast to operate at LoS D or better under 2018 and 2036 traffic conditions and with the introduction of the mid block crossing in Miller Street. The changes to the marked foot crossings has no discernible impact on intersection performance. Change in average delay at the intersection are forecast to be negligible.

5.4.3. Miller Street / McLaren Street

The intersection is forecast to operate at LoS B under existing conditions. This is forecast to change to LoS C in all future scenarios. In the AM peak hour, average delay deteriorates slightly from 20 seconds in 2036 to about 38 seconds with the introduction of 120 seconds network cycle time in the 2036 future scenarios. In the PM peak, average delay is forecast to change little with the proposed WAD works. The changes to the marked foot crossings has no discernible impact on intersection performance. Change in average delay and queues at the intersection are forecast to be negligible.

5.4.4. Miller Street Mid Block Crossing

The proposed signalised mid block crossing in Miller Street is forecast to operate satisfactorily in all future scenarios at LoS A. It was assumed that kerb side parking along Miller Street will be maintained during the AM peak period south of the proposed mid-block crossing. Clearways apply northbound along Miller Street between the Pacific Highway and McLaren Street during the PM peak period.

Traffic queues along Miller Street are not forecast to extend back into the Pacific Highway or Berry Street intersections in the PM peak hour. However, northbound queues may extend along Miller Street through the Pacific Highway intersection. SIDRA network modelling results indicate that the average back of queue length of 75m would be expected south of the mid block crossing where 80 m queuing space is available between the mid block crossing in Miller Street and the Pacific Highway stop line. As generated queues from the mid block crossing may interrupt the signal operation at the Pacific Highway and Miller Street intersection, consideration should be given to restricting the (northbound) kerb-side parking along Miller Street in the AM peak hour. With kerb-side parking restrictions in place, northbound queues are forecast to reduce to below 40 metres. Refer to Scenario S4U in **Appendix C.**

It is noted that Sydney Metro is currently reviewing the proposed provision of mid-block crossing along Miller St. The outcome will be provided in Victoria Cross Station – Metro Package 03 – Technical Note 1.

