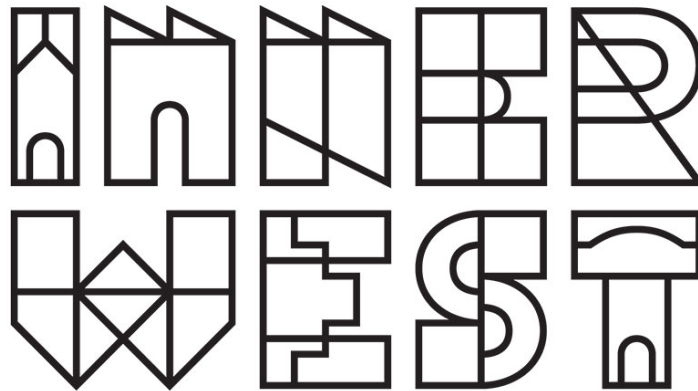


AGENDA



LOCAL TRAFFIC COMMITTEE MEETING

MONDAY 7 FEBRUARY 2022

10.00am

Function of the Local Traffic Committee

Background

Roads and Maritime Services (RMS) is legislated as the Authority responsible for the control of traffic on all NSW Roads. The RMS has delegated certain aspects of the control of traffic on local roads to councils. To exercise this delegation, councils must establish a local traffic committee and obtain the advice of the RMS and Police. The Inner West Council Local Traffic Committee has been constituted by Council as a result of the delegation granted by the RMS pursuant to Section 50 of the Transport Administration Act 1988.

Role of the Committee

The Local Traffic Committee is primarily a technical review and advisory committee which considers the technical merits of proposals and ensures that current technical guidelines are considered. It provides recommendations to Council on traffic and parking control matters and on the provision of traffic control facilities and prescribed traffic control devices for which Council has delegated authority. These matters are dealt with under **Part A** of the agenda and require Council to consider exercising its delegation.

In addition to its formal role as the Local Traffic Committee, the Committee may also be requested to provide informal traffic engineering advice on traffic matters not requiring Council to exercise its delegated function at that point in time, for example, advice to Council's Development Assessment Section on traffic generating developments. These matters are dealt with under **Part C** of the agenda and are for information or advice only and do not require Council to exercise its delegation.

Committee Delegations

The Local Traffic Committee has no decision-making powers. The Council must refer all traffic related matters to the Local Traffic Committee prior to exercising its delegated functions. Matters related to State Roads or functions that have not been delegated to Council must be referred directly to the RMS or relevant organisation.

The Committee provides recommendations to Council. Should Council wish to act contrary to the advice of the Committee or if that advice is not supported unanimously by the Committee members, then the Police or RMS have an opportunity to appeal to the Regional Traffic Committee.

Committee Membership & Voting

Formal voting membership comprises the following:

- one representative of Council as nominated by Council;
- one representative of the NSW Police from each Local Area Command (LAC) within the LGA, being Newtown, Marrickville, Leichhardt and Ashfield LAC's.
- one representative from the RMS; and
- State Members of Parliament (MP) for the electorates of Summer Hill, Newtown, Heffron, Canterbury, Strathfield and Balmain or their nominees.

Where the Council area is represented by more than one MP or covered by more than one Police LAC, representatives are only permitted to vote on matters which effect their electorate or LAC.

Informal (non-voting) advisors from within Council or external authorities may also attend Committee meetings to provide expert advice.

Committee Chair

Council's representative will chair the meetings.

Public Participation

Members of the public or other stakeholders may address the Committee on agenda items to be considered by the Committee. The format and number of presentations is at the discretion of the Chairperson and is generally limited to 3 minutes per speaker. Committee debate on agenda items is not open to the public.

AGENDA

- 1 Apologies
- 2 Disclosures of Interest
- 3 Confirmation of Minutes

Minutes of 6 December 2021 Local Traffic Committee Meeting 5
- 4 Matters Arising from Council's Resolution of Minutes
- 5 Part A – Items Where Council May Exercise Its Delegated Functions

Traffic Matters

ITEM		Page
LTC0222(1) Item 1	Canal Road and Charles Street, Leichhardt – Proposed Traffic Calming and Pedestrian Facility (GULGADYA-LEICHHARDT WARD/BALMAIN ELECTORATE/LEICHHARDT PAC)	10
LTC0222(1) Item 2	Dulwich Hill Station Precinct Public Domain Improvements - Stage 2 Works (Djarrawunang-Ashfield Ward / Summer Hill Electorate / Inner West PAC)	14
LTC0222(1) Item 3	Addison Road, Marrickville – Proposed new pedestrian refuge - Design Plan 10117_A ((Midjuburi-Marrickville Ward / NEWTOWN and SUMMER HILL ELECTORATES / INNER WEST PAC)	127
LTC0222(1) Item 4	O'Neill Street, Lilyfield (West of Foucart Street) - Proposed 'No Parking' restrictions (Baludarri-Balmain Ward/Balmain Electorate/Leichhardt PAC)	133
LTC0222(1) Item 5	Kegworth Street, Leichhardt At Intersection With Tebbutt Street–Intersection Development For Pedestrian And Children Safety–Traffic Facilities (GULGADYA-LEICHHARDT WARD/BALMAIN ELECTORATE/LEICHHARDT PAC)	135
LTC0222(1) Item 6	Intersection of Edward Street and Mungo Scott Place/WellesleyStreet-Interim treatment of intersection for improved sight line. (DJARRAWUNANG-ASHFIELD WARD/SUMMER HILL ELECTORATE/ASHFIELD PAC)	138

Parking Matters

ITEM		Page
LTC0222(1) Item 7	Annandale Street, Annandale - Removal of 'No Parking Police Vehicles Excepted' restrictions (GULGADYA-LEICHHARDT WARD/BALMAIN ELECTORATE/LEICHHARDT PAC)	142
LTC0222(1) Item 8	Marrickville Road, Marrickville near Livingstone Road - Implementation of short-term parking restrictions (MIDJUBURI-MARRICKVILLE WARD/ SUMMER HILL ELECTORATE/ INNER WEST PAC)	144

Late Items

Nil at time of printing.

6 Part B - Items for Information Only

Nil at the time of printing.

7 Part C - Items for General Advice

Nil at the time of printing.

8 General Business

9 Close of Meeting

**Minutes of Local Traffic Committee Meeting
Held remotely on 6 December 2021**

Meeting commenced at 10.04AM

ACKNOWLEDGEMENT OF COUNTRY BY CHAIRPERSON

I acknowledge the Gadigal and Wangal people of the Eora nation on whose country we are meeting today, and their elders past and present.

COMMITTEE REPRESENTATIVES PRESENT

Manod Wickramasinghe	IWC's Traffic and Transport Planning Manager (Chair)
Bill Holliday	Representative for Jamie Parker MP, Member for Balmain
Cathy Peters	Representative for Jenny Leong MP, Member for Newtown
Solon Ghosh	Transport for NSW (TfNSW)

NON VOTING MEMBERS IN ATTENDANCE

Adrian Prichard	Transit Systems – Inner West Bus Services
Colin Jones	Inner West Bicycle Coalition (IWBC)
George Tsaprounis	IWC's Coordinator Traffic Engineering Services (South)
Sunny Jo	IWC's Coordinator Traffic Engineering Services (North)
Jason Scoufis	IWC's Traffic and Parking Planner
Christina Ip	IWC's Business Administration Officer

VISITORS

Nil.

APOLOGIES:

SC Germaine Grant	NSW Police – Burwood Police Area Command
Sgt Charles Buttrose	NSW Police –Leichhardt Police Area Command

DISCLOSURES OF INTERESTS:

Nil.

CONFIRMATION OF MINUTES

The minutes of the Local Traffic Committee meeting held on 15 November 2021 were confirmed.

MATTERS ARISING FROM COUNCIL'S RESOLUTION OF MINUTES

The minutes of the Local Traffic Committee meeting held on 15 November 2021 are awaiting adoption.

EMAIL CONFIRMATION OF OFFICER'S RECOMMENDATION

The representative for NSW Police – Burwood supported the Officer's recommendations for the items in their PAC.

The representative for NSW Police – Leichhardt supported the Officer's recommendations for the items in their PAC.

LTC1221(1) Item 1 Rozelle North Local Area Traffic Management (LATM) Study

SUMMARY

Council has prepared a draft Local Area Traffic Management (LATM) study to address key community concerns about traffic, pedestrian and cycling facilities in the Rozelle North precinct area. The recommendations aim to align with Council policies and strategies, with an emphasis on improving pedestrian and cyclist movements, whilst retaining safe and acceptable traffic volume and speeds in local streets.

Officer's Recommendation

THAT:

1. The Committee endorse the draft Rozelle North Local Area Traffic Management (LATM) Study and the following treatments for community consultation:
 - a) Kerb blister in Wellington Street at Nelson Street;
 - b) Roundabout at Elliott Street/Terry Street/Glassop Street;
 - c) Kerb blisters in Glassop Street at White Street;
 - d) Raised pedestrian (zebra) crossing in Darling Street immediately south of Merton Street;
 - e) Raise existing at grade pedestrian (zebra) crossing in Wise Street immediately west of Darling Street;
 - f) Raise existing at grade pedestrian (zebra) crossing in Terry Street immediately south of Nagurra Place;
 - g) speed cushions in Terry Street between Norman Street and Thornton Street;
 - h) pedestrian (zebra) crossing in Wellington Street, immediately south of Terry Street;
 - i) pedestrian (zebra) crossing in Terry Street, immediately west of Wellington Street;
 - j) kerb extension and accessible parking space on eastern side of Darling Street immediately south of Nelson Street;
 - k) 10 km/h Shared Zone in Tilba Avenue;
 - l) Kerb extensions in Wellington Street immediately north of Merton Street ;
 - m) Terry Street near Wise Street linemarking; and
 - n) Convert Crystal Street to one way clockwise and investigate additional parking capacity
2. The report be placed on Public Exhibition, providing a minimum 28 days for community feedback and the results be reported back to the Traffic Committee.

DISCUSSION

The Committee members agreed with the Officer's recommendation.

COMMITTEE RECOMMENDATION

THAT:

1. The Committee endorse the draft Rozelle North Local Area Traffic Management (LATM) Study and the following treatments for community consultation:
 - a) Kerb blister in Wellington Street at Nelson Street;
 - b) Roundabout at Elliott Street/Terry Street/Glassop Street;
 - c) Kerb blisters in Glassop Street at White Street;
 - d) Raised pedestrian (zebra) crossing in Darling Street immediately south of Merton Street;
 - e) Raise existing at grade pedestrian (zebra) crossing in Wise Street immediately west of Darling Street;
 - f) Raise existing at grade pedestrian (zebra) crossing in Terry Street immediately south of Nagurra Place;
 - g) speed cushions in Terry Street between Norman Street and Thornton Street;
 - h) pedestrian (zebra) crossing in Wellington Street, immediately south of Terry Street;
 - i) pedestrian (zebra) crossing in Terry Street, immediately west of Wellington Street;
 - j) kerb extension and accessible parking space on eastern side of Darling Street immediately south of Nelson Street;
 - k) 10 km/h Shared Zone in Tilba Avenue;
 - l) Kerb extensions in Wellington Street immediately north of Merton Street ;
 - m) Terry Street near Wise Street linemarking; and
 - n) Convert Crystal Street to one way clockwise and investigate additional parking capacity
2. The report be placed on Public Exhibition, providing a minimum 28 days for community feedback and the results be reported back to the Traffic Committee.

For motion: Unanimous

LTC1221(1) Item 2 Darling Street between Mort Street and Curtis Road, Balmain - Road Occupancy - Anzac Day Dawn Service (Baludarri - Balmain Ward/ Balmain Electorate/ Leichhardt PAC)

SUMMARY

In preparation to mark the ANZAC Day Dawn Service 2021 on Monday, 25 April 2022, Inner West Council is organising the ANZAC Day dawn Service at the Loyalty Square War Memorial, Balmain. To facilitate the event, it is proposed to close Darling Street between

Mort Street and Curtis Road between 2:30am and 9:30am.

Officer's Recommendation

THAT the temporary road closure of Darling Street (Mort Street to Curtis Road), Balmain on Monday, 25 April 2022 between 2.30am – 9.30am be supported, subject to the following conditions:

1. Latest government and health advice on Covid-19 is followed at the time of the event including gatherings and/or social distancing restrictions;
2. All affected residents and businesses, including the NSW Police Local Area Commander, Fire & Rescue NSW and NSW Ambulance Services be notified in writing, by the applicant, of the proposed temporary road closure at least 14 days in advance of the closure with the applicant making reasonable provision for stakeholders;
3. That an unencumbered passage minimum 3.0m wide be available for emergency vehicles through the closed section of Darling Street, Balmain; and
4. The occupation of the road carriageway must not occur until the road has been physically closed; and

DISCUSSION

The TfNSW representative requested a copy of the TMP for endorsement.

The Committee members agreed with the Officer's recommendation.

COMMITTEE RECOMMENDATION

THAT the temporary road closure of Darling Street (Mort Street to Curtis Road), Balmain on Monday, 25 April 2022 between 2.30am – 9.30am be supported, subject to the following conditions:

- 1. Latest government and health advice on Covid-19 is followed at the time of the event including gatherings and/or social distancing restrictions;**
- 2. All affected residents and businesses, including the NSW Police Local Area Commander, Fire & Rescue NSW and NSW Ambulance Services be notified in writing, by the applicant, of the proposed temporary road closure at least 14 days in advance of the closure with the applicant making reasonable provision for stakeholders;**
- 3. That an unencumbered passage minimum 3.0m wide be available for emergency vehicles through the closed section of Darling Street, Balmain; and**
- 4. The occupation of the road carriageway must not occur until the road has been physically closed.**

For motion: Unanimous

LTC1221(1) Item 3 Traffic Committee Schedule 2022

SUMMARY

The proposed schedule of the Local Traffic Committee meetings has been prepared for the

2022 calendar year. It is recommended that the proposed meeting schedule be received and noted.

Officer's Recommendation

THAT the proposed schedule of meetings of the Local Traffic Committee for the 2022 calendar year be received and noted.

DISCUSSION

Meetings are proposed to be held face-to-face at Ashfield Service Centre, subject to COVID restrictions.

The Committee members agreed with the Officer's recommendation.

COMMITTEE RECOMMENDATION

THAT the proposed schedule of meetings of the Local Traffic Committee for the 2022 calendar year be received and noted.

For motion: Unanimous

General Business

LTC1021(1) Item 4 Safety concerns with Regional Route 7 (RR7)

The IWBC representative raised concerns with the extension of RR7 into Summer Hill. The representative suggested a number of improvements including extending the shared cycle path to Cadigal Reserve and Malthouse Way, and installing pram ramps at the Carlton Crescent/Longport Street roundabout and speed cushions at the approach of the roundabout. Council Officers to meet with the IWBC representative on site to discuss concerns.

LTC1021(1) Item 5 Request to improve pedestrian safety and access around schools

The representative for the Member for Newtown asked for an update on the request to improve pedestrian safety and access around schools submitted by a community advocacy group. Council Officers advised that the Road Safety Officer is reviewing the request. In addition, Council is arranging for a pedestrian crossing audit to be conducted around schools.

LTC1021(1) Item 6 Pedestrian access to Callan Park from Perry Street, Lilyfield

The representative for the Member for Balmain received feedback from a resident that Perry Street, Lilyfield is difficult to cross to access Callan Park and asked whether a marked pedestrian crossing has been considered to improve access this state road. The TfNSW representative advised that they are considering pedestrian access improvements at the Balmain Road/Perry Street and Balmain Road/Cecily Street intersections.

Meeting closed at 10.24am.

Item No: LTC0222(1) Item 1

Subject: CANAL ROAD AND CHARLES STREET, LEICHHARDT – PROPOSED TRAFFIC CALMING AND PEDESTRIAN FACILITY (GULGADYA-LEICHHARDT WARD/BALMAIN ELECTORATE/LEICHHARDT PAC)

Prepared By: Sunny Jo - Coordinator Traffic Engineering Services (North)

Authorised By: Manod Wickramasinghe - Traffic and Transport Planning Manager

SUMMARY

A review has been undertaken in Canal Road and Charles Street following a request for an improvement to pedestrian facilities to improve road safety. Adjustments to the shared path, kerb ramp locations, removal of some vegetation to improve sight distances, and speed cushions are proposed to improve safety.

Canal Road and Charles Street provides vehicular access to Blackmore Oval and the Canal Road Filming Centre. It is also an active transport link from Hawthorne Light Rail stop to the Bays Run circuit and to the Leichhardt North Light Rail stop and the pedestrian overpass across City West Link Road.

RECOMMENDATION

THAT:

1. The kerb ramps and path adjustments be made at the road bend of Canal Road and Charles Street as shown in the attached plan;
2. That changes be made to signage in Charles Street and Canal Road as shown in the attached plan; and
3. Two asphalt speed cushions and associated line marking and signage in Charles Street approximately 50m west of the road bend near the light rail underpass be included in Council's future Capital Works Program with an estimated cost of \$20,000.

BACKGROUND AND OTHER STAFF COMMENTS

Council received a request for pedestrian facility improvements including a pedestrian crossing at Canal Road, Leichhardt. The location is used by pedestrians to access the Leichhardt North Light Rail stop and the pedestrian overpass across City West Link Road.

Two crossing locations were reviewed by Council staff and examined ways to improve the existing pedestrian crossing facilities. Both locations are widely used by the community as a recreational path from Hawthorne Light Rail stop to the Bays Run circuit, and to the Leichhardt North Light Rail stop and the pedestrian overpass across City West Link Road.

An examination of the crash database indicates no reported accidents in the subject section of Canal Road or Charles Street.

Canal Road comprises of mainly unformed angle parking along the Hawthorne Canal frontage and provides two way carriageway with low traffic volumes. The roadway is generally shared with recreational users and a separated path is provided from Blackmore Oval, connecting to the Bay Run circuit. Along Charles Street, the road layout is two-way with no on-street parking.

Speed and volume data in Canal Road (2017), indicated an average traffic volume of 830 vehicles per day with 85th percentile speeds of 44.6km/h and 49.6km/h for eastbound and westbound speeds respectively.

At the western road bend at Canal Road, two existing raised thresholds are set up on both approaches to lower vehicle speeds as the area has a high level of pedestrian and bicycle movements. Currently the pedestrian ramps on both sides of the bend do not align and require pedestrians to cross at an angle and not the shortest distance across the road. It is proposed to relocate the crossing location so that visibility is maximised to both approaches.

At the eastern road bend, a kerb ramp is provided along the western side and is intended to connect to a driveway on the other side in order to reach the Leichhardt North Light Rail stop and the City West Link Road overpass. Site investigations suggest that this location would not be a suitable location for a marked foot crossing as visibility is compromised and the warrants for a pedestrian crossing would not be met given the low traffic numbers. As an alternative, pedestrian warning signs are proposed with a 75mm height asphalt speed cushions in Charles Street, approximately 50m west of this location.

FINANCIAL IMPLICATIONS

The estimated cost of two asphalt speed cushions is \$20,000, with the path adjustment estimated at \$10,000. These will be listed for consideration in Council's future Capital Works Program.

ATTACHMENTS

1. [Download](#) Proposed works and signage - Canal Road and Charles Street, Leichhardt





Item No: LTC0222(1) Item 2

Subject: DULWICH HILL STATION PRECINCT PUBLIC DOMAIN IMPROVEMENTS - STAGE 2 WORKS (DJARRAWUNANG-ASHFIELD WARD / SUMMER HILL ELECTORATE / INNER WEST PAC)

Prepared By: Stephen Joannidis - Urban Amenity Improvement - Delivery Manager

Authorised By: Manod Wickramasinghe - Traffic and Transport Planning Manager

SUMMARY

Cardno was commissioned for the traffic and transport assessment for the detailed design of the Dulwich Hill Station Precinct Public Domain Improvements (DHSPDI). Council adopted the Master Plan for Dulwich Hill Station Precinct at its meeting held on 13 August 2019. The Dulwich Hill Station Public Domain Master Plan provides the Dulwich Hill community with a plan to transform the streets and public spaces around the station into a pedestrian oriented village.

Dulwich Hill Station Precinct Public Domain Improvement works are to be delivered in two stages. Approval for relevant works in Stage 1 were submitted and approved by the Local Traffic Committee in July, 2020. Stage 1 works involved:

- A raised, signalised intersection at Wardell Road / Dudley Street;
- Footpath treatments and tree plantings on the southern side of Dudley Street; and
- A kerb extension on the southern side of Dudley Street at the intersection with Wardell Road.

This assessment is for Stage 2 works. The following works proposed to be undertaken within Stage 2 include:

- A raised entry threshold at the approach roads to Wardell Road and Ewart Street intersection (i.e. one on Wardell Road and a second one on Ewart Street – west of the intersection)
- Converting the existing Ewart Street threshold to a raised entry threshold, in line with the other thresholds built for the Dulwich Hill Station Precinct Public Domain Improvements;
- Tree plantings, garden beds and a rain garden; and
- New Bluestone Pavers for footpaths.

The proposed upgrades will transform the public spaces surrounding the station into a pedestrian oriented village. Many of the upgrades were developed to improve pedestrian and cyclist safety and efficiency throughout the precinct and facilitate access to and from the station. Overall, the upgrades align well with the existing and planned pedestrian and cycling networks and are expected to improve the safety and efficiency of the station precinct. It is noted that Council has received Blackspot funding to upgrade the entry thresholds.

RECOMMENDATION

THAT the following works proposed to be undertaken as part of Stage 2 be APPROVED:

1. New in road trees, garden beds, raingarden and footpath treatments;
2. A raised threshold with pedestrian (zebra) crossing at Bedford Crescent (subject to meeting TfNSW warrants); and

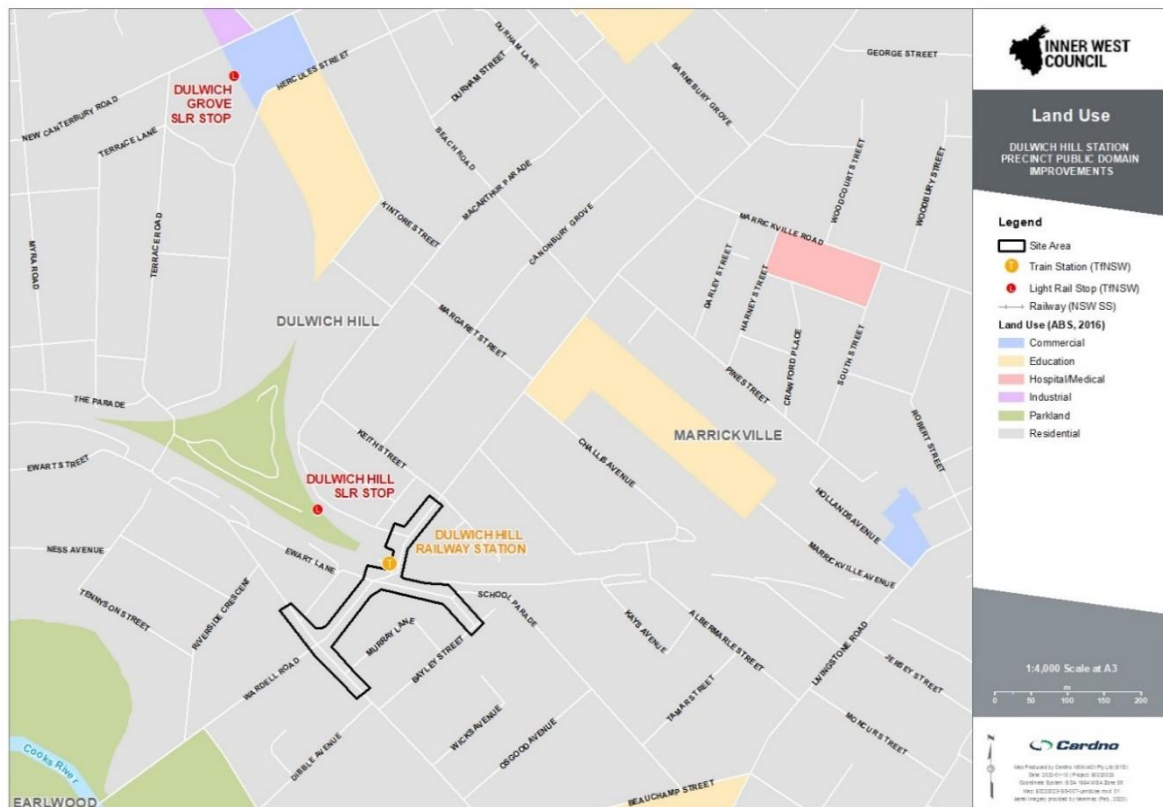
Raised thresholds to reduce vehicle speeds and signify the extent of a pedestrian-oriented village.

BACKGROUND

The Dulwich Hill Station Precinct (DHSP) site area includes:

- Wardell Road from Ewart Street to the north side of the Keith Street / Wilga Avenue intersection;
- Dudley Street;
- Ewart Street between Ewart Lane and Murray Lane; and
- Bedford Crescent.

The figure below illustrates the study area relative to the surrounding road network and different land uses around the study area. The study area consists of primarily residential along with some commercial/business area along Wardell Road between Ewart Street and Keith Street.



Dulwich Hill Station is a busy railway station and it along with the local commercial area generates significant pedestrian activity. Wardell Road is a busy regional road carrying a high volume of traffic and in combination with the high pedestrian activity it has been a Blackspot for numerous years.

In addition, local development and the implementation of the Sydney Metro Upgrades will see higher volumes of pedestrian movements which may compound the already poor crash history of the locality.

In 2020 a Blackspot funding application was submitted, and funding of \$341,250 was approved on 18 May 2021 for Dulwich Hill Station Precinct Upgrade works. Specifically, works to install entry thresholds, install slow point, raised threshold / horizontal deviation at mid-block location and conflict points (intersections and pedestrian crossings).

In the previous Traffic Committee report for Stage 1 works (6 July 2020 - LTC0720 Item 7) approval was sought for the raised, signalised intersection at Wardell Road / Dudley Street to address safety issues at the existing pedestrian crossing where crashes have been recorded, particularly as pedestrian movement increases with the implementation of the Sydney Metro upgrades. In Stage 2, thresholds are proposed to be utilised to establish a 40kmph zone at the DHSPDI as part of works to transform this area into a pedestrian friendly zone in accordance with the masterplan by Plummer & Smith.

FINANCIAL IMPLICATIONS

The project is fully funded by the Inner West Council and DPIE. It is noted that TfNSW has also contributed \$342,250 through the Blackspot Program.

The project has been listed in Councils Capital Works Program and funding has been committed for stage 2 in the 2021/22 financial year budget.

PUBLIC CONSULTATION

Public Consultation has already been undertaken during the master plan stage. This proposal has also received community feedback. Feedback included concerns over pedestrians mistaking the raised thresholds for right of way, light pollution, desire for more greenery and concerns for reduced parking, especially mobility parking scheme parking spots. Actions undertaken as a result of public consultation include:

- Converting the proposed raised threshold at Bedford Crescent to a zebra crossing to address concerns over right of way at raised thresholds;
- Removing tactile indicators and extending garden beds at remaining proposed raised thresholds to address concerns over right of way at raised thresholds;
- Clarifying that Mobility Parking Scheme parking spots have been shifted, not removed;
- Reviewing lighting to satisfy community concerns over light pollution; and
- Adding more road trees to increase greenery.

CONCLUSION

The upgrades will improve the safety and efficiency of pedestrians and cyclist movements throughout the precinct and facilitate access to and from the station.

ATTACHMENTS

1. [Traffic and Transport Assessment](#)
2. [80220023-PDW-1311-1317 - Signage and Linemarking plans, Cardno](#)
3. [80220023 220120 Transport Assessment Addendum for Stage 2](#)
4. [DHSPDI - TCS for the intersection with Wardell Road and Dudley Street](#)
5. [DHSPDI-40k zones](#)
6. [DHSPDI - TCS for the intersection with Wardell Road and Ewart Street](#)

Traffic and Transport Assessment

Dulwich Hill Station Precinct Public
Domain Improvements

80220023



Prepared for
Inner West Council

24 June 2020





Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

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Public Domain Improvements

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Date 24 June 2020

Version Number 2

Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
1	1/05/2020	Issued for Council Comments	Sabal Sharma/Lukas Labutis	Ivo Pais
2	24/06/2020	Updates Based on Council Comments	Sabal Sharma	Lukas Labutis

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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

80220023 | 24 June 2020 | Commercial in Confidence

ii



Table of Contents

1	Introduction	1
1.1	Background	1
1.2	Objectives	1
1.3	Study area	1
2	Background review	4
2.1	Wayfinding guidelines	4
2.2	Inner West Council documents	5
2.3	NSW Government	8
3	Crash data review	9
3.1	Crash locations	9
3.2	Crash severity and type	9
3.3	Crashes by road user	10
3.4	Lighting conditions	11
4	Active transport assessment	12
4.1	Pedestrian network	12
4.2	Cycling network	17
4.3	Station precinct public domain active transport improvements	21
5	Wayfinding site audit	24
5.1	Wayfinding walks	24
5.2	Summary of key site audit observations	37
5.3	Existing signage	37
6	Station precinct wayfinding assessment	42
6.1	Principles and approach	42
6.2	Key destinations	43
6.3	O-D routes	43
6.4	Gap analysis	46
6.5	Types of signs considered	46
6.6	Proposed wayfinding scheme	47
7	Traffic modelling	51
7.1	Intersection counts	51
7.2	Interpretation of modelling results	53
7.3	Existing conditions intersection performance results	53
8	Traffic signal warrants	56
8.1	Turning movement volumes	56
8.2	Signal warrant assessment	56
8.3	Proposed signalised intersection	60
8.4	Conclusion	64
9	40 km/hr high pedestrian activity area	65



9.1	Existing road network	65
9.2	Candidate 40 km/hr HPAA	66
9.3	Traffic management devices	67
9.4	Summary statement	74

Appendices

Appendix A traffic survey results

Appendix B sidra modelling outputs

Tables

Table 1-1	Staging plan	3
Table 2-1	CSP outcomes and strategies for unique, liveable and networked neighbourhoods	5
Table 2-2	LSPS relevant planning priorities and objectives	6
Table 3-1	Crash summary by severity	10
Table 3-2	Crash Summary by Road User Movement (RUM) code	10
Table 3-3	Crash involvement by road user	10
Table 4-1	Active transport impacts of proposed Stage A precinct works	23
Table 5-1	List of existing wayfinding signs within the Dulwich Hill Station precinct	37
Table 6-1	Wayfinding strategic directions and principles	42
Table 6-2	Wayfinding gaps	46
Table 6-3	Proposed wayfinding signs	48
Table 7-1	Level of Service Criteria for Intersections	53
Table 7-2	Wardell Road/Ewart Street SIDRA Results	54
Table 7-3	Wardell Road/Ewart Street SIDRA Results	55
Table 8-1	Signalised Intersection Warrant Assessment (Traffic Demand)	57
Table 8-2	Signalised Intersection Warrant Assessment (Continuous Traffic)	57
Table 8-3	Signalised Intersection Warrant Assessment (Pedestrian Safety)	58
Table 8-4	Signalised Intersection Warrant Assessment (Pedestrian Safety-high speed road)	59
Table 8-5	Signalised Intersection Warrant Assessment (Crashes)	59
Table 8-6	Wardell Rd/Dudley St signalised intersection Result Summary	62
Table 8-7	Signalisation impact on Wardell Rd/Ewart St intersection Result Summary	63
Table 8-8	Wardell Rd/Dudley Street average delay and LOS comparison	63
Table 8-9	Queuing Comparison	63
Table 9-1	Key Roads	65
Table 9-2	HPAA Warrants	67
Table 9-3	Masterplan Proposed Treatments	69
Table 9-4	40 km/hr HPAA Signage	71



Figures

Figure 1-1	Study Area	2
Figure 1-2	Staging plan	3
Figure 3-1	Crashes in the vicinity of Dulwich Hill Station	9
Figure 3-2	Pedestrian and cyclist crashes with RUM codes	11
Figure 4-1	Dulwich Hill Station walking catchment and key destinations	13
Figure 4-2	Existing and planned pedestrian infrastructure	15
Figure 4-3	Key pedestrian issues and features	16
Figure 4-4	Existing and planned cycling infrastructure	18
Figure 4-5	Key cycling issues and features	20
Figure 4-6	Proposed Dulwich Hill Station precinct improvements	22
Figure 5-1	Wayfinding walks undertaken	25
Figure 5-2	Map of existing wayfinding signs within the Dulwich Hill Station precinct	41
Figure 6-1	O-D routes identified for wayfinding signage	45
Figure 6-2	Examples of pylons, flag signs and finger signs	47
Figure 6-3	Proposed wayfinding scheme	50
Figure 7-1	2020 AM Peak	52
Figure 7-2	2020 PM Peak	52
Figure 7-3	Wardell Road/Ewart Street SIDRA geometry	54
Figure 7-4	Wardell Road/Dudley Street SIDRA geometry	55
Figure 8-1	Design of intersection of Wardell Rd/Dudley St	60
Figure 8-2	SIDRA Layout of Wardell Rd/Dudley St Signalised intersection	61
Figure 8-3	Scramble Crossing TCS Phasing Arrangements	62
Figure 9-1	40km/h HPAA criteria flowchart	66
Figure 9-2	Existing traffic management infrastructure	68
Figure 9-3	Dulwich Hill Station Precinct Upgrades	70
Figure 9-4	The typical position of speed signs at intersections	72
Figure 9-5	Proposed HPAA zone and indicative location of signage	73



1 Introduction

1.1 Background

Cardno has been commissioned by Inner West Council (Council) for a traffic and transport assessment for the detailed design of the Dulwich Hill Station Precinct Public Domain Improvements.

1.2 Objectives

The purpose of the study is to develop a traffic and transport assessment to inform the detailed design of the Dulwich Hill Station Precinct Public Domain Improvements. There are several key components to the preparation of the traffic and transport assessment. These include:

- > Review background reports and strategies and summarise the findings;
- > Review and map the available crashes in the study area involving pedestrians and vehicles;
- > Assess the proposed active transport amendments within the study area;
- > Review the wayfinding signage plans for the Dulwich Hill station;
- > Undertake and review the traffic survey of the local traffic network including pedestrian volumes;
- > Assess the performance of the existing local traffic network;
- > Undertake a traffic signal warrant assessment for the proposed signalised intersection at Wardell Road / Dudley Street;
- > Identify High Pedestrian Activity Areas appropriate for 40 km/h speed zones and determine appropriate signage; and
- > Prepare a traffic management plan per the Traffic Management Plan (TMP) guidelines.

1.3 Study area

1.3.1 Dulwich Hill Station Precinct

The Dulwich Hill Station Precinct (DHSP) is located in the inner west Sydney suburb of Dulwich Hill. The site area is located approximately 8km southwest from the Sydney CBD. The precinct is located close to the southern boundary of the Inner West LGA.

The DHSP site area includes:

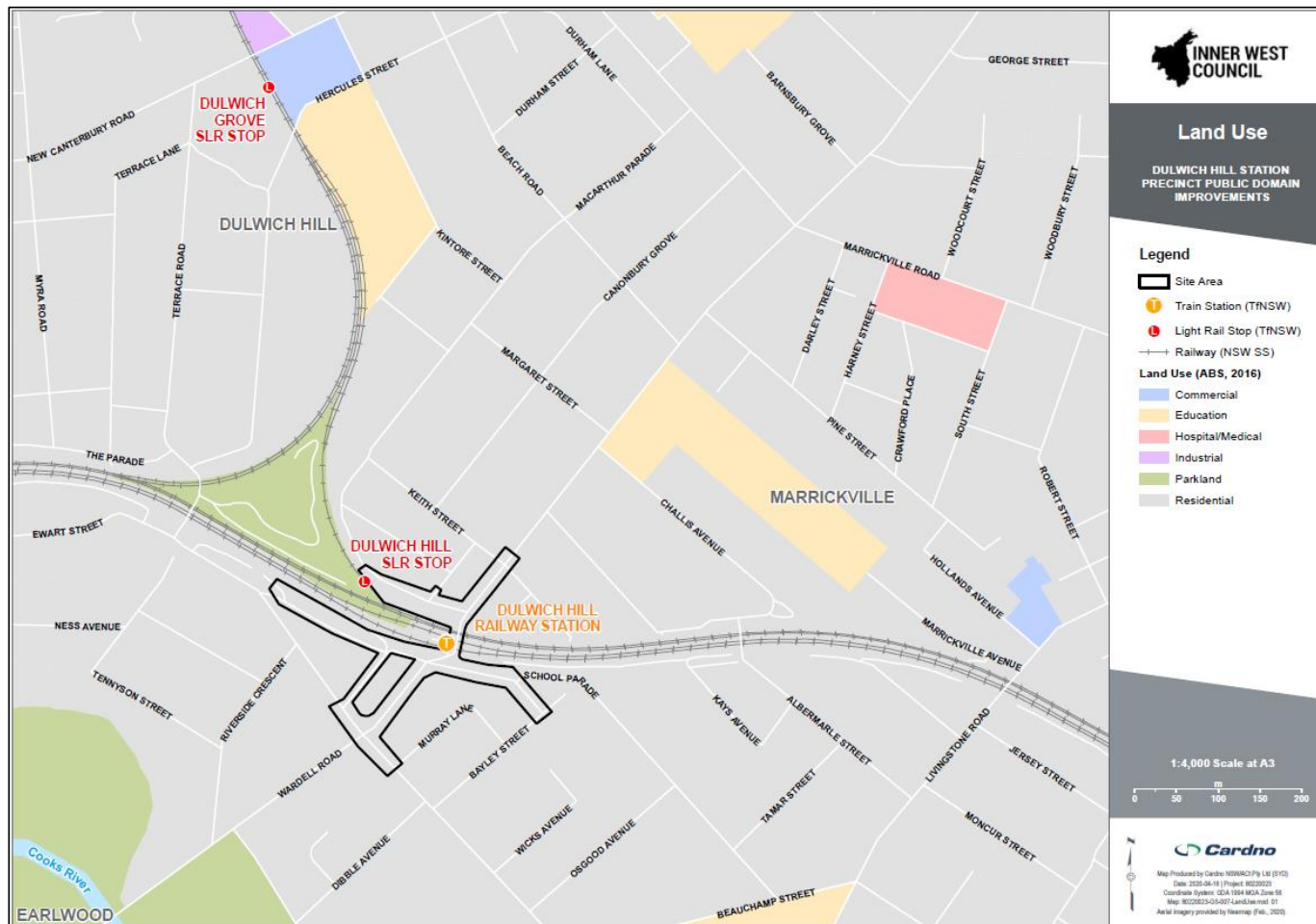
- > Wardell Road from Ewart Street to the north side of the Keith Street / Wilga Avenue intersection;
- > Dudley Street;
- > Ewart Street between Ewart Lane and Murray Lane; and
- > Bedford Crescent.

Figure 1-1 illustrates the study area relative to the surrounding road network and different land uses around the study area. The study area consists of primarily residential along with some commercial/business area along Wardell Road between Ewart Street and Keith Street.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 1-1 Study Area





1.3.2 Staging Plan

The detailed design of the Dulwich Hill Station Precinct Public Domain Improvements consists of the following stages described in **Table 1-1** and shown in **Figure 1-2** below.

Figure 1-2 Staging plan



Table 1-1 Staging plan

Stage	Part
A	Part 2. Dudley Street both sides
	Part 4. Raised signalised intersection for improved pedestrian movements
B	Part 3. Raised entry thresholds
C	Part 5a. Wardell Rd from Wilga Ave to Dudley St and to Dudley St
	Part 5a. Wardell Rd from Dudley St to Ewart Street
D	Part 5b. Paving, Kerb & Gutter, North side Ewart Street, Murray Lane to Wardell Rd
	Part 5b. Paving, Kerb & Gutter, North side Ewart Street, Ewart Lane to Wardell Rd
	Part 7. Ewart Lane

This assessment is only for Stage A of the Master Plan. This includes the intersection at Wardell Road / Dudley Street and both sides of Dudley Street,

2 Background review

2.1 Wayfinding guidelines

2.1.1 Wayfinding Planning Guide

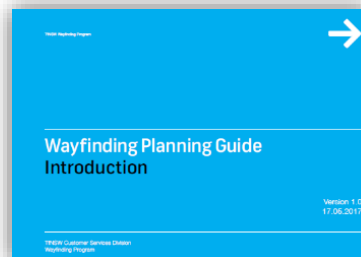
Transport for NSW (TfNSW) has developed a comprehensive system of signage and wayfinding practices for different public transport modes. The *Wayfinding Planning Guide* (TfNSW, 2018) (the Guide) details the principles for wayfinding for stations and interchanges as well as the Sydney Metro product.

The Guide covers aspects such as suitability of signage size, positioning, visibility, and legibility. It justifies why certain standards are adopted and upheld, e.g. customers can miss signs that a poorly sized or placed at inappropriate heights, therefore size and height is best considered from the perspective of the average customer's own height and likely proximity, as they move along key corridors.

The Guide outlines wayfinding requirements for customers during the following stages and zones:

- > Connect and welcome;
- > Entry;
- > Orientation and circulation;
- > Platforms; and
- > Exit.

The Guide also outlines various options for digital wayfinding signage and suggests how they could be used across the Sydney Metro network. Digital wayfinding signage can enhance directions to public transport services and provide streamlined information to aid customers in their decision-making.