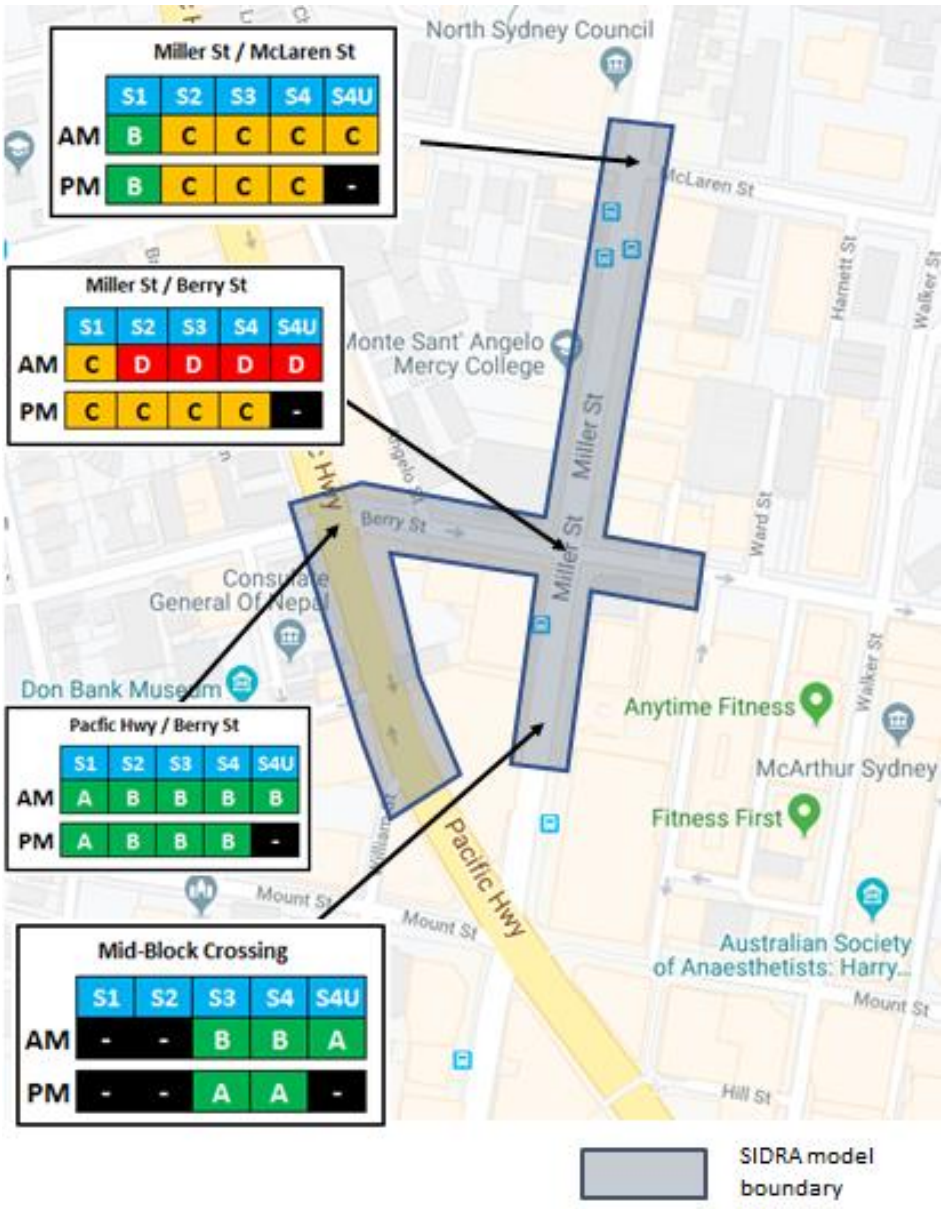


Figure 5.1 - Forecast AM and PM Peak intersection operation.

5.5. Crashes

Crash data analysed for the period year 2016 to year 2020 (inclusive). At the Miller Street / McLaren Street intersection there was one crashes recorded in the five years analysis period. The crash involved the right turn and through movement traffic. No injury is recorded. The works will mitigate pedestrian crashes.

5.6. Regulatory Signage

The proposed WAD works will not require changes to regulatory or wayfinding signage in Miller or McLaren Streets.