2.1.2 City of Sydney Wayfinding Strategy

The aim of the *City of Sydney (CoS) Wayfinding Strategy* (City of Sydney, 2012) is to "provide a clear and coordinated framework to deliver consistent wayfinding components and information to direct people to their desired destinations, and to encourage people to walk with comfort and confidence".

The strategy provides a strategic framework to inform future design development and implementation for pedestrian wayfinding in the CoS. This includes strategic directions, wayfinding system components, design development, signage information design and signage placement strategy.

As part of the development of the strategy, background research was undertaken and included test walk evaluations within the CoS, site evaluations and a benchmark review of best practice within Australia and worldwide. Many examples are provided for guidance and analysed to determine the effectiveness of wayfinding implementation.

The principles from the strategy have been adopted for this study to help provide a consistent, legible wayfinding system throughout the Dulwich Hill Station precinct.



2.2 Inner West Council documents

2.2.1 Community Strategic Plan

The *Community Strategic Plan* (Inner West Council, 2018) (CSP) was produced by Council with community input to identify a vision of how the Inner West Council might best evolve to satisfy community needs over the next two decades. The plan implementation will involve collaboration with key stakeholders and Council has committed to reporting back to the community every four years on progress.

This study can help to give effect to the CSP, particularly in regards to the strategic direction of unique, liveable and networked neighbourhoods. The relevant outcomes, strategies and indicators of this strategic direction are shown in **Table 2-1**.

Table 2-1 CSP outcomes and strategies for unique, liveable and networked neighbourhoods

No.	Outcome	Strategies	Indicators
2.3	Public spaces are high-quality, welcoming and enjoyable places, seamlessly connected with their surroundings.	<ul style="list-style-type: none"> Plan and deliver public spaces that fulfil and support diverse community needs and life Ensure private spaces and developments contribute positively to their surrounding public spaces 	<ul style="list-style-type: none"> Community satisfaction with managing development in the area. Community satisfaction with long-term planning for Council area. Satisfaction with safety of public spaces. Satisfaction with access to public transport. People who travel to work by public transport. Satisfaction with Cycleways. Satisfaction with maintaining footpaths. Community satisfaction with management of parking.
2.5	Public transport is reliable, accessible, connected and enjoyable.	<ul style="list-style-type: none"> Advocate for improved public transport services to, through and around Inner West. Advocate for, and provide, transport infrastructure that aligns to population growth. 	
2.6	People are walking, cycling and moving around Inner West with ease.	<ul style="list-style-type: none"> Deliver integrated networks and infrastructure for transport and active travel. Pursue innovation in planning and providing new transport options Ensure transport infrastructure is safe, connected and well maintained 	

2.2.2 Local Strategic Planning Statement

The *Local Strategic Planning Statement* (Inner West Council, 2019) (LSPS) provides a land use planning framework for the Local Government Area (LGA) to achieve the vision set for the LGA in 2036:

“a place of creative, connected, sustainable and productive neighbourhoods as vibrant, innovative and diverse as our community”.

The LSPS presents six strategic themes:

1. An ecologically sustainable Inner West;
2. Unique, liveable, networked neighbourhoods;
3. Sustainable transport;
4. Creative communities and a strong economy;
5. Caring, happy, healthy communities; and
6. Progressive local leadership.

The transport and public domain related planning priorities and objectives of the LSPS are shown in **Table 2-2**.



Table 2-2 LSPS relevant planning priorities and objectives

No.	Planning priority	Objectives
7	Provide for a rich diversity of functional, safe and enjoyable urban spaces connected with and enhanced by their surroundings	<ul style="list-style-type: none"> Provide urban spaces that support community needs and creative places
8	Provide improved and accessible sustainable transport infrastructure	<ul style="list-style-type: none"> Safe, user-friendly active transport infrastructure forms an integral part of Inner West and supports all types of trips Public transport usage substantially increases because it serves all users and gets people where they need to go Shared transport forms an integral part of Inner West's transport network, reducing private vehicle ownership Inner West has an adaptive and responsive parking framework for private vehicles that responds to function, location and access to alternative transport Inner West embraces emerging transport technology that reduces our carbon footprint and improves travel information and services Land uses support freight, servicing and delivery corridors and reduce conflict between different land users A sustainable freight, delivery and service network that benefits Inner West
11	Provide accessible facilities and spaces that support active, healthy communities	<ul style="list-style-type: none"> The community has access to a wide range of accessible high quality open spaces, community facilities, recreational and cultural spaces A Blue/Green Grid promotes active and healthy lifestyles

The LSPS also designates the area immediately south of Dulwich Hill Station as a local centre / urban hub. Future green links passing near or through Dulwich Hill Station are also shown connecting north-south along the anticipated GreenWay and east-west following the T3 Bankstown rail line.

2.2.3 Draft Integrated Transport Strategy

The Draft Integrated Transport Strategy reviews the previous strategies and plans from the three councils merged into Inner West Council (Ashfield, Leichhardt and Marrickville), the existing and future transport networks, and the travel demand and behaviour to present a multi-modal transport strategy for the entire LGA.

A vision was developed through stakeholder consultation as follows:

"Growing numbers of Inner West residents, workers and visitors prefer to walk, cycle and use public transport because it is safe, convenient, enjoyable and healthy. Everyone is connected to their community and local services, and can access educational, retail, cultural and recreational districts, as well as jobs and services across local and regional areas. The transport network enhances local economic vitality, with freight and goods movements are separated from people by space and/ or time".



A modal hierarchy was developed and includes walking as the highest priority, followed by cycling, public transport, delivery services and freight, and private vehicles and taxis.

Core principles were developed based on the review of council strategies and plans, the vision and modal hierarchy and included the following:

- > Plan land use to support active and sustainable transport for reduced travel times and distances;
- > Improve safety, personal security, and provide equitable access for full community participation;
- > Prioritise people in centres and main streets and revitalise key roads;
- > Progress active transport infrastructure, services and programs;
- > Encourage shift to public transport and shared transport from private vehicles by providing attractive alternatives, and reduce the impact of congestion and parking;
- > Manage an efficient freight and goods delivery network to enhance Inner West liveability; and

- > Harness technology to improve information, safety, travel choices and environmental outcomes.

The strategy identified potential core pedestrian and cycling networks, which align with the north-south and east-west cycling links near Dulwich Hill Station presented in the LSPS and show Wardell Road as a key pedestrian link.

2.2.4 Marrickville Bicycle Strategy (2007)

Marrickville's Bicycle Strategy sought to increase the appeal of cycling within the former Marrickville LGA, proposing a \$7.2 million network of designated corridors. A supporting component is a gradual roll-out scheme of bicycle parking and end-of-trip facilities. The Bicycle Infrastructure Development Strategy for Marrickville, part of this report, was guided by four clear actions:

- > Develop a bicycle network plan;
- > Develop a bicycle parking plan;
- > Integrate the cycling network with public transport; and
- > Create bicycle friendly streets and neighbourhoods.

Although dated, the principles of the Bicycle Strategy have been considered in this study to inform the provision of cycling infrastructure.

2.2.5 Dulwich Hill Station Detailed Master Plan

The Dulwich Hill Station Public Domain Master Plan provides Inner West Council and the Dulwich Hill community with a ten-year plan to transform the streets and public spaces around the station into a pedestrian-oriented village. Plummer and Smith were engaged by Inner West Council in 2017 to undertake a detailed master plan for the public domain around the Dulwich Hill Station. A significant aim of the master plan was to develop a pedestrian-oriented village centre around Dulwich Hill Station. Improvements to the public domain help provide an environment that fosters spaces for the community to live their life including recreation, social activity and economic stimulus through encouraging pedestrians to linger and spend more money at local businesses as they pass through the village.



The Master Plan document comprises the following sections:

- > Project context: this section provides an introduction and background to the project including existing Council policies supported by the plan, project objects and project methodology;
- > Site Analysis: the physical characteristics of the site area and its context are described with analysis in plan, text, and images. The focus is on the physical site, but it also includes site and cultural history, sense of place and meaning to the community;
- > Design Strategies: each of the proposed design strategies that help create a pedestrian-oriented village centre are described in plan, text, and images to articulate the desired outcome for the precinct;
- > The Detailed Master Plan: the master plan compiled all the strategies to spatially illustrate the designed outcomes, supported by text and imagery; and
- > Project Costs and Implementation: This section outlines the probable costs for the project and articulates a potential staging and implantation strategy. The master plan aims to deliver a pedestrian-oriented village centre around Dulwich Hill Station. The strategies to deliver this aim include:
 - Provide raised threshold treatments to the entries along Wardell Road at Wilga Avenue and Ewart Street designed to slow traffic and define the village centre;
 - Provide pedestrian priority and connection across Bedford Crescent;
 - Install new pavement treatments to delineate a shared pedestrian zone in Ewart Lane.

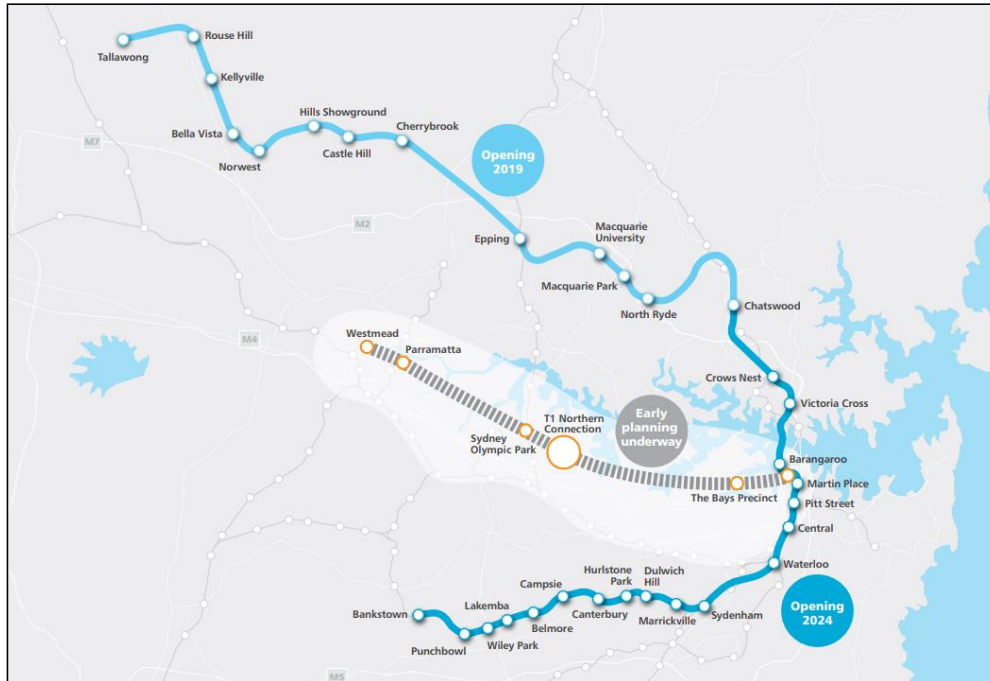


2.3 NSW Government

2.3.1 Sydney Metro City & Southwest (Sydney Metro)

The New South Wales Government is committed to delivering the Sydenham to Bankstown City Metro and Southwest with a planned stop at Dulwich Hill Station.

Sydney Metro City & Southwest will operate fully segregated from the existing Sydney Trains railway between Sydenham and Bankstown. The State Government's proposed rail upgrades will provide an increased frequency of trains and faster access to the city and northern rail lines along with upgraded equal access at Dulwich Hill Station.



2.3.2 Sydenham to Bankstown Urban Renewal Corridor Strategy

Following the release of the revised draft Sydenham to Bankstown Urban Renewal Corridor Strategy in 2017, the community has provided clear and important feedback that it wants community values and place character at the heart of the planning process. The Department of Planning, Industry, and Environment (DPIE) has listened and is responding with a new approach through which the community's aspirations and Councils' vision underpin planning of the area.

DPIE with Inner West and Canterbury Bankstown Councils will develop a high-level, principle-based planning strategy for the corridor, which will address the community's aspirations and Councils' vision for their areas. The strategy will guide open space, transport, and community infrastructure investments as well as appropriate development in the corridor. It will contain a set of planning principles to ensure the local character is protected and enriched, and that the delivery of new homes, jobs, and services are well coordinated.

3 Crash data review

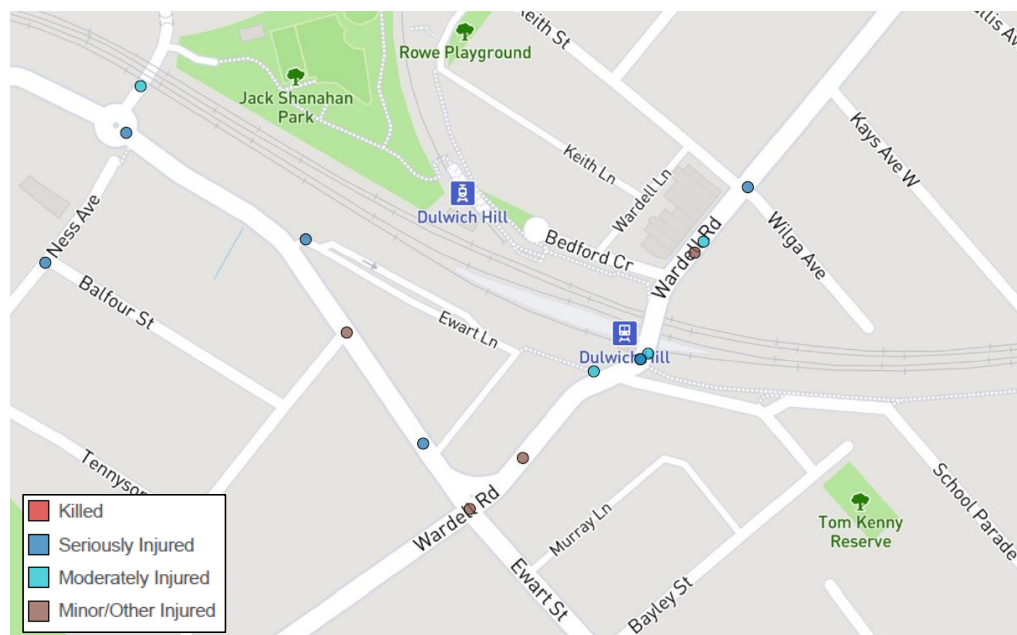
Crash data is reliant on incidents being reported to the NSW Police, either through police attendance at a crash scene or reporting by involved parties. It is generally understood that minor collisions without injuries are not reported. As such, analytics of all crashes is not possible. Notwithstanding, crash data does include more serious accidents. This allows analytics to identify trends in accidents and location issues/ crash clusters.

Five-year crash data history from TfNSW (the Centre for Road Safety) was analysed from 2014 to 2018 (inclusive).

3.1 Crash locations

The locations of crashes in the vicinity of Dulwich Hill Station are shown in **Figure 3-1**.

Figure 3-1 Crashes in the vicinity of Dulwich Hill Station



Source: Crash and casualty statistics, TfNSW via <https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/nsw.html?tabnsw=7>, viewed 24/03/2020

All crashes occurred along Wardell Road and Ewart Street, being the key north-south and east-west movement corridors within the vicinity of the station respectively. The key crash locations included:

- > The pedestrian crossing at Dulwich Hill Station;
- > Wardell Road between Bedford Crescent and Wilga Avenue; and
- > Various intersections on Ewart Street with Wardell Road and side roads.

3.2 Crash severity and type

Overall, there were 16 crashes within proximity of Dulwich Hill Station. A summary of crashes by severity is shown in **Table 3-1** and by crash type in **Table 3-1**.



Table 3-1 Crash summary by severity

Crash severity	2014	2015	2016	2017	2018	Total
Non-casualty (tow-away)	1	2			1	4
Minor/other injury		1	3			4
Moderate injury		1	1	2		4
Serious injury	1	1	1	1		4
Total	2	5	5	3	1	16

Source: Crash and casualty statistics, TfNSW via
https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/lga_stats.html?tblq=4, viewed 24/03/2020

Table 3-2 Crash Summary by Road User Movement (RUM) code

RUM code and description	2014	2015	2016	2017	2018	Total
0 - Ped nearside			1	1		2
1 - Ped emerging	1					1
2 - Ped far side			1	1		2
12 - Left far			1			1
30 - Rear end		1	1			2
35 - Lane change left		1				1
39 - Other same direction			1			1
59 - Other overtaking		1				1
63 - Vehicle door		1				1
71 - Off rd left => obj					1	1
83 - Off rt/rt bnd=>obj		1				1
88 - Out of cont on bend				1		1
93 - Pkd vehicle runaway=>obj	1					1
Total	2	5	5	3	1	16

Source: Crash and casualty statistics, TfNSW via
https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/lga_stats.html?tblq=4, viewed 24/03/2020

There were no fatal crashes in the vicinity of Dulwich Hill Station in the reporting period, and 4 resulting in serious injury.

3.3 Crashes by road user

The crashes by road user for each year are shown in **Table 3-3**. The crashes are apportioned according to vulnerability and special vehicle types, for example, if a crash involved a motorcyclist and a truck, it is determined to be a motorcyclist crash. If a crash involved a car and pedestrian, it is determined to be a pedestrian crash.

Table 3-3 Crash involvement by road user

Road user	2014	2015	2016	2017	2018	Total
Pedestrian	1		2	2		5
Cyclist		2				2
Motorcycle			1	1		2
Car		2	2		1	5
Articulated truck	1	1				2
Total	2	5	5	3	1	16

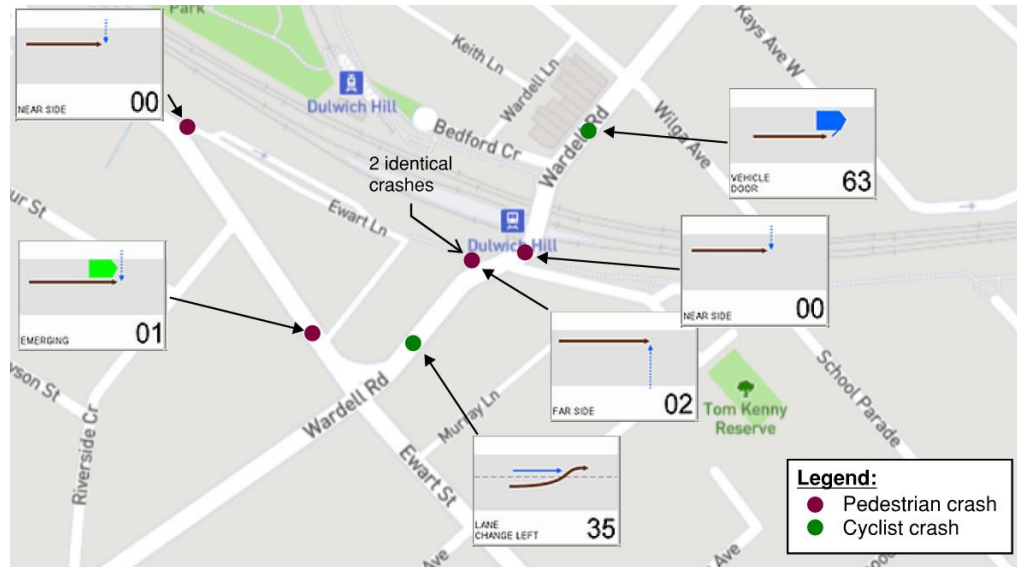
Source: Crash data, Transport for NSW, supplied 2019



In total there were five pedestrian crashes and two cyclist crashes, comprising 31% and 13% of total crashes respectively. In combination this indicates that 44% of crashes involve vulnerable active transport modes.

The locations of the pedestrian and cyclist crashes, as well as the associated Road User Movement (RUM) codes, are shown in **Figure 3-2**.

Figure 3-2 Pedestrian and cyclist crashes with RUM codes



Source: Crash and casualty statistics, TINSW via
<https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/nsw.html?tabnsw=7>, viewed 24/03/2020

The data indicates that the most reported pedestrian and cyclist crashes occurred along Wardell Road. All of the pedestrian crashes along Wardell Road were pedestrian near side or far side crashes. The introduction of traffic management measures and a reduced speed limit may help to mitigate this, particularly at the intersection of Wardell Road and Dudley Street where a cluster of three pedestrian crashes were observed.

The two reported cyclist crashes in the study area were both observed along Wardell Road. One involved a collision with a vehicle door of a parked car, and the other involved a collision with a car changing lanes (from the travel lane to the parking lane in front of the retail tenancies). A contributing factor to these may have been the lack of a formal cycleway along Wardell Road. Given the mixed traffic arrangements for cyclists and vehicles, introduction of a reduced speed limit and raised threshold treatments to increase driver awareness of vulnerable road users may help to mitigate these safety issues.