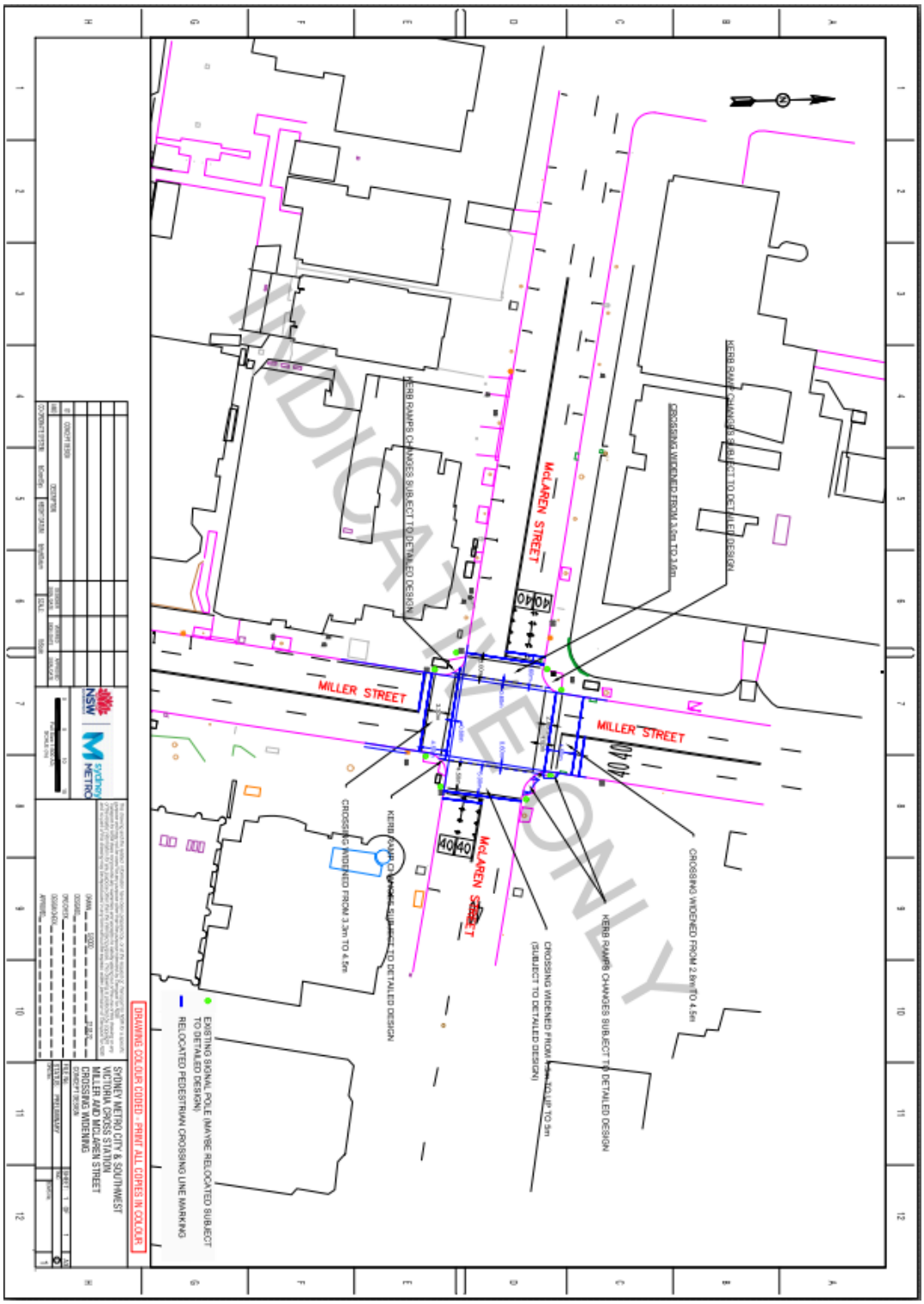
6. Conclusion

The works are required to better accommodate the safe and efficient movement of all customers. The proposed widening of the marked foot crossings on all approaches to the Miller Street and McLaren Street intersection is required to support the future planned growth of the North Sydney CBD on pedestrian accessibility, safety and capacity grounds. The works will also increase crossing capacity in response to forecast increased pedestrian demands in the area. The works will facilitate improved access to and from the Victoria Cross Metro Station.

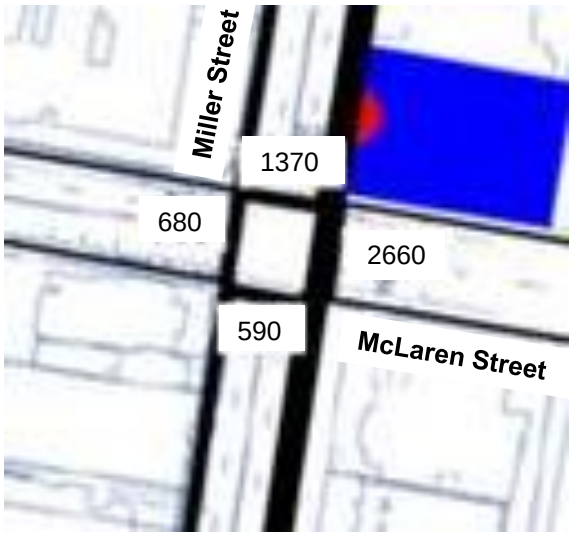
The impacts of the works on network efficiency and intersection operation have been assessed using Sidra. The analysis shows that all intersections continue to operate satisfactorily during the AM and PM peak hours. Minimal change in traffic queues is forecast across the scenarios. Northbound queuing along Miller Street from the proposed mid-block crossing may extend into the Pacific Highway / Miller Street intersection in the AM peak hour. There may be scope to restrict short term kerbside parking along the western kerb of Miller Street in the AM peak period if queuing becomes an issue in coming years. It is also noted that Sydney Metro is currently reviewing the proposed provision of mid-block crossing along Miller St. The outcome will be provided in Victoria Cross Station – Metro Package 03 – Technical Note 1.

The works require delivery via the Works Authorisation Deed (WAD) because they will impact traffic signal layout and infrastructure at the Miller Street / Berry Street intersection.

Appendix A. Concept sketch – marked foot crossing changes at Miller Street / McLaren Street



Appendix B. Forecast pedestrian movements at Miller Street / McLaren Street, 2036 AM peak hour



Source: Sydney Metro (Metron)

Appendix C. Sidra Analysis Outputs, 2036

Site ID	Intersection		Scenario	Peak	Demand	DoS	Ave. Delay	LoS	Queue
I-01	Pacific Highway / Berry Street	S1	2018 Existing	AM	2567	0.88	14	A	71 (N)
		S2	2036 Future Base		2652	0.94	18	B	82 (N)
		S3	2036 with Metro		2652	0.94	18	B	82 (N)
		S4	S3 with widened ped crossings		2652	0.94	18	B	82 (N)
		S4U	S4 without kerb side parking		2652	0.94	18	B	82 (N)

Peak	Demand	DoS	Ave. Delay	LoS	Queue
PM	2223	0.89	14	A	54 (N)
	2524	1.04	25	B	113 (S)
	2524	1.04	25	B	111 (S)
	2524	1.06	27	B	120 (S)

Site ID	Intersection		Scenario	Peak	Demand	DoS	Ave. Delay	LoS	Queue
I-02	Miller Street / Berry Street	S1	2018 Existing	AM	2501	0.93	42	C	110 (N)
		S2	2036 Future Base		2606	0.91	48	D	110 (W)
		S3	2036 with Metro		2606	0.91	48	D	110 (W)
		S4	S3 with widened ped crossings		2606	0.91	49	D	110 (W)
		S4U	S4 without kerb side parking		2606	0.91	49	D	110 (W)