3.4 Lighting conditions

The proportion of crashes under each lighting condition were the following:

- > 56% of all crashes occurred in daylight;
- > 25% of crashes occurred in darkness; and
- > 19% of crashes occurred at dusk.

Overall the majority of crashes occurred in daylight conditions.



4 Active transport assessment

This section provides the outcomes of the active transport assessment of the proposed upgrades. At this stage only Stage A of the Master Plan is considered, which includes the intersection at Wardell Road / Dudley Street and both sides of Dudley Street. However, a review of the greater networks and overview of all Master Plan upgrades is detailed to provide context and demonstrate how the proposed upgrades align with the overarching vision for the precinct.

4.1 Pedestrian network

4.1.1 Network and destinations

4.1.1.1 Key destinations

Key destinations within the vicinity of the station generating or attracting pedestrian trips to / from the station include the following:

- > The Dulwich Hill light rail stop;
- > Bus stops on Dudley Street;
- > The kiss and ride / taxi bays on Bedford Crescent;
- > The commuter car park south-west of the station;
- > Jack Shanahan Reserve;
- > Tom Kenny Reserve;
- > The Cooks River;
- > The GreenWay;
- > Marrickville Library;
- > Dulwich Hill Public School;
- > St Maroun's College;
- > Marrickville West Primary School;
- > Wardell Road;
- > Dulwich Hill Village; and
- > Maronite Sisters of the Holy Family Village (Maronite Sisters Village).

These key destinations are mapped together with the typical walking catchment of the station in **Figure 4-1**.

4.1.1.2 Existing network and infrastructure

The Dulwich Hill Station precinct has an established footpath network with footpaths on all roads except Ewart Lane. The footpaths are generally wide along Wardell Road, however there is a pinch point immediately adjacent to the existing station entrance due to the constrained bridge geometry and pedestrian fencing. There are also some other minor pinch points along Wardell Road due to street furniture and outdoor dining.

A marked pedestrian crossing is provided immediately south of the station to facilitate pedestrian movement across Wardell Road. The intersection of Wardell Road and Ewart Street provides signalised crossings on all four approaches, accommodating movement in all directions to serve access to the station, retail strip along Wardell Road and surrounding residential areas.

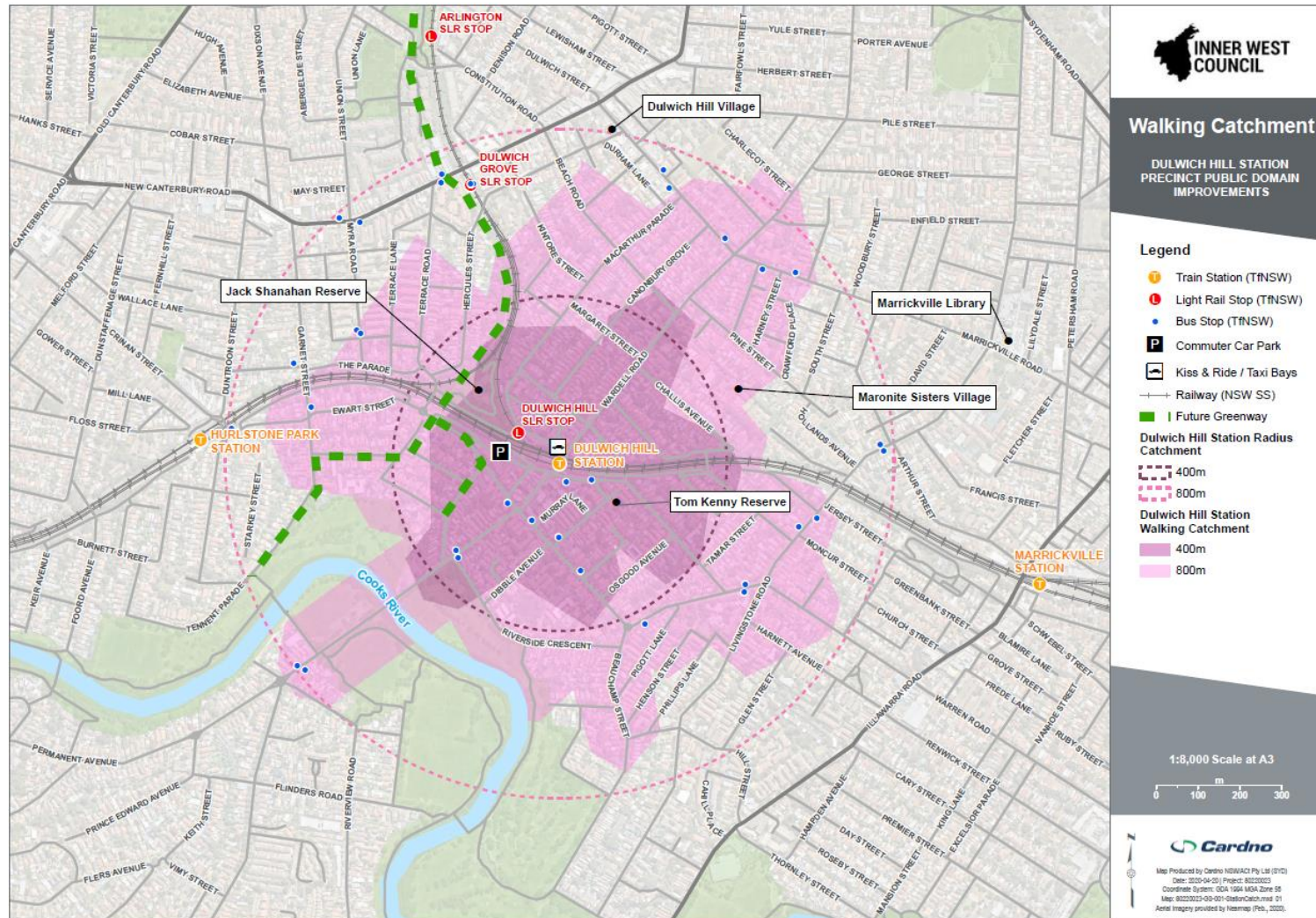
Pedestrian refuges are provided on side roads at the connections to Wardell Road, including Dudley Street, Keith Street and Wilga Avenue. Another pedestrian refuge is provided on Wardell Road at the intersection with Keith Street and Wilga Avenue. No other crossings are provided on Wardell Road between the station and Keith Street / Wilga Avenue, which may encourage informal crossing near the station.

Some of the public domain has recently been upgraded by developers, including the southern side of Dudley Street adjacent to 2 Dudley Street, and the corner of Ewart Street / Wardell Road adjacent to 260-264 Wardell Road. These upgrades resulted in renewed pavement, street furniture and landscaping to improve public amenity.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 4-1 Dulwich Hill Station walking catchment and key destinations





4.1.1.3 Planned future works

Significant changes to the pedestrian network will be implemented by Sydney Metro through the provision of an additional station concourse connecting Bedford Crescent to Ewart Lane and provision of a pedestrian plaza immediately south of the station. The concourse connection will be DDA-compliant and will allow paid pedestrian access (via the use of an Opal card or other linked card) across the rail line and to the train station and light rail stop. The new concourse is expected to become the main station entrance and will help to link the station to the interchange facilities.

The new concourse will also help to alleviate the footpath pinch point on the existing bridge and potential conflict between pedestrians and vehicles. Ramp or lift access will also be provided to accommodate a DDA-compliant route to the station from the south.

The pedestrian plaza will provide a new, high quality pedestrian space accommodating access to the station and improving the public domain. This will include works to extend the kerbline on Wardell Road and remove the disused bus stop.

The future GreenWay will also provide an enhanced shared path network, and is detailed further in **Section 4.2.1.3**.

4.1.1.4 Summary of existing and planned pedestrian infrastructure

The existing and planned pedestrian infrastructure within the study area is shown in **Figure 4-2**.

4.1.2 Pedestrian experience and key issues

The pedestrian experience throughout the Dulwich Hill Station precinct is mixed and the condition of the public domain varies. Some areas have poor amenity due to inconsistent or low quality pavements, excessive street furniture, vandalism and potential Crime Prevention Through Environmental Design (CPTED) issues while other areas are new and inviting due to recent development.

Retail tenancies provide activation along Wardell Road, particularly south of the station. Consistent pedestrian and vehicle movement along Wardell Road and Ewart Street provides passive surveillance in key areas, although some local roads and connections such as the link between Bedford Crescent and Keith Street (adjacent to the light rail line) have poor sightlines and possible security issues.

Key issues in the pedestrian environment include the following:

- > Inconsistent and poor quality footpath pavements due to reinstatement works and lack of maintenance;
- > Clutter on footpaths due to redundant signage, poles, fencing and excessive street furniture;
- > Pinch points due to narrow footpaths or clutter on the footpath;
- > Poor sightlines to wayfinding signage and transport facilities;
- > Lack of a lift/ step free or DDA access to the train station;
- > Steep grades to the station from Wardell Road to the south;
- > Non DDA-compliant kerb ramps;
- > Lack of a pedestrian crossing of Wardell Road north of the station;
- > Potential safety issues and vehicle-pedestrian conflict along Wardell Road, particularly at the bridge across the rail line and crossing north of Dudley Street;
- > CPTED concerns on links such as the connection from Bedford Crescent to Keith Street;
- > Poor pedestrian amenity and lack of a footpath on Ewart Lane; and
- > Long and indirect crossing via the refuge on Dudley Street at Wardell Road.

Some key pedestrian issues and features are shown in **Figure 4-3**.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 4-2 Existing and planned pedestrian infrastructure





Figure 4-3 Key pedestrian issues and features



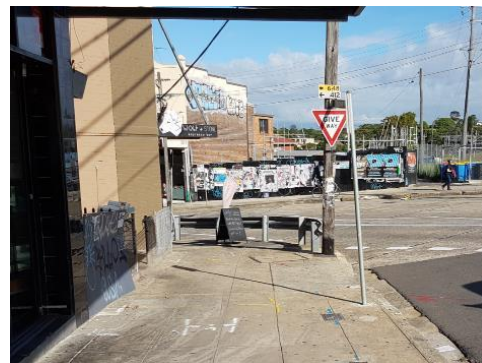
Potential CPTED issues at link between Bedford Crescent & Keith Street including sightlines, passive surveillance and lack of escape options



Constrained footpath on Wardell Road due to street furniture and landscaping



New bus stop, footpath and cycleway on northern side of Dudley Street



Poor amenity due to vandalism, construction hoarding and pedestrian fencing focused on accommodating vehicles



Poor amenity, pavement quality and footpath clutter on Ewart Street



Poor amenity, pavement quality and lack of footpath on Ewart Lane



4.2 Cycling network

4.2.1 Network and destinations

4.2.1.1 Key destinations

Key destinations within the vicinity of the station generating or attracting cycling trips to / from the station are similar to that of pedestrians but also include links to the Cooks River cycleway and Marrickville Station. These connections and the areas served are further detailed in the following sections.

4.2.1.2 Existing network and infrastructure

A separated bidirectional cycleway was recently constructed on the northern side of Dudley Street and leads towards Marrickville Station. This route is inconsistent, requiring cyclists to dismount east of School Parade and transition to on-road cycling routes further to the east. The route passes through low-traffic local streets until it reaches Illawarra Road and connects to Marrickville Station. The existing marked pedestrian crossing on Wardell Road also requires cyclists to dismount from this route to cross the bridge to access Dulwich Hill Station, and may result in potential conflict if cyclists choose to continue cycling through.

Ewart Street is designated as a cycle route in the *Staying Active in Marrickville Map* published on Inner West Council's website, however, it is a mixed traffic route, a 50 kilometre per hour speed limit with infrastructure is limited to bicycle stencils located in the parked vehicle door opening zone east of Wardell Road.

Bike parking is provided in numerous places in the precinct in the form of bike racks, including the following locations:

- > The southern side of Bedford Crescent near Wardell Road (share bikes only – 6 spaces);
- > The end of Bedford Crescent (10 spaces);
- > Immediately south of the station on the western side of Wardell Road (8 spaces);
- > The northern side of Dudley Street near Wardell Road adjacent to the cycleway (4 spaces);
- > The northern side of Dudley Street adjacent to the bus stop (6 spaces); and
- > Various poles along Wardell Road, mostly south of the station (5 spaces).

The bike parking was observed to be moderately utilised, particularly south of the station. The share bike parking also appeared to be utilised by private bikes instead of share bikes.

No other cycling infrastructure is present in the study area, however the Cooks River cycleway is located further to the south. This is predominantly a recreational cycling route that follows the Cooks River and provides access from Dulwich Hill to areas to the east such as Sydney Airport and Wolli Creek, and areas to the west such as Canterbury and suburbs towards Strathfield.

4.2.1.3 Planned future works

The future GreenWay will be a regionally significant active transport route and ecological corridor linking the Cooks River in Earlwood to the Parramatta River at Iron Cove. It will consist of a 5.5 kilometre long shared path, primarily for recreation, generally following the alignment of Hawthorne Canal. It will link the established Bay Run shared path around Iron Cove to the Cooks River shared path. The GreenWay will also provide a key north-south connection linking Dulwich Hill to the Cooks River and areas to the north including Haberfield and Leichhardt.

The works will include new and upgraded shared paths and crossings, and renewal and improvements to the natural environment along the corridor.

The GreenWay will be a short distance from Dulwich Hill Station, passing across Ewart Street from Terrace Road to Ness Avenue, and could be accessible via Ewart Lane and Ewart Street.

The draft Inner West Council Integrated Transport Strategy also indicates a proposed route from School Parade east towards Marrickville Station, and from Dulwich Hill Station west towards the future GreenWay. This would help to provide a continuous east-west cycling route.

4.2.1.4 Summary of existing and planned cycling infrastructure

The existing and planned pedestrian infrastructure within the study area is shown in **Figure 4-4**.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 4-4 Existing and planned cycling infrastructure





4.2.2 Experience and key issues

The cycling experience throughout the Dulwich Hill Station precinct is mixed due to inconsistent and varied infrastructure. Cycling to / from the east is a safe and a comfortable experience along Dudley Street due to the new separated cycleway. However, the connection points are inconvenient and potentially unsafe – the marked pedestrian crossing immediately to the west of the cycleway requires cyclists to dismount, and may result in conflict if a cyclist approaches at high speed. The connection to the east also requires cyclists to dismount to join a narrow footpath.

The cycling experience on other routes is poor since cyclists are required to mix with vehicle traffic and there is limited infrastructure to support on-road cycling. Grades on Wardell Road approaching the station are steep and may result in safety issues for cyclists travelling northbound. Traffic volumes are significant along Wardell Road and Ewart Street, both with posted 50 kilometre per hour limits, which may result in safety issues and discourage many cyclists from using the on-road environment.

Key issues in the cycling environment include the following:

- > A lack of cycling infrastructure provided;
- > Inconsistent cycling infrastructure;
- > Lack of connectivity to other cycling routes and key destinations;
- > Potentially unsafe and inconvenient connection points; and
- > Poor sightlines to cyclists on Dudley Street.

Some key cycling issues and features are shown in **Figure 4-5**.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 4-5 Key cycling issues and features



New separated bi-directional cycleway along Dudley Street



Poor sightlines to cyclist from Dudley Street approaching the pedestrian crossing on Wardell Road



Connection from Dudley Street cycleway to the east, forcing cyclists to dismount onto a narrow footpath



Highly utilised bike parking on the southern side of the station, with poor amenity.



Share bike parking on Bedford Crescent, appearing to be utilised by private bikes



Bike parking with spare capacity further west on Bedford Crescent



4.3 Station precinct public domain active transport improvements

The proposed upgrades to the Dulwich Hill Station precinct public domain will transform the public spaces surrounding the station into a pedestrian oriented village. Many of the upgrades were developed to improve pedestrian and cyclist safety and efficiency throughout the precinct, and facilitate access to and from the station.

The proposed improvements impacting active transport as part of the overall Master Plan for the Dulwich Hill Station Precinct include the following:

- > Raised entry thresholds at:
 - Wardell Road north of Keith Street (designed to accommodate buses);
 - Bedford Crescent at Wardell Road; and
 - The intersection of Wardell Road / Ewart Street (designed to accommodate buses);
- > A raised, signalised intersection at Wardell Road / Dudley Street;
- > New footpath treatments along the southern side of Dudley Street;
- > A kerb extension on the southern side of Dudley Street at the intersection with Wardell Road;
- > Resurfacing of Ewart Lane (south of the station) and conversion to a shared zone;
- > A kerb extension on the north corner of the Wardell Road / Ewart Street intersection; and
- > Footpath widening on the western side of Wardell Road along the bridge (via timber deck extension and minor relocation of the station building).

The proposed improvements in the context of the existing and planned active transport infrastructure are shown in **Figure 4-6**.

The upgrades will improve safety and efficiency of pedestrian and cycling movement in various ways. The raised entry thresholds will signify to vehicles the change in environment and start of a pedestrian-oriented village, and will reduce vehicle travel speeds. Kerb extensions will also narrow road geometry to help reduce vehicle speeds and provide additional footpath space for pedestrians to circulate and queue. The additional footpath space can also be utilised for outdoor dining and street furniture for improved amenity.

The raised, signalised intersection at Wardell Road / Dudley Street will provide additional crossings for pedestrians and cyclists, and will include cycle lanterns to accommodate a continuous cycle route from Dudley Street towards Ewart Lane. This will improve safety compared to the existing pedestrian crossing and decrease the potential for conflict between pedestrians, cyclists and vehicles.

The renewal of Ewart Lane will improve a key link to the new station concourse constructed by Sydney Metro, with increased safety due to the implementation of a shared zone. This and other public domain works will refurbish footpath and road pavements, providing consistent and high quality materials to enhance the public space and revitalise zones for people.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 4-6 Proposed Dulwich Hill Station precinct improvements





For this study, only Stage A of the Master Plan is being assessed. This includes the intersection at Wardell Road / Dudley Street and both sides of Dudley Street, including the following items:

- > Item 7 – a raised, signalised intersection at Wardell Road / Dudley Street;
- > Item 11 – footpath treatments and tree plantings on the southern side of Dudley Street; and
- > Item 12 – a kerb extension on the southern side of Dudley Street at the intersection with Wardell Road.

A summary of the active transport impacts of these proposed works and the pedestrian and cycling issues addressed are shown in **Table 4-1**.

Table 4-1 Active transport impacts of proposed Stage A precinct works

Item	Proposed upgrade	Active transport impacts	Issue(s) addressed
7	Raised signalised intersection at Wardell Road / Dudley Street	Improved pedestrian safety and connections	Lack of safe crossings of Wardell Road and Dudley Street
11	New in-road trees and footpath treatments on the southern side of Dudley Street	Improved pedestrian amenity	Pedestrian amenity
12	Kerb extension on the southern corner of the Wardell Road / Dudley Street intersection	Additional space for pedestrian circulation and queuing	Lack of footpath space for people to dwell, gather and dine, poor amenity

In particular, the raised, signalised intersection at Wardell Road / Dudley Street will help to address safety issues at the existing pedestrian crossing where crashes have been recorded, particularly as pedestrian movement increases with the implementation of the Sydney Metro upgrades. The intersection is proposed to be a scramble crossing to maximise space for pedestrian movement and allow pedestrians to cross in any direction at once.

Overall the upgrades align well with the existing and planned pedestrian and cycling networks, and are expected to improve the safety and efficiency of the station precinct.



5 Wayfinding site audit

A site audit was undertaken on the morning of 12 March 2020 to review the site area and existing wayfinding signage. The audit focused on existing signs within the study area, assessing the provision, legibility, destinations signed and general conditions of the pedestrian network.

To audit the site, 'wayfinding walks' were undertaken from the station to the immediate surrounds to understand the typical pedestrian journeys, experience and need for signage. The presence of existing signage was documented along these walks with key issues identified.

The results of the wayfinding walks and a summary of the key findings are provided in the following sections.

5.1 Wayfinding walks

5.1.1 Overview of the wayfinding walks

The following wayfinding walks were undertaken to cover the study area:

1. Dulwich Hill Station to Bedford Crescent and light rail stop;
2. Bedford Crescent to Keith Street;
3. Dulwich Hill Station to School Parade and Tom Kenny Reserve;
4. Dudley Street to Ewart Street; and
5. Wardell Road to Ewart Lane and commuter car park.

A map of the wayfinding walks is shown in **Figure 5-1**.

The key findings and pictures of site conditions and provided in the following sections.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 5-1 Wayfinding walks undertaken





5.1.2 Wayfinding walk 1 – Dulwich Hill Station to Bedford Crescent and light rail stop



Location	Dulwich Hill Station exit
Observation	No visible signage – unclear which direction pedestrians should follow.



Location	Wardell Road facing north
Observation	Signage to interchange facilities obscured by poles. Interchange facilities themselves cannot be seen due to foliage.



Location	Wardell Road at Bedford Crescent
Observation	Signage to station & bus stops vandalised. Signage to light rail not visible from key angles.



Location	Bedford Crescent facing west
Observation	Existing kiss and ride kerbside designation sign.

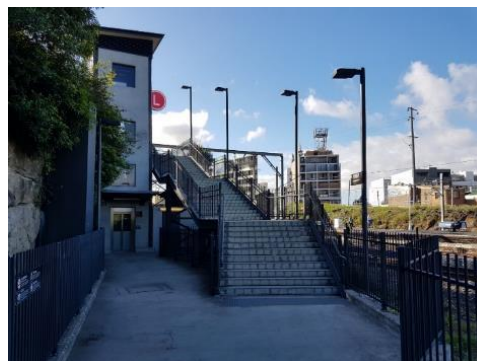


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Dulwich Hill Station Precinct Public Domain Improvements

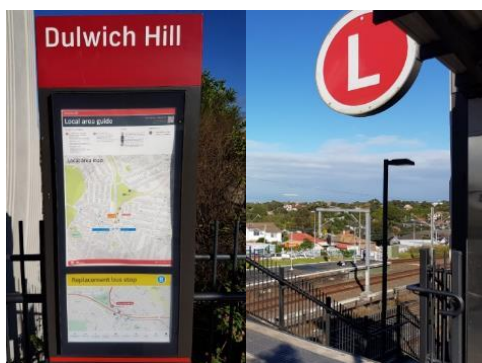
Item 2



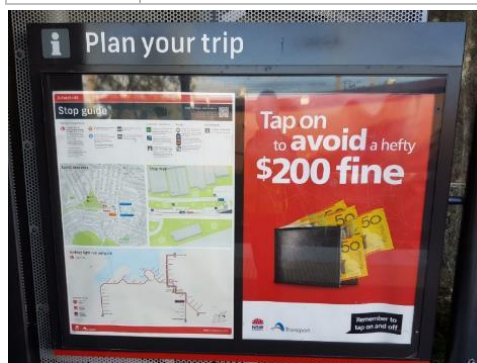
Location	Bedford Crescent adjacent to the light rail stop.
Observation	Light rail mode ID is clearly visible.



Location	Light rail stop.
Observation	Signage to the train station and buses is difficult to see due to the sign angle. The lift is clearly visible and does not require signage.



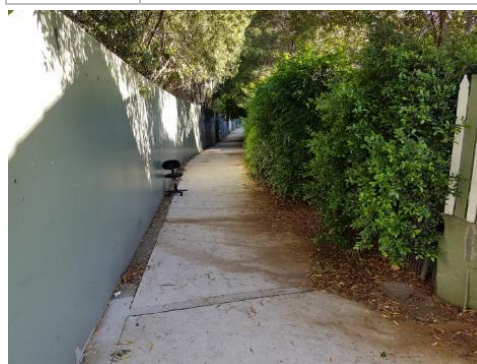
Location	Adjacent to the light rail stop.
Observation	Local area guide map and mode ID.



Location	At the light rail stop.
Observation	Stop guide map.



Location	Bedford Crescent at the light rail stop.
Observation	Signage to the train station and buses is available but can be difficult to see during the morning due to the location of the sun.



Location	End of Bedford Crescent.
Observation	No signage and unclear sightlines.

Attachment 1



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

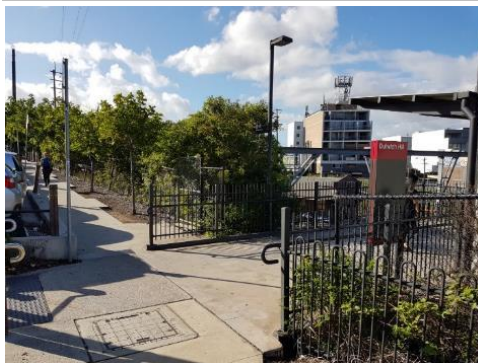
Item 2



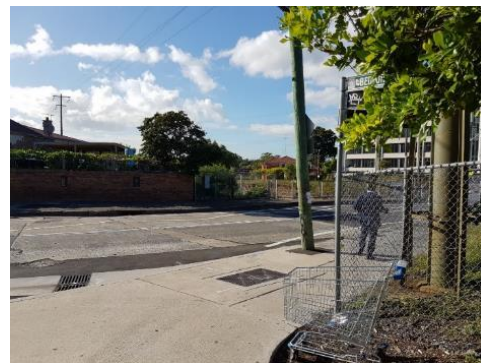
Location	West of Bedford Crescent.
Observation	Choice of paths without signage for guidance. Facilities obscured by foliage.



Location	Bedford Crescent facing east.
Observation	Light rail mode ID clearly visible.



Location	Bedford Crescent adjacent to the light rail.
Observation	Signage to the train station and buses difficult to see and legibility is obscured by foliage shadows.



Location	Corner of Wardell Road / Bedford Crescent.
Observation	Signage to the train station and buses obscured by foliage until immediately next to the sign.

Attachment 1



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

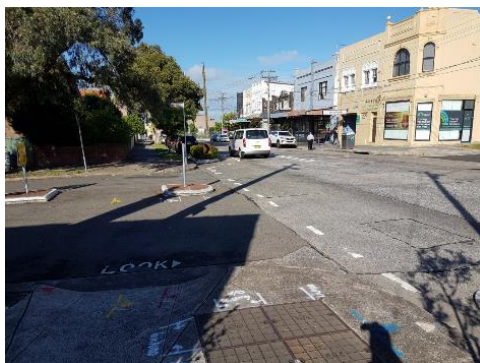
5.1.3 Wayfinding walk 2 – Bedford Crescent to Keith Street



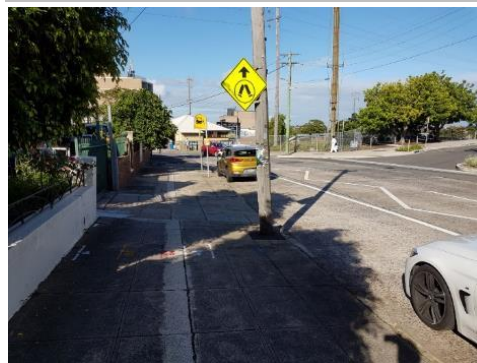
Location	Wardell Road north of Bedford Crescent.
Observation	No existing wayfinding signage.



Location	Wardell Road at Keith Street (facing north).
Observation	No existing wayfinding signage aside from road names.



Location	Wardell Road at Keith St (facing south).
Observation	No existing wayfinding signage on approach to the station.



Location	Wardell Road facing south.
Observation	Lack of signage on approach to the train station.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Item 2



Location	Wardell Road near Dulwich Hill station.
Observation	Lack of visible train mode ID sign.



Location	Wardell Road near Dudley Street.
Observation	No signage to bus stops on Dudley Street.

5.1.4 Wayfinding walk 3 – Dulwich Hill Station to School Parade and Tom Kenny Reserve



Location	Corner of Wardell Road / Dudley Street (facing east).
Observation	Bus stop on the southern side of Dudley Street is visible. No wayfinding signage.



Location	Corner of Wardell Road / Dudley Street (facing east).
Observation	Bus stop on the southern side of Dudley Street is visible, but not on the northern side. No wayfinding signage.



Location	Corner of Wardell Rd / Dudley St (facing NE).
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Location	Dudley Street facing east.
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Attachment 1



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Observation	Bicycle signage to Marrickville along dedicated cycleway.
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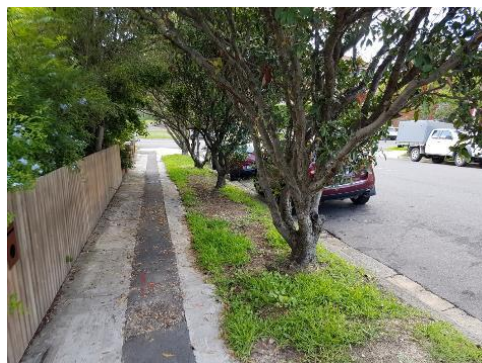


Location	Dudley Street near School Parade.
Observation	No wayfinding signage.

Observation	Bus stop post becomes visible.
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Location	School Parade facing west.
Observation	No wayfinding signage. Bus stop post is almost visible.



Location	Dudley Street near Bayley Street.
Observation	No wayfinding signage aside from street name signs.



Location	Bayley Street at Tom Kenny Reserve.
Observation	Signage indicating Tom Kenny Reserve. No other wayfinding signage.



Location	Dudley Street north of Bayley Street.
Observation	No wayfinding signage on approach to the train station.



Location	Dudley Street near School Parade facing west.
Observation	Bus stop and train station begin to become visible from a distance.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements



Location	Dudley Street facing west.
Observation	Bus stop post and train station are visible in the distance. No wayfinding signage present.



Location	Dudley Street facing west.
Observation	Good visibility to the train station.



Location	Dudley Street at Wardell Road (facing north).
Observation	Station is clearly visible but pedestrian access may encourage informal crossing.



5.1.5 Wayfinding walk 4 – Dudley Street to Ewart Street



Location	Wardell Road facing south.
Observation	No wayfinding signage. Local retail visible.



Location	Wardell Road near Ewart Street.
Observation	No wayfinding signage aside from street signs at the intersection.



Location	Ewart Street facing east.
Observation	Bus stop post visible but vandalised. No other wayfinding signage.



Location	Wardell Road / Ewart Street intersection facing north.
Observation	No signage on approach to the train station.



Location	Wardell Road / Ewart Street intersection facing north.
Observation	Existing signage indicating Jack Shanahan Park. No other wayfinding signage aside from street names.



Location	Ewart Street facing west.
Observation	Night bus stop signage obscured by shelter. No other wayfinding signage.



Location	Ewart Street / Ewart Lane intersection.
Observation	Existing signage to Ewart Lane. Poor pedestrian infrastructure quality and amenity.



Location	Ewart Lane facing north.
Observation	To become a revitalised lane leading towards the new station entrance.



Location	Wardell Road near Ewart Street facing north.
Observation	Station mode ID is barely visible from a distance. No other wayfinding signage.



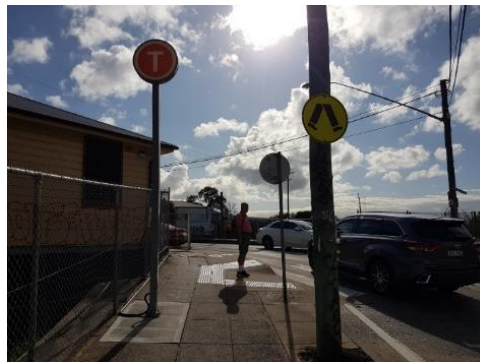
Location	Wardell Road facing north.
Observation	Station mode ID is visible from a distance.



Location	Wardell Road near the train station.
Observation	Existing signage indicating Jack Shanahan Park. Station mode ID no longer visible. Advertising sign dominates view.



Location	Wardell Road near the train station facing west.
Observation	Existing narrow path to Ewart Lane due to construction hoarding. To be improved through master plan works.



Location	Wardell Road / Dudley Street intersection.
Observation	Station clearly marked on final approach.

5.1.6 Wayfinding walk 5 – Wardell Road to Ewart Lane and commuter car park



Location	Ewart Lane facing south.
Observation	No wayfinding signage. Poor pedestrian amenity and safety. To be revitalised.



Location	Ewart Lane facing west.
Observation	Lack of signage and pedestrian provision to commuter car park.



Location	Ewart Lane facing west.
Observation	No wayfinding signage. Lack of pedestrian footpath.



Location	Ewart Lane at Ewart Street.
Observation	No wayfinding signage for pedestrians. Lack of pedestrian footpath.



Location	Ewart Street near Ewart Lane.
Observation	No wayfinding signage for pedestrians. Small commuter car park sign for vehicles with low legibility. No visibility to the train station.

5.2 Summary of key site audit observations

Key observations from the wayfinding site audit included the following:

- > There are limited destinations currently signed – these include the light rail stop, bus stops, train station (from Bedford Crescent only) and Jack Shanahan Reserve;
- > Many signs have poor visibility and are obscured by foliage, structures or graffiti;
- > There is no wayfinding signage immediately visible at the exit of the station;
- > Some signs do not face the direction of pedestrian flow and are therefore visible from limited angles; and
- > There is limited signage on approach to the station.

5.3 Existing signage

A list of all existing wayfinding signs within the study area is shown in **Table 5-1**.

Table 5-1 List of existing wayfinding signs within the Dulwich Hill station precinct

Detail	Content	Picture
Sign ID	Ex-FI-01	
Sign type	Finger	
Location	SW Corner of Wardell Road / Bedford Crescent	
Destinations signed	Dulwich Hill Station Bus stops Wardell Road	
Sign ID	EX-FI-02	
Sign type	Finger	
Location	SW Corner of Wardell Road / Bedford Crescent	
Destinations signed	Dulwich Hill light rail stop	
Sign ID	EX-PY-01	
Sign type	Pylon	
Location	Light rail access on Bedford Crescent	
Destinations signed	Local area map	



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Detail	Content	Picture
Sign ID	EX-FI-03	
Sign type	Finger	
Location	Light rail access on Bedford Crescent	
Destinations signed	Dulwich Hill Station Bus stops Wardell Road	
Sign ID	EX-FI-04	
Sign type	Finger	
Location	Light rail stop	
Destinations signed	Dulwich Hill Station Bus stops Bedford Crescent	
Sign ID	EX-WA-01	
Sign type	Wall-mounted	
Location	Light rail stop	
Destinations signed	Local area map	
Sign ID	EX-FI-05	
Sign type	Finger	
Location	Eastern corner of Wardell Road / Dudley Street	
Destinations signed	Marrickville Station	
Sign ID (left)	EX-FL-01	
Sign type	Flag	
Location	Northern side of Wardell Road	
Destinations signed	Bus stop ID	
Sign ID (right)	EX-FL-02	
Sign type	Flag	
Location	Southern side of Wardell Road	
Destinations signed	Bus stop ID	



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Detail	Content	Picture
Sign ID (left)	EX-JP-01	
Sign type	J-pole	
Location	Northern side of Ewart Street, west of Murray Lane	
Destinations signed	Bus stop ID	
Sign ID (right)	EX-JP-02	
Sign type	J-pole	
Location	Southern side of Ewart Street, west of Wardell Road	
Destinations signed	Bus stop ID	
Sign ID	EX-FI-06	
Sign type	Finger	
Location	SW corner of Wardell Road / Ewart Street	
Destinations signed	Jack Shanahan Park Skate park & mountain bike track	
Sign ID	EX-FI-07	
Sign type	Finger	
Location	Western side of Wardell Road, opposite Dudley Street	
Destinations signed	Jack Shanahan Park Skate park & mountain bike track	
Sign ID	EX-MD-01	
Sign type	Mode ID	
Location	Western side of Wardell Road, south of Dulwich Hill Station	
Destinations signed	Bus stop mode ID	



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Detail	Content	Picture
Sign ID (left)	EX-MD-02	
Sign type	Mode ID	
Location	Western side of Wardell Road, south of Dulwich Hill Station	
Destinations signed	Dulwich Hill Station mode ID	
Sign ID (right)	EX-JP-03	
Sign type	J-pole	
Location	Eastern side of Wardell Road, opposite Bedford Crescent	
Destinations signed	School bus stop ID	
Sign ID	EX-FL-03	
Sign type	Flag	
Location	Southern side of Bayley Street, opposite Dudley Street	
Destinations signed	Tom Kenny Reserve	
Sign ID	EX-MD-03	
Sign type	Mode ID	
Location	Southern side of Bedford Crescent at the light rail access	
Destinations signed	Light rail mode ID	
Sign ID	EX-MD-04	
Sign type	Mode ID	
Location	Light rail access at the top of the stairs	
Destinations signed	Light rail mode ID	

Note: street name signs have been excluded

The existing signs within the study area are mapped in **Figure 5-2**.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 5-2 Map of existing wayfinding signs within the Dulwich Hill Station precinct



6 Station precinct wayfinding assessment

6.1 Principles and approach

Wayfinding signage is important to allow people to easily find their way to their destination. Wayfinding in combination with the surrounding environment facilitates people in their decision making and helps them to read, understand and navigate through the area.

High quality wayfinding systems allow people to arrive at their destination easily and quickly by providing the right information at the right time. Effective wayfinding signage will help people know where they currently are, where they need to go and how to get there.

The principles and approach of the wayfinding signage assessment are provided in the following sections.

6.1.1 Wayfinding principles

Wayfinding principles for this study were adapted from the *CoS Wayfinding Strategy*, with consideration of the differing context of the Inner West Council LGA and the Dulwich Hill Station precinct area.

The strategic directions and principles underpinning the wayfinding assessment are outlined in **Table 6-1**.

Table 6-1 Wayfinding strategic directions and principles

Strategic direction	Principles	Description
Consistency	Consistent design language	The design of wayfinding signage will be consistent, providing a reliable wayfinding system which is connected by a single identity and an integrated whole-of-journey approach.
	Sign elements familiarity	The signage will be easily recognisable and familiar to pedestrians, including the colour, proportions, graphics and other features.
	Modularity approach	Signage modules will allow for flexibility of application, so that signs can be located primarily for wayfinding outcomes and balanced with site constraints. Modules will make updates to signs easier and provide a consistent design, finish, graphics and features to provide a recognisable wayfinding system.
	Primary character	The primary character (main colour) of the system will be consistent with other council products, an appropriate background for graphics and help to identify the group of wayfinding signs.
Accessibility	Comprehensible	The information displayed on signs will be easy to read and be understood as quickly as possible.
	Pre-journey planning	Websites and third-party apps can facilitate pre-journey planning to support wayfinding signage. An accessible map or other information could be distributed via Council's website to support an inclusive wayfinding system.
	Use of logos and international symbols	Plain English language will be used in conjunction with internationally recognised pictograms and standard pictograms used by TfNSW.
	Signage design	Signs will be compliant with accessible design standards and incorporate ergonomic principles such as viewing distance, letter height and placement of information on signs. Braille and tactile indicators will be included as relevant on pylon signs.
	Visible and recognisable	Signs will be visible and recognisable through consistent locations and messages for visually-impaired people.
	Typeface	The typeface used on signs will be legible and used against a background with a minimum of 30% luminance contrast.
	Languages	Plain English will be displayed on signs, and other languages can be accommodated using mobile and digital technology.
	Signage placement	Signs will be located at decision points and along the routes as reassurance signs, with consideration of pedestrian flow and sign elements. Signs will face the direction of pedestrian flow to maximise legibility.



Strategic direction	Principles	Description
	Ease of orientation	Orientation will be considered in the sign design and placement to help pedestrians understand where they are. Maps will be placed "heads-up" in accordance with best practice.
	Use of multi-media	Multi-media information can be used to complement signage and may include digital, web, print and people.
	Communications and marketing	A communications and marketing campaign can help inform residents, commuters and visitors. Printed and online newsletters and other material can be distributed prior to and during the implementation of wayfinding signage to facilitate public knowledge of the system.
Sustainability	Quality and life cycle	Signs should be designed for the long term, with consideration of the need for future updates, maintenance (especially due to vandalism) and the life span of the system. Signs will be designed for high quality and durability.
	Cost-effectiveness and updates	Cost-effectiveness could be achieved through a specific method of fabrication, assembly, installation and fixing. A register of all signs should be established and maintained to facilitate cost-effective maintenance programs.
Legibility	Integration with the public domain	Clutter should be minimised to increase legibility and comprehension. Content will be minimised to display essential information only, and messages will be short, simple and unambiguous. Signs should integrate with the public domain and facilitate the pedestrian-oriented village character.

6.1.2 Station precinct wayfinding approach

The overarching approach to developing a proposed wayfinding solution for the Dulwich Hill Station precinct included the following steps:

1. Undertake a site audit of existing conditions and wayfinding signage;
2. Identify key destinations within a typical walking catchment of the station;
3. Determine key origin-destination (O-D) routes for pedestrians between the station and these destinations;
4. Identify gaps in the current wayfinding system; and
5. Determine a proposed wayfinding solution.

The results of the site audit are documented in **Section 5**. The remainder of the steps are detailed in the following sections.

6.2 Key destinations

The key destinations within the station walking catchment (taken roughly as an 800 metre radius from the station) are consistent with the active transport assessment (refer to **Section 4.1.1.1**). These are also mapped together with the O-D routes in **Figure 6-1**.