Peak	Demand	DoS	Ave. Delay	LoS	Queue
PM	2193	0.67	36	C	81 (W)
	2505	0.77	39	C	100 (W)
	2505	0.77	39	C	100 (W)
	2505	0.77	39	C	103 (W)

Site ID	Intersection		Scenario	Peak	Demand	DoS	Ave. Delay	LoS	Queue
I-03	Miller Street / McLaren Street	S1	2018 Existing	AM	1684	0.69	20	B	56 (N)
		S2	2036 Future Base		1705	0.75	38	C	120 (N)
		S3	2036 with Metro		1705	0.75	38	C	120 (N)
		S4	S3 with widened ped crossings		1705	0.75	38	C	120 (N)
		S4U	S4 without kerb side parking		1705	0.75	38	C	120 (N)

Peak	Demand	DoS	Ave. Delay	LoS	Queue
PM	1407	0.44	20	B	33 (N)
	1562	0.66	35	C	74 (S)
	1562	0.66	35	C	75 (S)
	1562	0.60	33	C	71 (S)

Site ID	Intersection		Scenario	Peak	Demand	DoS	Ave. Delay	LoS	Queue
I-05	Miller Street Mid-Block crossing	S1	2018 Existing	AM	-	-	-	-	-
		S2	2036 Future Base		-	-	-	-	-
		S3	2036 with Metro		1121	0.92	21	B	95 (S)
		S4	S3 with widened ped crossings		1121	0.92	21	B	95 (S)
		S4U	S4 without kerb side parking		1121	0.50	11	A	41 (S)

Peak	Demand	DoS	Ave. Delay	LoS	Queue
PM	-	-	-	-	
	-	-	-	-	-
	984	0.49	10	A	33 (S)
	984	0.49	10	A	33 (S)

Appendix D. Sidra Analysis Checklist

Victoria Cross site, 20 September 2019 by Chris Chun
SIDRA model name 7 revision:

- **01 VC 2018 Existing_RevD.sip8**
- **02 VC 2036 Future Base_RevD.sip8**
- **03 VC 2036 with Metro_RevD.sip8**
- **04 VC 2036 S3 with widened ped crossing_RevD.sip8**

No.	Topic	Sub Topic	Status	Response
0	**General setting**			
0a		Current setup – "NEW South Wales"	✓	Checked
0b		Parameter Settings - Site level of service method – "Delay (RTA NSW)"	✓	Checked
0c		Confirm original data source (traffic/pedestrian volume, signal timing)	✓	• The analysis outlined in this WAD Package technical note makes use of traffic counts undertaken in April 2018 which was provided from (former RMS). • Pedestrian counts were undertaken in 2015 for the Sydney Metro City and Southwest Chatswood to Sydenham Environmental Impact Statement (EIS). • Intersection signal history data was obtained from the SCATS system for all signalised intersections within the study area.
0d		Calibration/validation process as per TfNSW (former RMS) modelling guidelines	✓	The validation process of the SIDRA models was undertaken by adopting SCATS signal control data. After the initial modelling results produced for base models, a calibration process was undertaken by matching the queueing vehicles and traffic behaviour observation from the site inspections.
0e		Pre analysis site visit (queue lengths, lane lengths, phasing, cycle times etc)	✓	Site inspections were conducted during weekday morning and afternoon peak periods (Wednesday 26 June 2019) to make observations to assist with model development. While on site observations were made of: • intersection layout • traffic signal operation • pedestrian and cyclist movements • vehicle queuing

0f		Software package and version	✓	Version 8.0.5.7916
1	**Intersection & Lane Geometry**			
1a		Approach and exit distances checked	✓	Network models were developed based on the geometry identified in aerial imagery from Nearmap as well as observations from the site inspections.
1b		Arrivals profiles	✓	
1c		Length of short lane	✓	
1d		Median island	✓	
1e		Lane configuration	✓	
1f		Lane utilisation ratio	✓	Adjustment to lane utilisation values were made to reflect the observed lane demand behaviour, including use of bus lanes, the location of bus stops and on-street parking provision. The adjustments made to the 2018 Base models (Scenario 1) to account for downstream constraints and lane utilisation were retained in future 2036 models (Scenario 2 to 4).
1g		Lane discipline (for bus only lanes)	✓	
1h		Parking lane assumptions / coding	✓	Existing on-street parking adopted
2	**Movement Definitions**			
2a		Additional vehicles types	✓	
2b		Banned movements	✓	
3	**Pedestrians**			
3a		Crossing location (full/slip lane)	✓	
3b		Volumes	✓	
3c		Crossing distance (if manual input required)	✓	Crossing distance was measured from Nearmap
3d		Walking speed – change to 1.2m/s	✓	Pedestrian walking speed of 1.2m/sec was adopted for all sites.
4	**Volumes**			
4a		Traffic data checked & fit for use ?	✓	
4b		Pedestrian data checked & fit for use?	✓	Pedestrian volumes are forecast based on TfNSW demand modelling for Victoria Cross Station
4c		Cyclist data checked & fit for use ?	✓	
4d		HV, bus & other data checked ?	✓	