6.3 O-D routes

Origin-Destination (O-D) routes were developed to identify the key paths between Dulwich Hill Station and the surrounding destinations. The routes were based on the following key principles:

- > **Existing and planned infrastructure:** The routes align with existing and planned pedestrian infrastructure to accommodate key movement paths;
- > **Key land uses and points of interest:** The routes cater for outbound movements from Dulwich Hill Station to destinations and trip attractors of local significance, in addition to the inbound movements directing customers to the station. The destinations were identified in collaboration with Council;
- > **Directness and desire lines:** The routes are direct as possible, avoiding the need for significant deviations to be made, and provide good connectivity between the station and key land uses;
- > **Ease of navigation at decision points:** Where a decision point is required, such as a change in the direction of travel, the routes allow for clear placement of signage; and



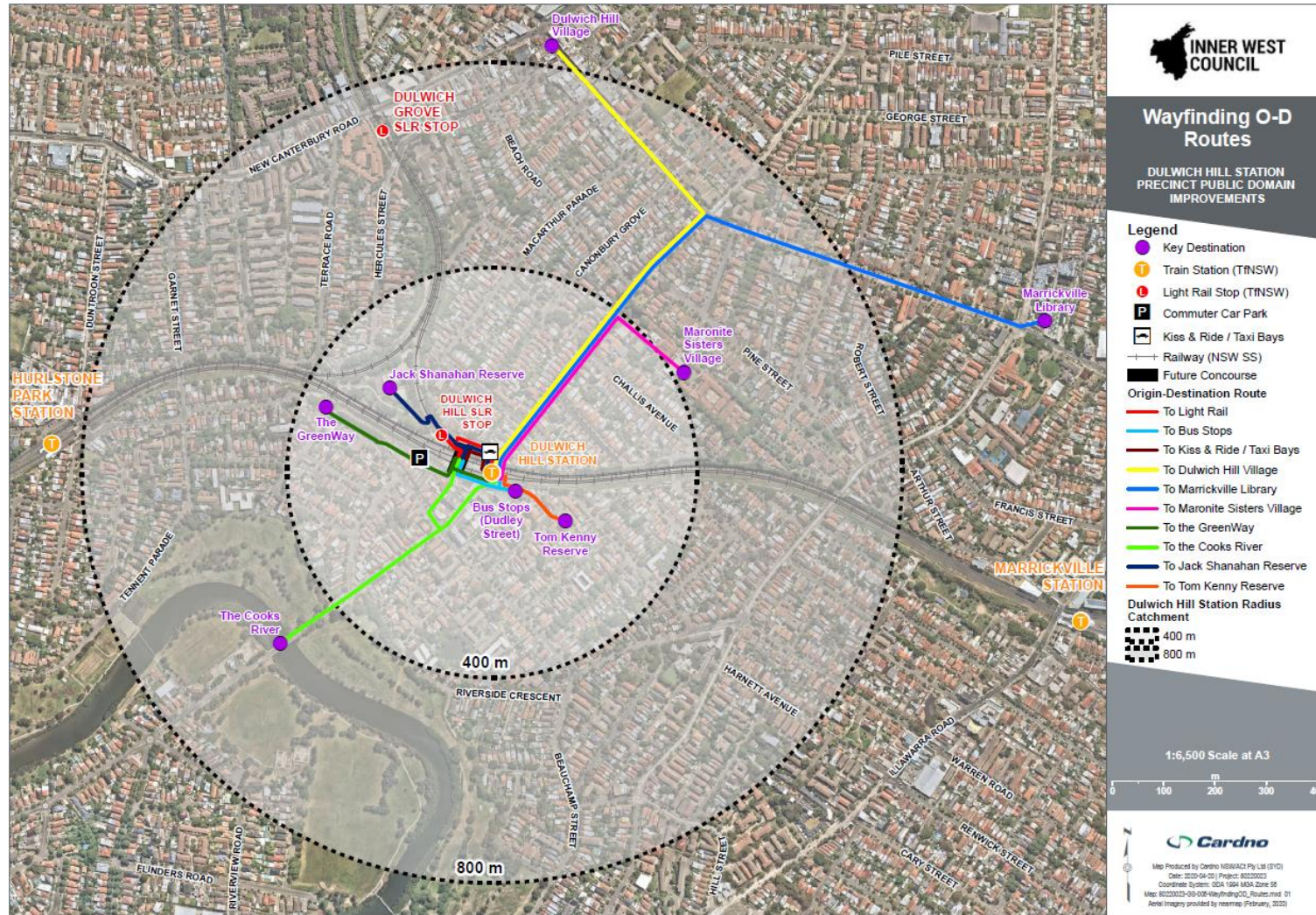
- > **Amenity and safety:** The routes provide a pleasant and accessible walking environment, and provide opportunities for passive and active surveillance to improve personal safety.

The O-D routes to and from the key destinations identified for the provision of wayfinding signage are shown in **Figure 6-1**.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 6-1 O-D routes identified for wayfinding signage





6.4 Gap analysis

As a result of the O-D routes identified and the site audit of existing wayfinding signage, wayfinding signage gaps within the Dulwich Hill Station precinct were identified. These included points where wayfinding signage was not provided, or where signage was limited.

Various gaps were identified and are outlined in **Table 6-2**.

Table 6-2 Wayfinding gaps

Destination	Inbound signage (towards station)	Outbound signage (away from station)
Dulwich Hill Light Rail Stop	Provided but limited visibility	Provided but limited visibility
Bus stops (Dudley Street)	Nil – but partial visibility of station from bus stops	Only provided at corner of Wardell Road / Bedford Crescent
Kiss and ride / taxi bays	Nil	Nil
Commuter car park	Nil	Nil
Jack Shanahan Reserve	Nil	Provided in limited locations
Tom Kenny Reserve	Nil	Identifier only
Cooks River	Nil	Nil
GreenWay	Nil	Nil
Marrickville Library	Nil	Nil
Dulwich Hill Village	Nil	Nil
Maronite Sisters Village	Nil	Nil

Key issues included:

- > Limited or no signage on many routes;
- > Obscured signage on routes to / from the light rail stop and bus stops; and
- > Key decision points with limited or no wayfinding provision to guide pedestrians.

6.5 Types of signs considered

This study is focused on the provision of two types of signs; pylons (free-standing or surface-mounted) and flags and finger signs (fixed to a post). Flags and finger signs provide directional guidance at key decision points, while pylons typically contain local area maps and other general information. Example uses of these signs are shown in **Figure 6-2**.



Figure 6-2 Examples of pylons, flag signs and finger signs



Source: Adapted from Legible Sydney – Volume 1 Wayfinding Strategy, City of Sydney, 2012

To avoid clutter, opportunities to use existing structures for flag and finger signs were considered, and most signs were proposed as flag or finger signs rather than pylons.

6.6 Proposed wayfinding scheme

Based on the gap analysis, a proposed wayfinding solution was developed to ensure the provision of high quality wayfinding signage throughout the Dulwich Hill Station precinct, including pylons, flags and finger signs.

The proposed new wayfinding signs, or relocated existing signs, are listed in **Table 6-3**.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Table 6-3 Proposed wayfinding signs

Sign ID	Sign type	Location	Destinations signed	Notes
EX-FI-02	Finger	Corner of Wardell Road and Bedford Crescent	Dulwich Hill light rail stop, Jack Shanahan Reserve, kiss and ride / taxi bays	Post relocated from the western side of the footpath.
PR-FI-12	Finger	Corner of Wardell Road and Bedford Crescent	Jack Shanahan Reserve, kiss and ride / taxi bays	Can be mounted on the existing relocated pole.
EX-FI-03	Finger	Bedford Crescent at light rail stop	Dulwich Hill Station, bus stops on Dudley Street	Relocated from the opposite corner for visibility.
PR-FI-01	Finger	NW corner of Wardell Road / Dudley Street	Bus stops on Dudley Street, Tom Kenny Reserve	
PR-FI-02	Finger	Immediately east of the eastbound bus stop on Dudley Street	Dulwich Hill Station	
PR-FI-03	Finger	Western side of Wardell Road opposite Dudley Street	Commuter car park, GreenWay	To be coordinated with Sydney Metro.
PR-PY-01	Pylon	New station plaza near Ewart Lane	Local area map, commuter car park, Cooks River, GreenWay	To be coordinated with Sydney Metro. Assumed the new station concourse will be visible from this point.
PR-FI-04	Finger	Bedford Crescent at light rail stop	Jack Shanahan Reserve	To point towards the light rail stop since access is provided via this route. Sydney Metro to provide internal station signage to help direct pedestrians once on the new station concourse.
PR-FI-05	Finger	Bedford Crescent at light rail stop	Dulwich Hill Station	To point to the new station concourse. To be coordinated with Sydney Metro.
PR-PY-02	Pylon	South-east corner of Jack Shanahan Reserve	Local area map, Dulwich Hill Station, light rail stop, bus stops on Dudley Street	Good location for a local area map with interchange information.
PR-FI-06	Finger	Immediately east of the eastbound bus stop on Dudley Street	Tom Kenny Reserve	
PR-PY-03	Pylon	North-west end of Tom Kenny Reserve	Local area map, Dulwich Hill Station, light rail stop, bus stops on Dudley Street	
PR-FI-07	Finger	Western side of Wardell Road opposite Dudley Street	Cooks River	
PR-FI-08	Finger	Eastern corner of Ewart Lane / Ewart Street	Cooks River	
PR-FI-09	Finger	Northern island of Wardell Road / Ewart Street intersection	Cooks River	
PR-FI-10	Finger	Southern side of Wardell Road at Beaman Park entrance	Dulwich Hill Station	



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Sign ID	Sign type	Location	Destinations signed	Notes
PR-FI-11	Finger	Northern island of Wardell Road / Ewart Street intersection	Dulwich Hill Station	
PR-PY-04	Finger	Eastern corner of Ewart Street / Terrace Road	Dulwich Hill Station	
PR-FI-13	Finger	Bedford Crescent at light rail stop	Marrickville Library, Dulwich Hill Village, Maronite Sisters Village, kiss and ride / taxi bsys	
PR-FI-14	Finger	Corner of Wardell Road and Bedford Crescent	Marrickville Library, Dulwich Hill Village, Maronite Sisters Village	
PR-FI-15	Finger	Northern corner of Wardell Road / Marrickville Road	Marrickville Library	
PR-FI-16	Finger	North-east corner of Livingstone Road / Marrickville Road	Dulwich Hill Station	
PR-FI-17	Finger	Northern corner of Wardell Road / Marrickville Road	Dulwich Hill Station	
PR-FI-18	Finger	Northern corner of Wardell Road / Marrickville Road	Dulwich Hill Village	
PR-FI-19	Finger	Western side of Wardell Road north of Margaret Street	Maronite Sisters Village	
PR-FI-20	Finger	Western side of Wardell Road north of Margaret Street	Dulwich Hill Station	
PR-FI-21	Finger	Eastern corner of New Canterbury Road / Marrickville Road	Dulwich Hill Station	

In total the wayfinding solution proposes:

- > 22 new finger signs;
- > 3 new pylon signs; and
- > 2 relocated existing signs.

Wayfinding signs within the Sydney Metro scope of works should be coordinated with Sydney Metro, and it is assumed that signage within the station itself will be provided by Sydney Metro as part of the station upgrade.

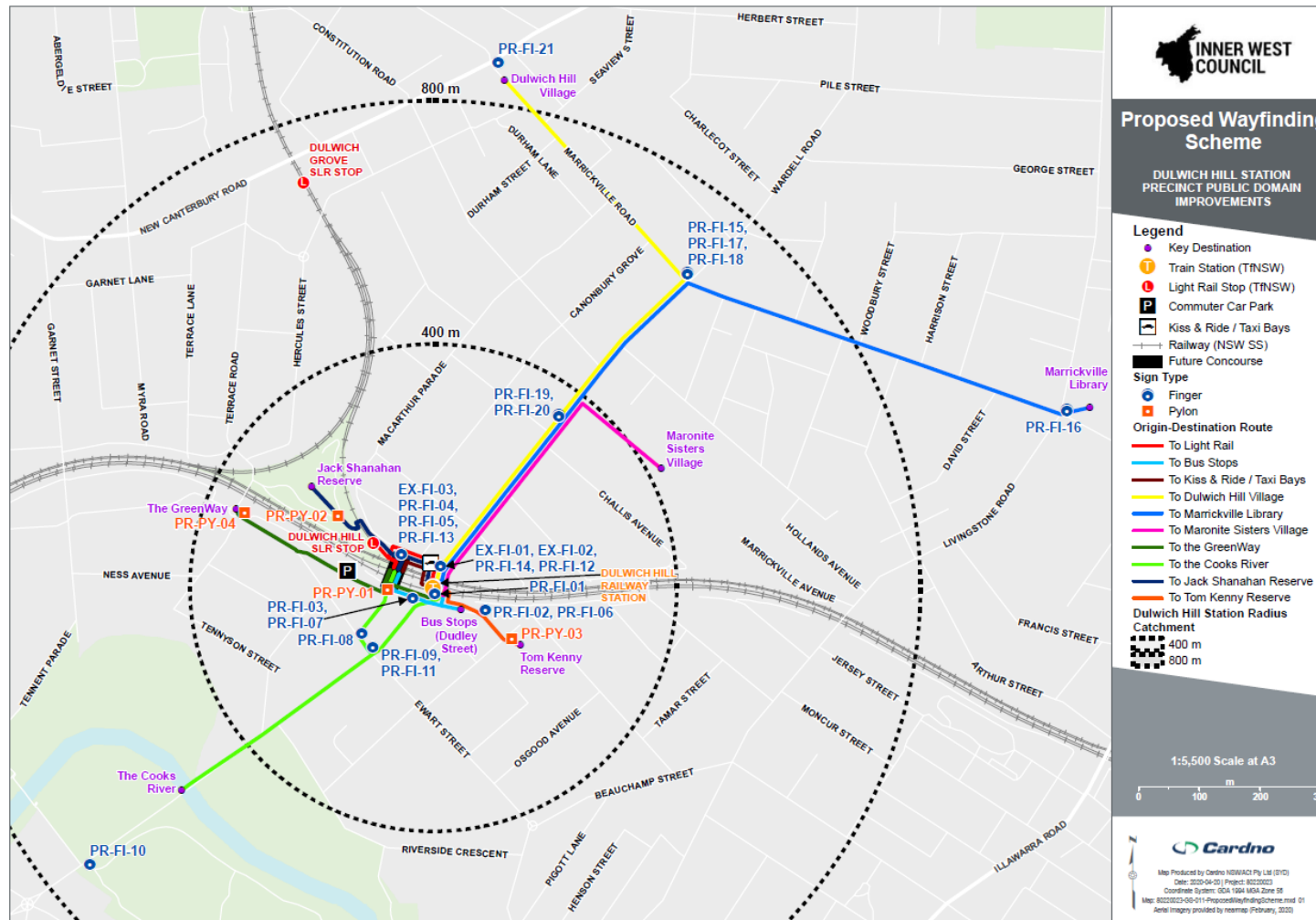
It is also recommended that one existing sign is removed, EX-FI-07. This is located at the western side of Wardell Road opposite Dudley Street and points to Jack Shanahan Reserve. However this sign does not align with the O-D routes developed, directs pedestrians along a longer route, and is redundant since sign PR-FI-12 (located at the corner of Wardell Road / Bedford Crescent) would assist pedestrians travelling northbound or southbound along the most desirable route.

The proposed wayfinding scheme is mapped in **Figure 6-3**.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 6-3 Proposed wayfinding scheme





7 Traffic modelling

Traffic modelling was undertaken using SIDRA Network version 8 software for the assessment of the existing condition. This allows evaluation of the road network performance and operational issues at the intersection level. Traffic signal data such as cycle time was observed from the video footage obtained during intersection count and applied to the SIDRA models.

7.1 Intersection counts

Traffic surveys were undertaken on **Wednesday 19 February 2020** to obtain intersection counts for typical weekday AM and weekday PM peak periods. The counts were undertaken at the following locations between 6:00 am – 10:00 am for the AM peak and 3:00 pm – 7:00 pm for the PM peak.

- > Wardell Road/Dudley Street; and
- > Wardell Road/Ewart Street.

The surveys counted light vehicles, heavy vehicles, and pedestrians. The weather was sunny and no unusual occurrences were noted. Based on the cumulative traffic volumes of the two intersections, the AM and PM peak hours for critical assessment purposes were calculated to be:

- > AM Peak Hour: 8:00 am to 9:00 am; and
- > PM Peak Hour: 5:00 pm to 6:00 pm.

The data was used to inform the traffic modelling by providing traffic under existing conditions.

Figure 7-1 and **Figure 7-2** show the AM and PM peak hour volumes at the intersection.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 7-1 2020 AM Peak

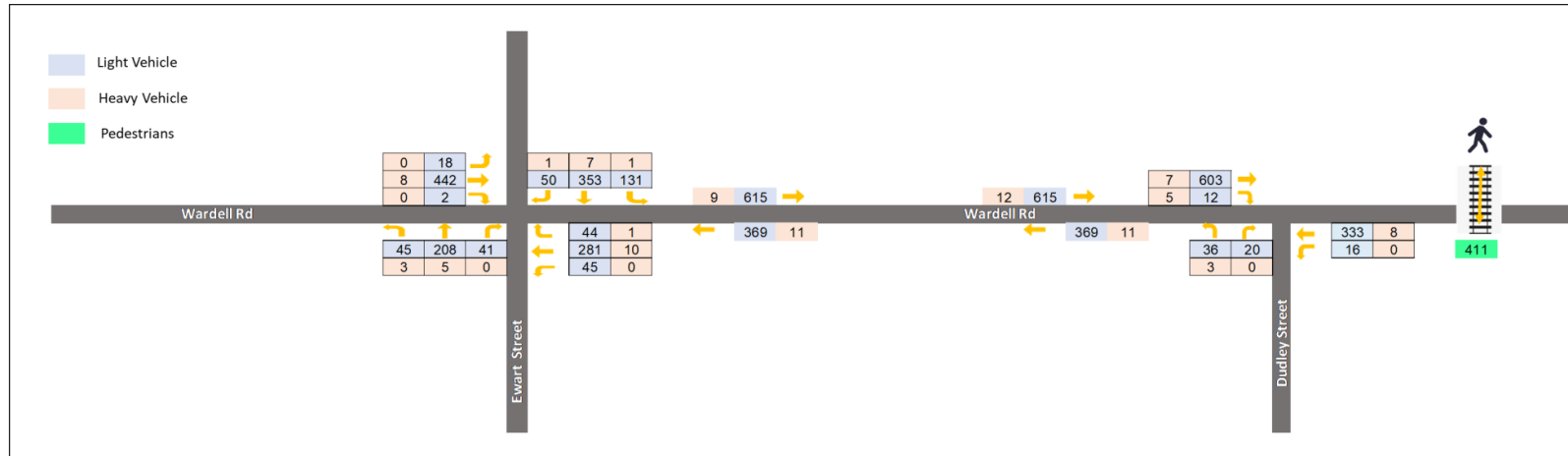
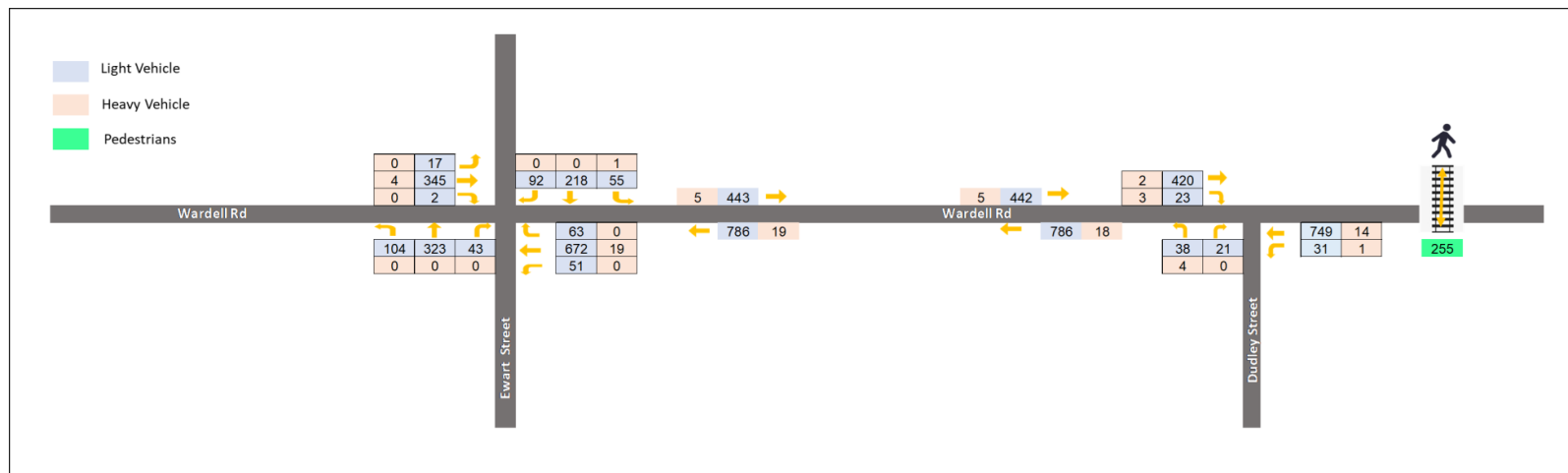


Figure 7-2 2020 PM Peak





7.2 Interpretation of modelling results

The intersection performance assessment was undertaken using SIDRA Intersection version 8 software. This software identifies several parameters to identify the performance of intersections. These parameters include Degree of Saturation (DoS), Average Delay in seconds and Level of Service (LoS).

Level of Service (LoS) is the standard measure used to assess the operational performance of the network and intersections. Level of Service is ranked from LoS A to LoS F, with LoS A representing the best performance and LoS F the worst. The assessment of intersection operation is based on criteria defined by TfNSW (formerly RMS) as outlined in **Table 7-1**.

Table 7-1 Level of Service Criteria for Intersections

Level of Service	Average Delay per Vehicle (sec/veh)	Traffic Signals, Roundabout	Giveway & Stop Signs
A	< 14	Good Operation	Good Operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near Capacity & accident study required
E	57 to 70	At Capacity, at signals incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	> 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires additional capacity.

Source: Guide to Traffic Generating Developments (RMS, 2002)

Average Delay (Delay) provides a measure of the operational performance of an intersection and determines the LoS when applying the TfNSW method. It should be noted that the delay should be taken as a guide only as longer delays could be tolerated in some locations (i.e. inner-city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route). For traffic signals, the weighted average delay over all movements is used. For roundabouts and priority control intersections (sign control) the critical movement for assessing LoS should be the movement with the highest average delay.

Degree of Saturation (DoS) is another measure of the operational performance of individual intersections. It is ideal to operate with a DoS of less than 0.9, with DoS of up to 0.8 considered satisfactory. Intersections are considered to be close to capacity as the DoS approaches 1.0, with queue lengths increasing.

7.3 Existing conditions intersection performance results

Intersection modelling was undertaken for key intersections using SIDRA Network software. The intersection assessment has been undertaken using SIDRA v8 network input parameters. This is to enable the model to see the impact of queue propagation which occurs in reality.

7.3.1 Wardell Road/Ewart Street Intersection

Figure 7-3 illustrates the existing SIDRA layouts for Wardell Road/Ewart Street intersection along with the operational performance results summarised in **Table 7-2**.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 7-3 Wardell Road/Ewart Street SIDRA geometry

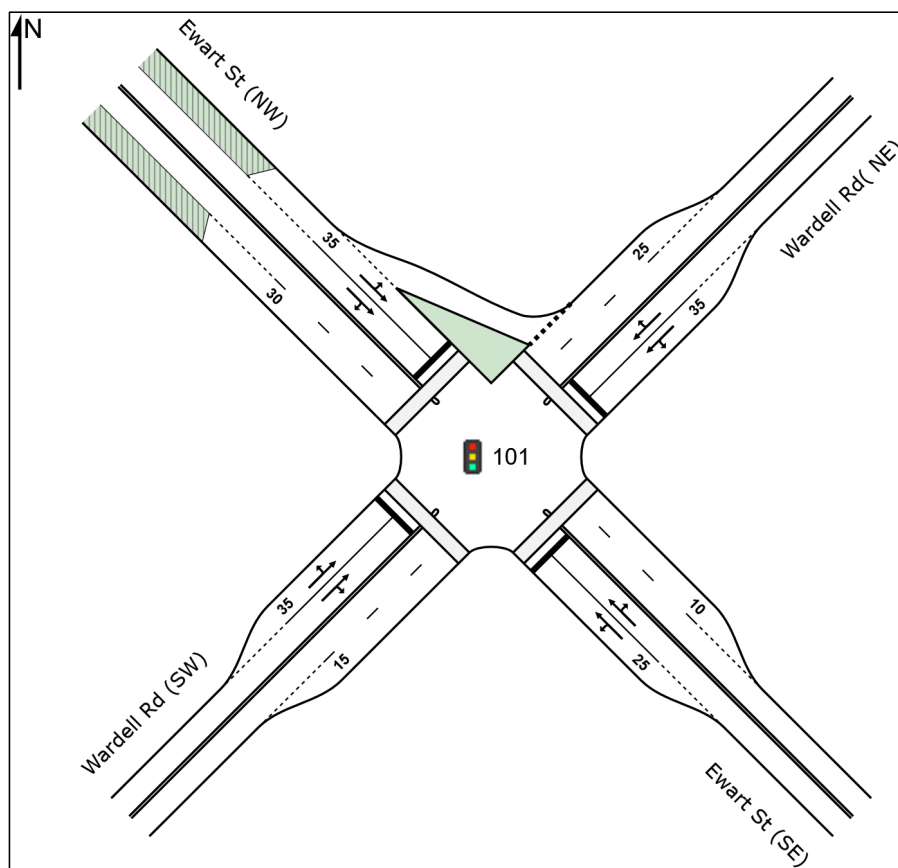


Table 7-2 summarises the intersection performance for Wardell Road/Ewart Street intersection under the existing scenario.

Table 7-2 Wardell Road/Ewart Street SIDRA Results

Peak	DoS	Delay (sec)	LoS	95th %ile Queue(m)	Approach*
AM Peak	0.894	36.5	C	93.3 m	NW (Ewart St)
PM Peak	0.891	32.3	C	100 m	NE (Wardell Rd)

* Corresponds to the longest queue

Intersection performance shows that under the existing scenarios, the performance of Wardell Road/ Ewart Street is LoS C in both AM and PM peak. This demonstrates acceptable performance during both peak hours.

7.3.2 Wardell Rd/ Dudley St Intersection

Figure 7-4 illustrates the existing SIDRA layouts for Wardell Rd/ Dudley St intersection.

Figure 7-4 Wardell Road/Dudley Street SIDRA geometry

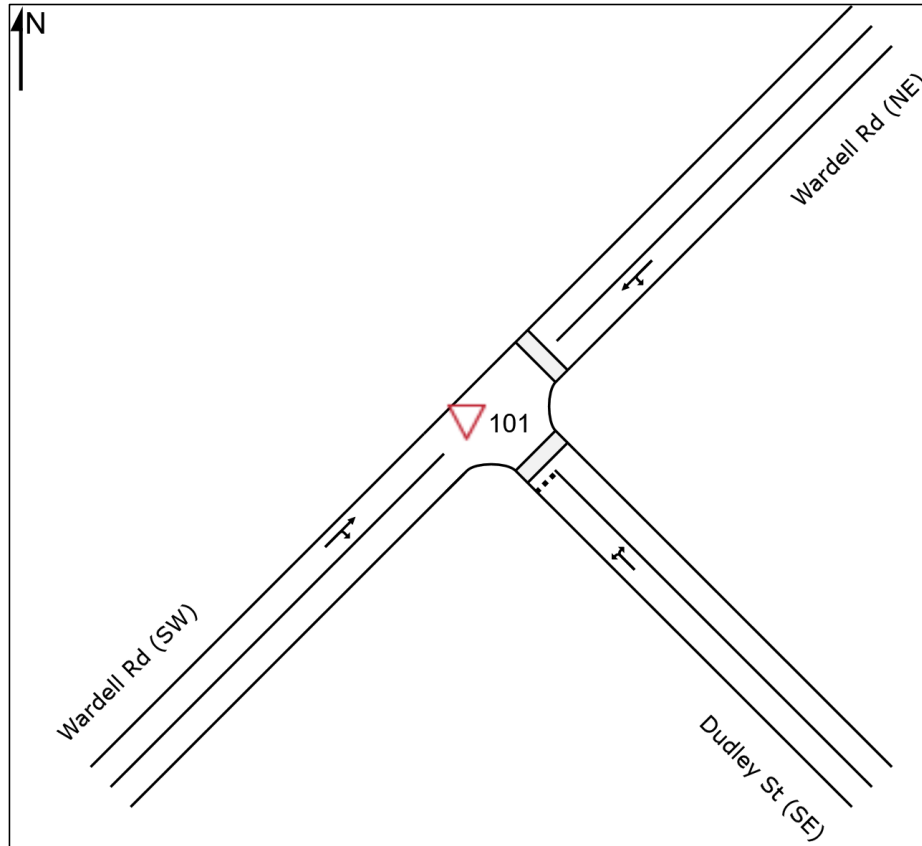


Table 7-3 summarises the intersection performance for Wardell Rd/ Dudley St intersection under the existing scenario.

Table 7-3 Wardell Road/Ewart Street SIDRA Results

Peak	DoS	Delay (sec)	LoS	95th %ile Queue(m)	Approach*
AM Peak	0.963	35.1	C	75.5 m	SW (Wardell Rd)
PM Peak	0.988	44.2	D	142 m	NE (Wardell Rd)

* Corresponds to the longest queue

Intersection performance shows that under the existing scenarios, the performance of Wardell Rd/ Dudley St intersection is LoS C in the AM peak and LoS D in the PM peak. Intersection performance at LoS D signifies Wardell Rd/ Dudley St intersection operates near capacity in the PM peak.



8 Traffic signal warrants

The proposed upgrades to the Dulwich Hill Station precinct public domain includes signalised intersection at Wardell Road / Dudley Street. A signal warrant assessment has been undertaken to determine whether the intersection meets the RMS warrants for traffic signals, as per the *RMS Traffic Signal Design – Section 2 – Warrants*.

8.1 Turning movement volumes

The intersection counts explained in **Section 7.1** were used to inform the demand for the warrants.

8.2 Signal warrant assessment

RMS Traffic Signal Design: Section 2 – Warrants provides detailed guidelines on the criteria/warrants that need to be satisfied for an intersection to be converted into a traffic signal operated intersection. Section 2.3 of the instructions document specifies that the various warrants in terms of traffic flow and/or pedestrian safety need to be met before installing traffic signals. The following warrants for the installation of traffic signals are set out:

(a) Traffic demand:

For each of four one-hour periods of an average day:

- (i) The major road flow exceeds 600 vehicles/hour in each direction; and
- (ii) The minor road flow exceeds 200 vehicles/hour in one direction.

OR

(b) Continuous Traffic

For each of the four one-hour periods of an average day:

- (i) The major road flow exceeds 900 vehicles/hour in each direction; and
- (ii) The minor road flow exceeds 100 vehicles/hour in one direction; and
- (iii) The speed of traffic on the major road or limited sight distance from the minor road causes undue delay or hazard to the minor road vehicles; and
- (iv) There is no other nearby traffic signal site easily accessible to the minor road vehicles.

OR

(c) Pedestrian Safety

For each of four-one hour periods of an average day:

- (i) The pedestrian flow crossing the major road exceeds 150 persons/hour; and
- (ii) The major road flow exceeds 600 vehicles/hour in each direction or, where there is a central median of at least 1.2 m wide, 1000 vehicles/hour in each direction.

OR

(d) Pedestrian Safety-high speed road

For each of four-one hour periods of an average day:

- (i) The pedestrian flow crossing the major road exceeds 150 persons/hour; and
- (ii) The major road flow exceeds 450 vehicles/hour in each direction or, where there is a central median of at least 1.2m wide, 750 vehicles/hour in each direction; and
- (iii) The 85th percentile speed on the major road exceeds 75 km/hr.

OR



(e) Crashes:

- (i) The intersection has been the site of an average of three or more reported tow-away or causality traffic accidents per year over a three year period, where the traffic accidents could have been prevented by traffic signals; and
- (ii) The traffic flows are at least 80% of the appropriate flow warrants.

8.2.1 Traffic demand

The results of the warrant assessment based on traffic demand are shown in **Table 8-1** below.

Table 8-1 Signalised Intersection Warrant Assessment (Traffic Demand)

Traffic Demand Warrant	Approach	Observed Traffic								Warrant Met
Each of four one-hour periods of an average day		06:00-07:00	07:00-08:00	08:00-09:00	09:00-10:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00	
(i) The major road flow exceeds 600 vehicles / hour in each direction;	Wardell Rd North	130	261	356	294	685	736	824	647	✓
	Wardell Rd South	563	657	615	560	425	411	435	443	✗
(ii) The minor road flow exceeds 200 vehicles/hour in one direction.	Dudley St East	27	44	59	51	65	61	64	62	✗

As seen in **Table 8-1** there is not sufficient traffic demand for the signalised intersection warrant criteria to be met at Wardell Rd / Dudley St. Although the traffic volumes of the Wardell Rd North approach satisfies the required warrant criteria, the traffic volumes of Wardell Rd South and Dudley St East approach do not satisfy the criteria. As the traffic demand category has not been satisfied, the warrant based on continuous traffic has been assessed.

8.2.2 Continuous traffic

The results of the warrant assessment based on continuous traffic are shown in **Table 8-2** below.

Table 8-2 Signalised Intersection Warrant Assessment (Continuous Traffic)

Traffic Demand Warrant	Approach	Observed Traffic								Warrant Met
For each of the four one-hour periods of an average day:		06:00-07:00	07:00-08:00	08:00-09:00	09:00-10:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00	
(i) The major road flow exceeds 900 vehicles/hour in each direction; and	Wardell Rd North	130	261	356	294	685	736	824	647	✗
	Wardell Rd South	563	657	615	560	425	411	435	443	✗
(ii) The minor road flow exceeds 100 vehicles/hour in one direction; and	Dudley St East	27	44	59	51	65	61	64	62	✗



(iii) The speed of traffic on the major road or limited sight distance from the minor road causes undue delay or hazard to the minor road vehicles; and	There is a steep descending grade on Wardell Road (South) which leads to higher relative speeds to the vehicle going southbound.	✓
(iv) There is no other nearby traffic signal site easily accessible to the minor road vehicles.	This condition is not met. A signalised intersection is located approximately 115 m west of the proposed signalised intersection which is easily accessible to the minor road vehicles through side streets such as Bayley Street.	✗

As seen in **Table 8-2** the warrant for continuous traffic is not satisfied based on continuous traffic flow hence the warrant based on pedestrian safety been assessed.

8.2.3 Pedestrian safety

The results of the warrant assessment based on pedestrian safety are shown in **Table 8-3** below.

Table 8-3 Signalised Intersection Warrant Assessment (Pedestrian Safety)

Traffic Demand Warrant	Approach	Observed Traffic								Warrant Met
Each of four one-hour periods of an average day		06:00 - 07:00	07:00 - 08:00	08:00 - 09:00	09:00 - 10:00	15:00 - 16:00	16:00 - 17:00	17:00 - 18:00	18:00 - 19:00	
(i) The pedestrian flow crossing the major road exceeds 150 persons/hour; and	Wardell Rd North	97	296	411	128	224	159	255	259	✓
(ii) The major road flow exceeds 600 vehicles/hour in each direction or, where there is a central median of at least 1.2 m wide, 1000 vehicles/hour in each direction.	Wardell Rd North	130	261	356	294	685	736	824	647	✓
	Wardell Rd South	563	657	615	560	425	411	435	443	✗

Table 8-3 shows that traffic volumes for Wardell Rd South do not meet the required criteria although the traffic volumes for Wardell Road North were satisfied based on pedestrian and traffic volumes. As the warrant for this category has not been satisfied, the other categories have been assessed as shown below.

8.2.4 Pedestrian safety-high speed road

The results of the warrant assessment based on pedestrian safety-high speed road are shown in **Table 8-4** below.



Table 8-4 Signalised Intersection Warrant Assessment (Pedestrian Safety-high speed road)

Traffic Demand Warrant	Approach	Observed Traffic								Warrant Met
Each of four one-hour periods of an average day		06:00 - 07:00	07:00 - 08:00	08:00 - 09:00	09:00 - 10:00	15:00 - 16:00	16:00 - 17:00	17:00 - 18:00	18:00 - 19:00	
(i) The pedestrian flow crossing the major road exceeds 150 persons/hour; and	Wardell Rd North	97	296	411	128	224	159	255	259	✓
(ii) The major road flow exceeds 450 vehicles/hour in each direction or, where there is a central median of at least 1.2m wide, 750 vehicles/hour in each direction; and	Wardell Rd North	130	261	356	294	685	736	824	647	✓
	Wardell Rd South	563	657	615	560	425	411	435	443	✓
(iii) The 85th percentile speed on the major road exceeds 75 km/hr.	This condition is not met. The speed limit of Wardell Rd is 50 km/hr.									✗

Table 8-4 shows that Wardell Rd / Dudley St does not meet the warrant criteria based on Pedestrian safety high-speed road.

8.2.5 Crashes

The results of the warrant assessment based on crashes are shown in **Table 8-5** below.

Table 8-5 Signalised Intersection Warrant Assessment (Crashes)

Traffic Demand Warrant	Approach	Observed Traffic Demand	Warrant Met
(i) The intersection has been the site of an average of three or more reported tow-away or causality traffic accidents per year over a three year period, where the traffic accidents could have been prevented by traffic signals; and	Five-year crash data history from TfNSW (the Centre for Road Safety) was assessed from 2014 to 2018 (inclusive). It was found that a total of three crashes were recorded which were in the 2016- 2017 period. According to the RUM codes, all the three crashes at the intersection of Wardell Rd / Dudley St involved pedestrians. However, the requirement of an average of three or more reported tow- away or causality traffic accidents per year over three years is not met.		✗
(ii) The traffic flows are at least 80% of the appropriate flow warrants.	This condition is not met the average traffic flows of Dudley St East(minor road) is 54 veh/hr which is only 27 % of the recommended 200 veh/hr.		✗

Hence Wardell Rd / Dudley St does not meet the warrant for traffic signal based on crashes as the traffic flow is not satisfied.



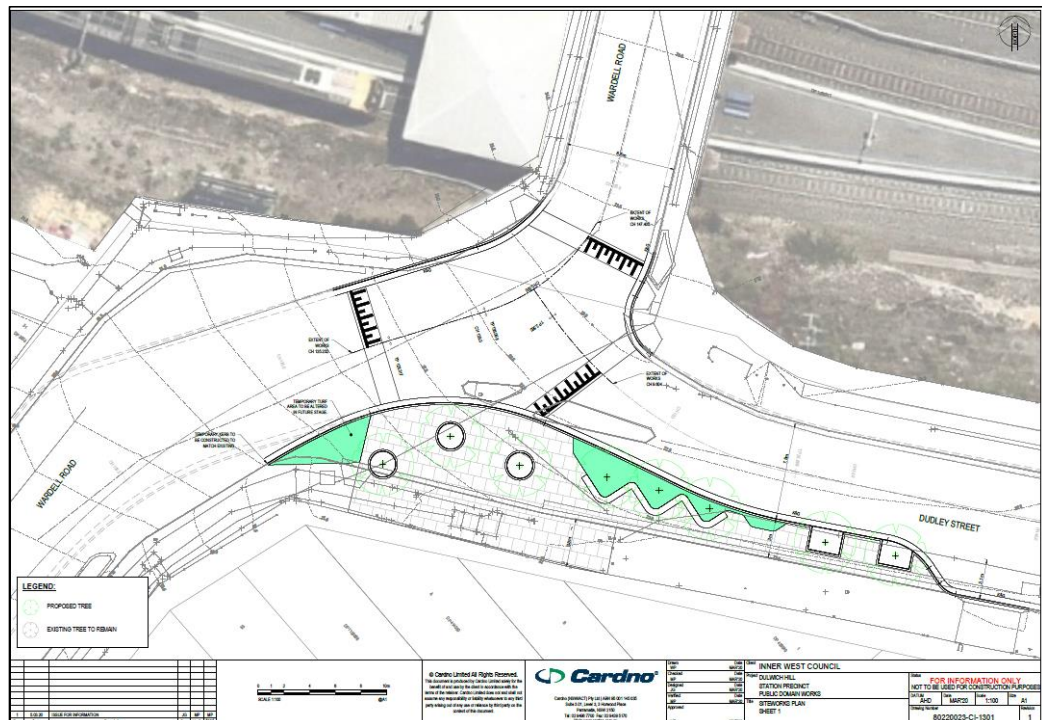
Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Based on the analysis, the intersection of Wardell Rd / Dudley St does not satisfy any of the traffic signal warrant criteria. Cardno understands that Council intends to implement the signalised intersection at Wardell Rd / Dudley St given the proximity of the intersection to the existing Dulwich Hill station and proposed Sydney Metro Station. Signalising the intersection would offer improved safety for all modes, especially pedestrian movements. Council proposes to implement a signalised intersection with a scramble crossing to offer more crossing opportunities for pedestrians and cater to the anticipated increase in pedestrian demand due to Sydney Metro. Council met with TfNSW to discuss the proposed signalised intersection at Wardell Rd / Dudley St and TfNSW was supportive of the proposal.

8.3 Proposed signalised intersection

The design for the proposed intersection of Wardell Rd and Dudley St is shown in **Figure 8-1**.