4e		Peak flow factor	✓	SIDRA default peak flow factor of 95 percent was applied.
4f		Growth rate applied / justification	✓	Growth in the network was estimated based on SCATS detector loop count data collected for May 2015 and May 2018 at assessed intersections. A growth rate of 0.5% per annum was applied to PM peak but no growth rate was applied to the AM peak hour volumes.
5	**Priorities**			
5a		Setting between traffic and pedestrians	✓	Priority was given to pedestrian crossing over the turning movements for signalised intersections.
6	**Gap acceptance**			
6a		Check if any parameters have been adjusted.	✓	Default parameters were used
7	**Vehicle movement data**			
7a		Applied speed	✓	As per existing speed limit (40 & 50 km/h)
7b		Signal co-ord /common control group ?	✓	No common control group (CCG) within the developed network models
7c		Signals – applied start loss or late start	✓	Start loss time was applied for turning movements against to the pedestrian crossing movement at the signalised intersection. Additional start loss time (1 sec) was applied to consider the increased pedestrian demand in 2036 models.
8	**Phasing & Timing**			
8a		Applied cycle time / justification	✓	2018 base models were analysed based on current SCATS signal data. Pacific Hwy / Berry St, Miller St / Berry St are currently operating with an average cycle time between 110 and 120 seconds during the peak hours. Miller Street / McLaren Street intersection is currently operating at 80 seconds cycle time. It was advised that all sites mentioned above are linked to the intersection of Pacific Highway / Miller Street (TCS 630) as a subsystem which has a maximum cycle time of 120

				seconds. Therefore a 120 seconds cycle time was adopted for all tested future models (Scenario 2, and 4).
8b		Source of phasing information	✓	Intersection signal history data was obtained from the SCATS system for all signalised intersections within the study area. The signal sequences, timing and cycle times adopted in the existing base models were maintained in the future models. Where required adjustments, the phase time have been manually adjusted within the minimum and maximum phase times that are provided in the SCATS data to ensure each approach gets the appropriate green time.
8c		Phase transition	✓	
9	**Results**			
9a		Results in “Movement Summary” and “Lane Summary”	✓	Network model outputs were checked and reported
9b		Adopted cycle time setting in “Phasing Summary”	✓	User-given phase time setting was adopted for the existing base model with a cycle time of 80 / 110 seconds. User-given Cycle time of 120 seconds was adopted for all future models.
9c		Lane utilisation and Capacity adjustment % in “Lane Summary”	✓	
9d		Ensure sufficient delay time has been applied to traffic movement against pedestrian crossing in “Movement timing”	✓	Reviewed that sufficient green time was allocated to pedestrian crossing movement.
10	**Network Model**			
10a		Site level of service method – “Delay (RTA NSW)”	✓	Checked
10b		Cycle time	✓	As mentioned above phasing times were optimised by SIDRA for all future models by applying the user-given cycle time.
10c		Signal offsets – Program or User given offsets	✓	
10d		Network routes	✓	
10e		Network configuration – check network layout	✓	

Appendix E. Forecast Traffic Queues, 2036

Figure E1 - Forecast AM Peak network queues (Pacific Highway / Berry Street).

Figure E2 - Forecast PM Peak network queues (Pacific Highway / Berry Street).

Figure E3 - Forecast AM Peak network queues (Berry Street / Miller Street).

Figure E4 - Forecast PM Peak network queues (Berry Street / Miller Street).

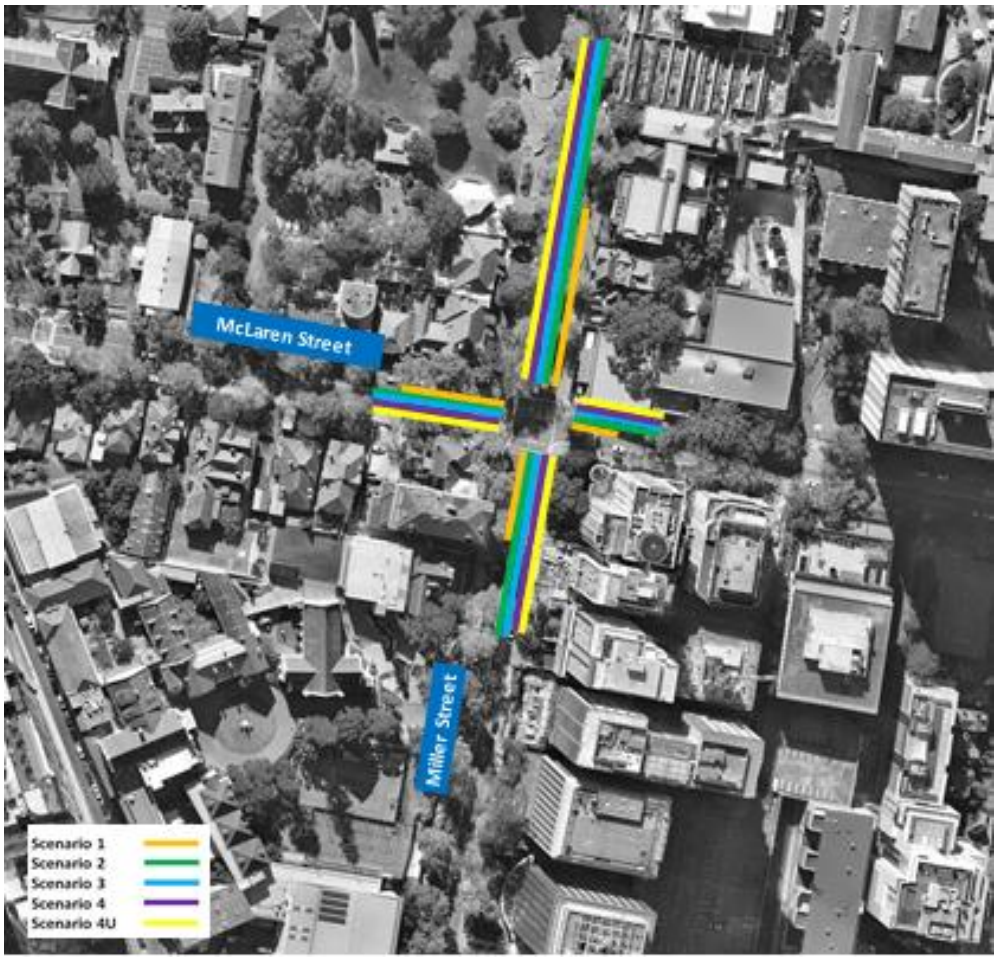


Figure E5 - Forecast AM Peak network queues (Miller Street / McLaren Street).

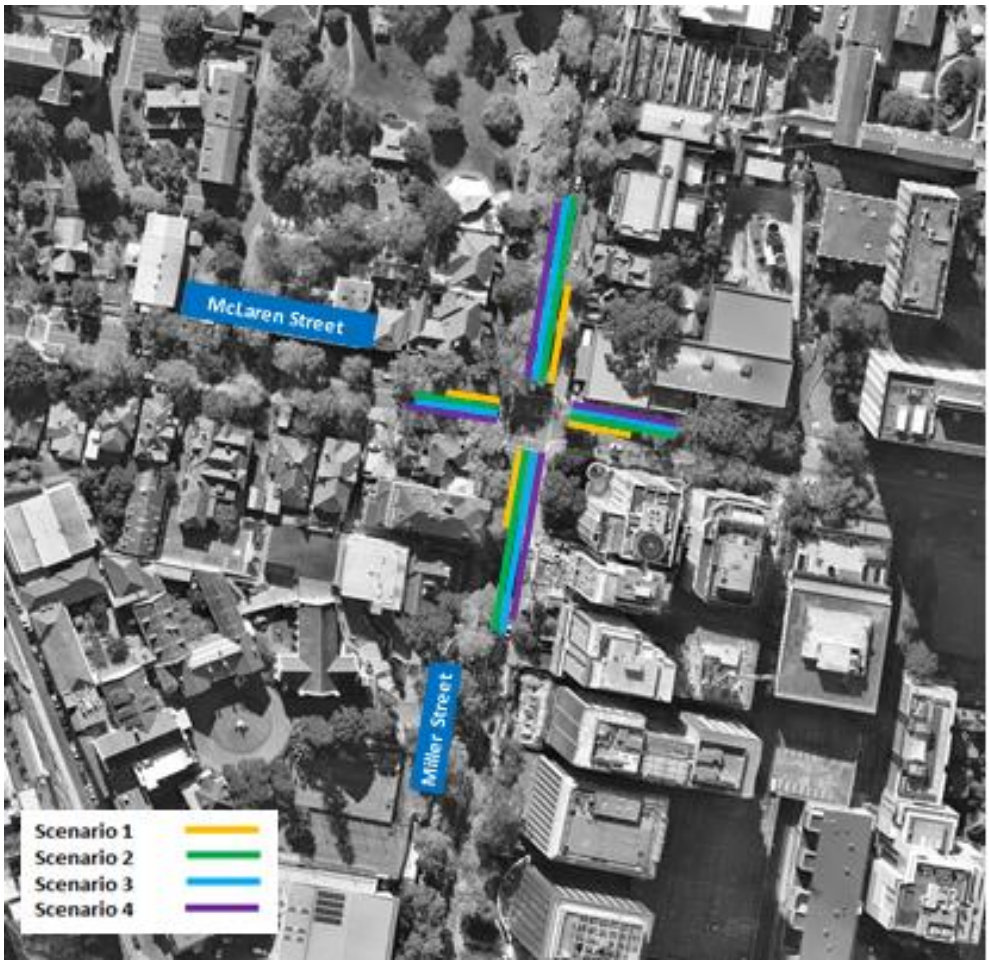
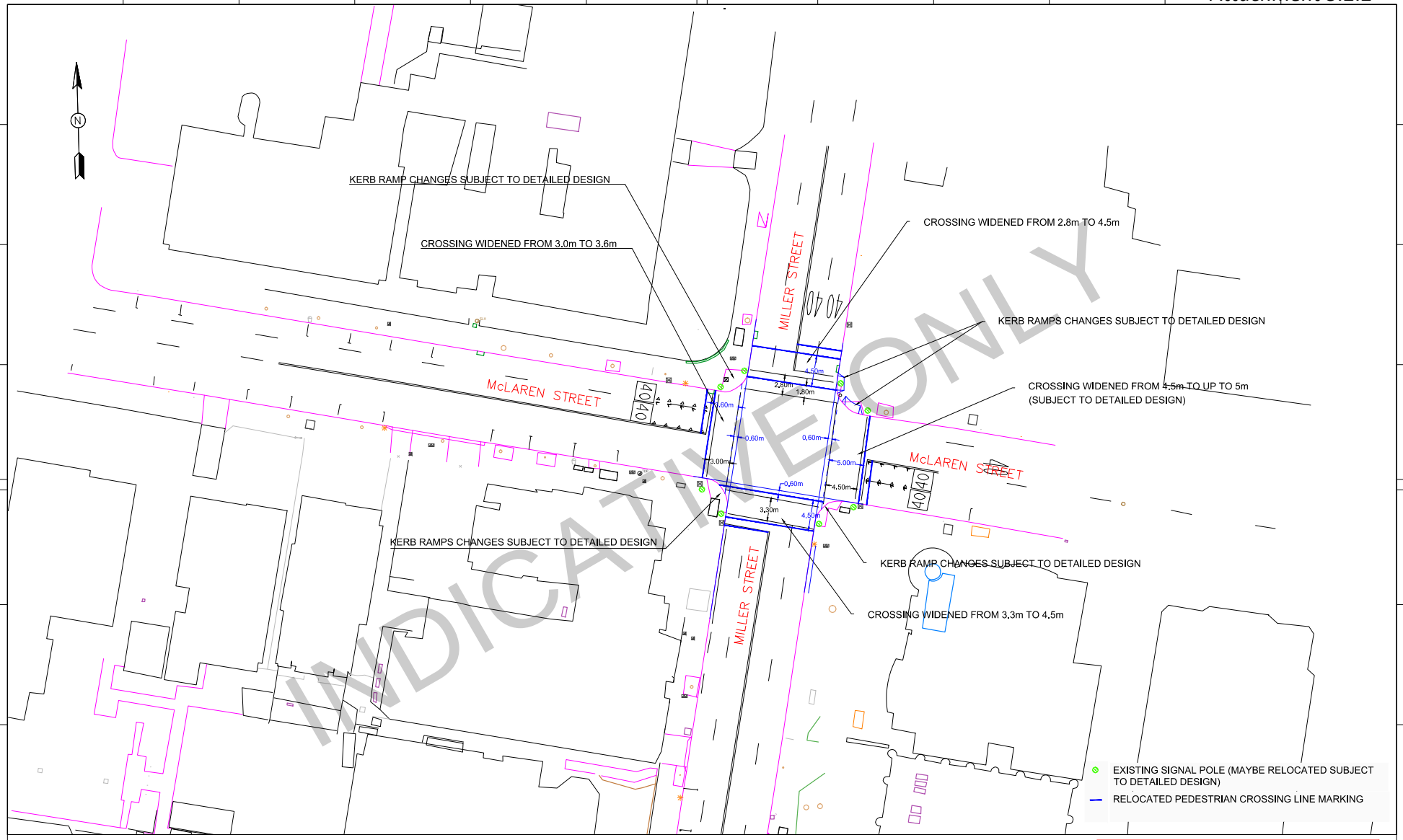


Figure E6 - Forecast PM Peak network queues (Miller Street / McLaren Street).



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Full Size 1:500 A3;
SCALE (m)

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ORG CHECK
DESIGN CHECK
APPROVED

SYDNEY METRO CITY & SOUTHWEST
VICTORIA CROSS STATION
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CROSSING WIDENING
CONCEPT DESIGN

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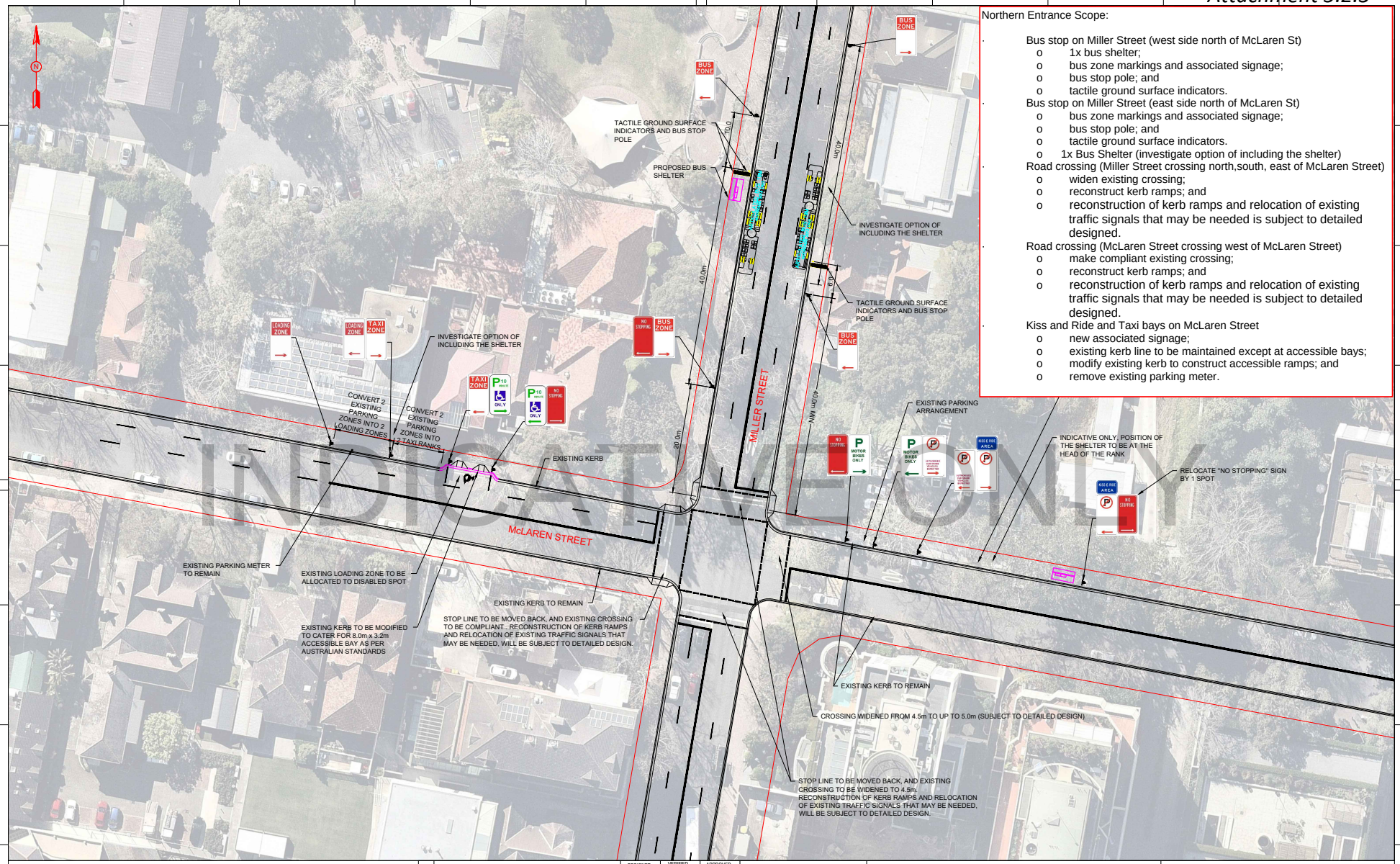

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VICTORIA CROSS STATION
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CROSSING WIDENING
CONCEPT DESIGN

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