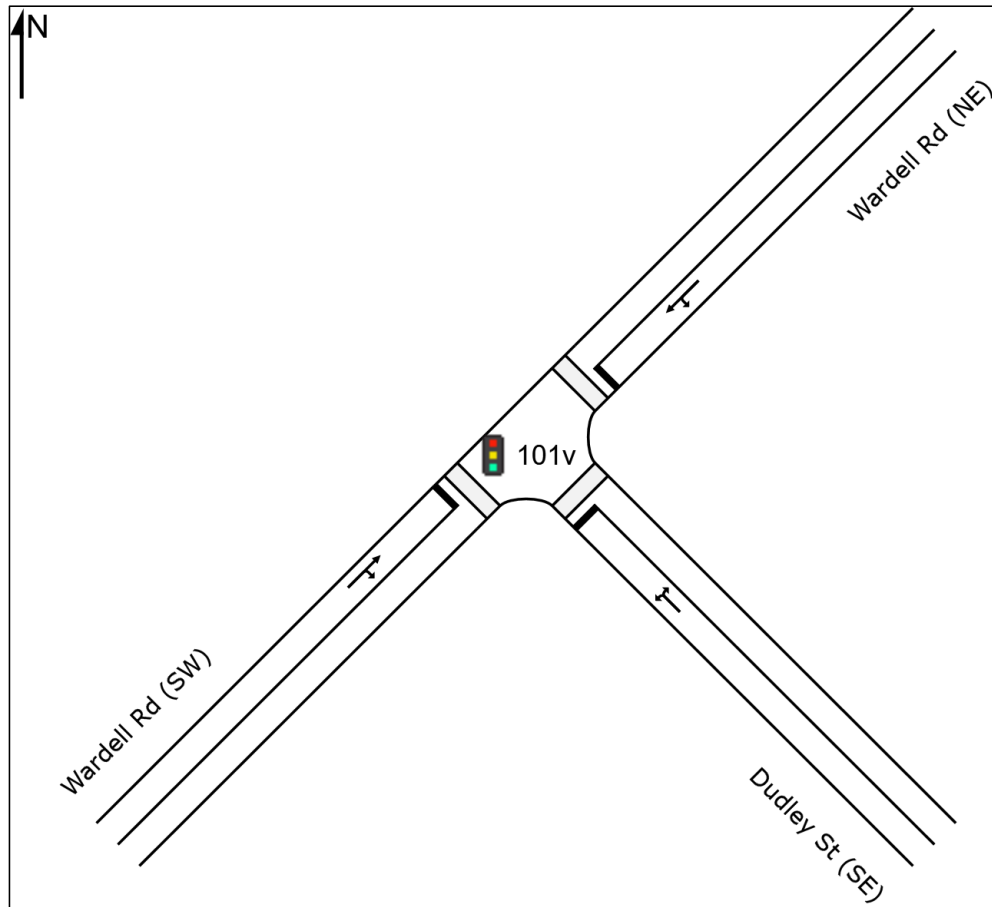
Figure 8-1 Design of intersection of Wardell Rd/Dudley St



The SIDRA layout for the proposed signalised intersection is illustrated in **Figure 8-2**.



Figure 8-2 SIDRA Layout of Wardell Rd/Dudley St Signalised intersection

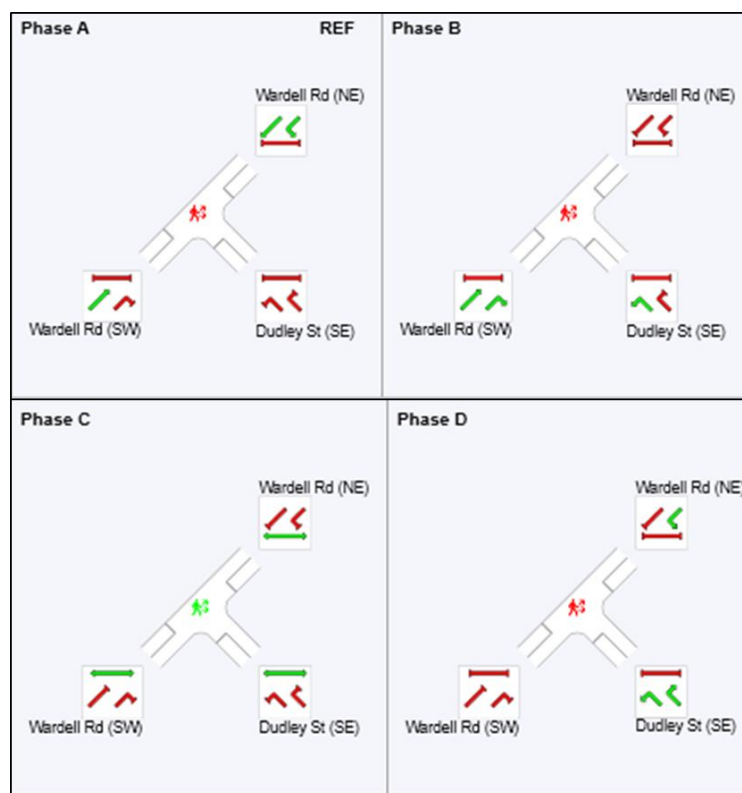


Cardno has been directed by Council to proceed with pedestrian movements operating in a scramble pedestrian phase at Wardell Rd / Dudley Street.

The phasing arrangements of the signalised intersection including the scramble pedestrian phase are shown in **Figure 8-3**. However, it should be noted that the final TCS design is still being prepared by B-Line sub-consultants.



Figure 8-3 Scramble Crossing TCS Phasing Arrangements



The results for the proposed signalised intersection are summarised in **Table 8-6**. A 100 second cycle time was adopted for the Wardell Rd/Dudley St signalised intersection to accommodate coordination with the Wardell Rd/Ewart St intersection (based on the observation of video footage obtained during the intersection counts).

Table 8-6 Wardell Rd/Dudley St signalised intersection Result Summary

Peak	DoS	Delay (sec)	LoS	95th %ile Queue(m)	Approach*
AM Peak	0.624	15.7	B	65.8	NE (Wardell Rd)
PM Peak	0.789	19.6	B	130.5	NE (Wardell Rd)

* Corresponds to the longest queue

Intersection performance shows that under the proposed signalised intersection scenarios, Wardell Rd/ Dudley St intersection performs satisfactorily at LoS B in both AM and PM peak respectively.

It should be noted that the results of the modelling are subject to change based on the final geometry, phasing, and cycle times implemented.

In order to assess the network impacts the intersection performance of Wardell Rd/Ewart St due to the signalisation of Wardell Rd/ Dudley St is shown in **Table 8-7** below.



Table 8-7 Signalisation impact on Wardell Rd/Ewart St intersection Result Summary

Peak	DoS	Delay (sec)	LoS	95th %ile Queue(m)	Approach*
AM Peak	0.844	32.5	C	86.9	SW(Wardell Rd)
PM Peak	0.901	32.7	C	100.0	NE (Wardell Rd)

* Corresponds to the longest queue

A comparison of **Table 7-2** and **Table 8-7** shows that the intersection performance of Wardell Rd/Ewart St performance remains unchanged due to the signalisation of Wardell Rd/ Dudley St with LoS C under both existing and proposed signalisation of Wardell Rd/ Dudley St scenario.

8.3.2 Results comparison

Table 8-8 summarises and compares the average delay and LOS for the existing condition and proposed signalised intersection at Wardell Rd/Dudley St intersection.

Table 8-8 Wardell Rd/Dudley Street average delay and LOS comparison

Wardell Rd/Dudley Street	Existing Scenario		Proposed Signalised Intersection	
	AM	PM	AM	PM
Average Delay(sec)	35.1	44.2	15.7	19.6
LOS	C	D	B	B

It is observed from **Table 8-8** that the signalisation of Wardell Rd / Dudley St improves the performance of the intersection. Under the proposed signalised intersection scenario LoS B is achieved in both AM and PM peak respectively.

Table 8-9 compares the queueing between the existing scenario and the proposed signalised intersection scenario at Wardell Rd/Dudley St intersection.

Table 8-9 Queueing Comparison

Approach	Existing Scenario		Proposed Signalised Intersection	
	AM	PM	AM	PM
South East (Dudley Street)	1.6 m	3.8 m	7.9 m	10.9 m
North East (Wardell Road)	14.0 m	142.0 m	65.7 m	130.5 m
South West (Wardell Road)	75.5 m	14.7 m	43.1 m	63.4 m

It can be observed from **Table 8-9** that proposed signalisation does not directly result in a decrease in queueing. It is observed that the queue increases in the SW approach (Wardell Road) in the PM peak from 14.7 m to 63.4 m however this is not an issue as the distance of the upstream signalised intersection Wardell Road/ Ewart Street is approximately 100 m (more than the queue length observed). The increase in queue length is due to the traffic signals balancing out delays and queues experienced at each approach based on signal phasing timings (i.e. – vehicles waiting for the green light).



8.4 Conclusion

The intersection of Wardell Rd / Dudley St does not satisfy the traffic signal warrant criteria. Cardno understands that Council intends to implement the signalised intersection at Wardell Rd / Dudley St given the proximity of the intersection to the existing Dulwich Hill station and proposed Sydney Metro Station. Signalising the intersection would offer improved safety for all modes, especially pedestrian movements. Council proposes to implement a signalised intersection with a scramble crossing to offer more crossing opportunities for pedestrians and cater to the anticipated increase in pedestrian demand due to Sydney Metro. Council met with TfNSW to discuss the proposed signalised intersection at Wardell Rd / Dudley St and TfNSW was supportive of the proposal.

The traffic modelling shows that the signalisation of Wardell Rd / Dudley St improves the performance of the intersection. Under the existing geometry (priority controlled), the performance of Wardell Rd/ Dudley St intersection is LoS C in the AM peak and LoS D in the PM peak. Intersection performance at LoS D signifies that the intersection operates near capacity in the PM peak. Under the proposed signalised intersection scenario with scramble crossing, the intersection performs satisfactorily at LoS B in both AM and PM peaks.

It should be noted that the results of the modelling are subject to change based on the final geometry, phasing, and cycle times implemented.

9 40 km/hr high pedestrian activity area

A 40 km/h High Pedestrian Activity Area (HPAA) is an area of high pedestrian activity, in town centres and near railway stations, bus interchanges, and services such as medical centres and schools. The maximum speed limit is 40 km/h at all times and makes drivers more aware of the presence of pedestrians moving about or near the road. This creates a safer road environment for all road users, particularly for pedestrians, cyclists and children.

A 40 km/h HPAA is established in conjunction with a suitable local area traffic management scheme with physical devices or treatments to create a self-enforcing 40 km/h speed environment. Typically, the speed limits are complemented with physical traffic calming devices and threshold treatments.



Benefits of providing 40km/h speed limits are listed below:

- > Travelling at slower speeds improves the driver's ability to stop at a safer distance to avoid crashes, otherwise reduce the severity of a crash; and
- > Statistics show that there was a 33% reduction in crashes causing serious injuries and deaths between 2005 and 2015 where 40km/h zones have been introduced.
- > Reduction in Pedestrian Accidents.

The potential for implementing 40km/h speed limits have been identified by relevant RMS guidelines and taking into consideration surrounding land uses.

9.1 Existing road network

9.1.1 Land use zoning

The study area consists of primarily residential along with some commercial/business area along Wardell Road between Ewart Street and Keith Street.

9.1.2 Road network

The road network within the station precinct is detailed in **Table 9-1**.

Table 9-1 Key Roads

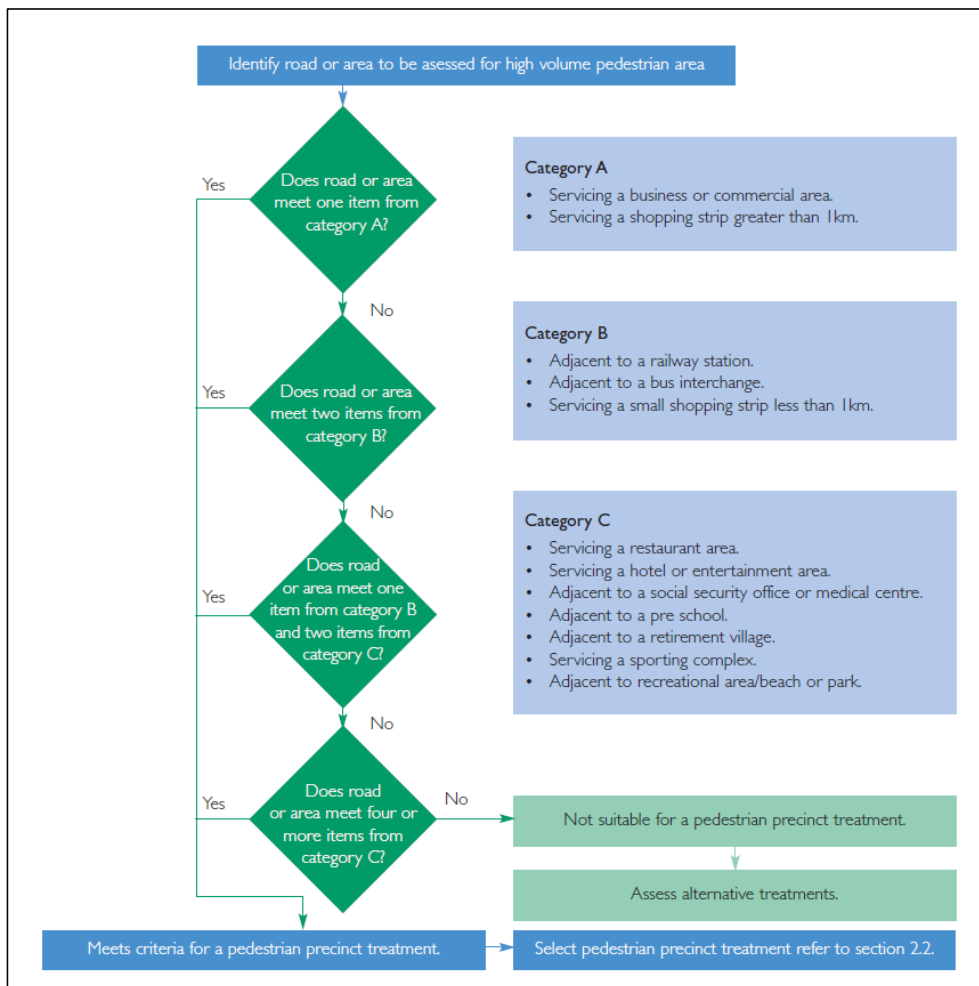
Road Name	Road Classification	Managing Authority	Number of Lane	Speed Limit
Wardell Road	Local Road	Inner West Council	2 travel lanes	50 km/hr
Ewart Street	Local Road	Inner West Council	2 travel lanes	50 km/hr
Dudley Street	Local Road	Inner West Council	2 travel lanes	50 km/hr
Ewart Lane	Local Road	Inner West Council	1 travel lanes	50 km/hr
Bedford Crescent	Local Road	Inner West Council	2 travel lanes	50 km/hr

9.2 Candidate 40 km/hr HPAA

9.2.1 Identification of high volume pedestrian areas

The RMS guideline for 40 km/h speed limits in high volume pedestrian areas specifies the criteria for 40km/h speed limits areas as shown in **Figure 9-1**.

Figure 9-1 40km/h HPAA criteria flowchart



As described in **Figure 9-1** a warrant must be met before the implementation of HPAA. The warrant assessment for roads in the study area is shown in **Table 9-2**. It should be noted that Ewart Ln is proposed as a shared zone as per the masterplan.



Table 9-2 HPAA Warrants

Location	Category A	Category B	Category C	Criteria Satisfied
Wardell Road	Servicing a Business or Commercial Area between Ewart Street and Keith Street	N/A	N/A	One Item from Category A
Bedford Crescent	N/A	Bedford Crescent is an interchange area	N/A	Note 1
Ewart Street	N/A	N/A	N/A	N/A
Dudley Street	Servicing a Business or Commercial Area between Wardell Road and School Parade	N/A	N/A	One Item from Category A

Note 1 Bedford Crescent is adjacent to a railway station and a light rail station and was therefore considered that it meets Category B.

Hence based on the warrant assessment for the roads in the study area Wardell Road, Bedford Crescent and Dudley Street have been selected for the implementation of HPAA.

9.3 Traffic management devices

9.3.1 Overview

The implementation of a 40 km/hr speed limit needs to consider the control and enforcement methods of the lower speed limit. Certain combinations of road conditions can lead drivers to travel at certain speeds more than the limit if not controlled. These include long and straight sections and wide roadways. For successful implementation, the 40 km/hr speed zone must be able to self-enforce and self-regulate the speed limit.

As assessment of the relevant streets was undertaken to appraise the existing road environment and to identify the installation of additional traffic management infrastructure required to reinforce the 40 km/hr speed environment.

9.3.2 Relevant guidelines/documents

As a part of the development of various road treatments in this stage, various documents have been reviewed and referred for the road treatments across the study area:

- > NSW Speed Zoning Guidelines; and
- > Dulwich Hill Station Precinct Masterplan.

9.3.3 Existing infrastructure

Several existing traffic calming devices and treatments are already in use within the study area. The location of the existing traffic management infrastructure was received from the Council and was mapped in **Figure 9-2**.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 9-2 Existing traffic management infrastructure





As seen in **Figure 9-2** there are many pedestrian refuge and chokers within the study area, however there are no existing raised threshold treatments for traffic calming in the study area.

9.3.4 Treatment locations

Dulwich Hill Station precinct upgrades

The masterplan includes traffic calming treatments to the road environment that will create a self-enforcing 40km/h speed environment. This includes raised entry thresholds that will signify to vehicles the change in environment and will reduce vehicle travel speeds. Kerb extensions will also narrow road geometry to help reduce vehicle speeds as well.

The raised, signalised intersection at Wardell Road / Dudley Street will provide additional crossings for pedestrians and cyclists and is also a traffic calming measure that aims to improve safety for pedestrians.

The masterplan proposed traffic calming treatment locations along the precinct are shown in **Table 9-3**.

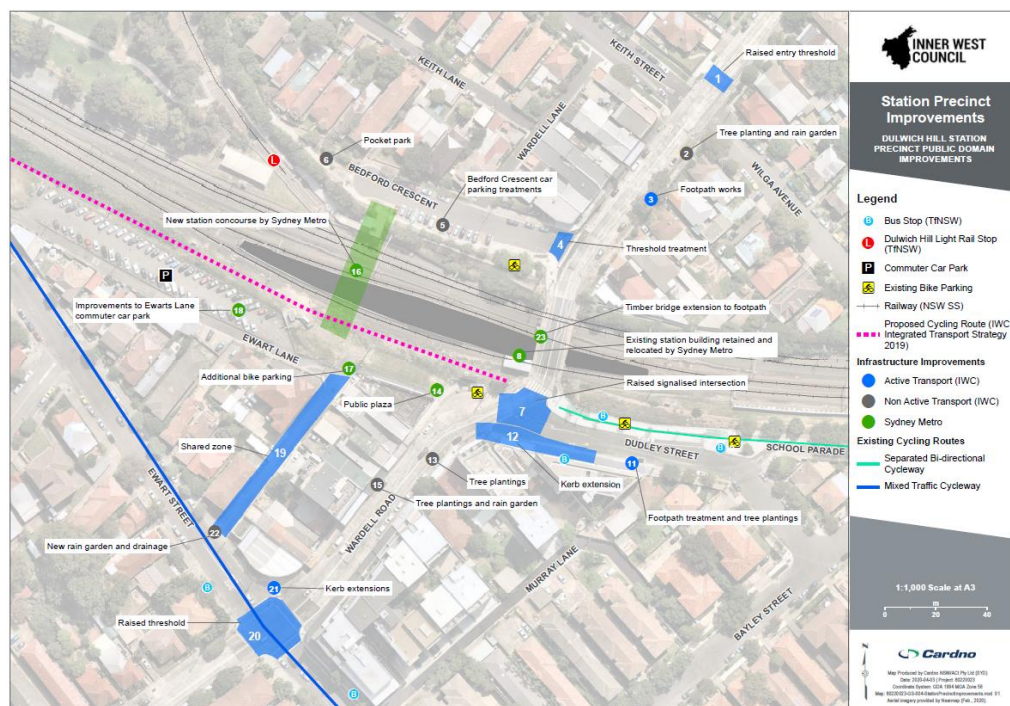
Table 9-3 Masterplan Proposed Treatments

No.	Proposed Masterplan Treatment	Traffic Calming Impacts
1	Entry threshold (raised) on Wardell Road north of Keith Street	Reduce vehicle travel speeds. Entry thresholds will create a safe environment for pedestrians, with traffic calming creating self-enforcement for the 40km/h area
4	Entry threshold (raised) on Bedford Crescent at Wardell Road	Reduce vehicle travel speeds. Entry thresholds will create a safe environment for pedestrians, with traffic calming creating self-enforcement for the 40km/h area
7	Raised signalised intersection at Wardell Road / Dudley Street	Reduce vehicle speeds at the crossing point. The raised threshold will create a safe environment for pedestrians, with traffic calming creating self-enforcement for the 40km/h area
12	Kerb extension on the southern corner of the Wardell Road / Dudley Street intersection	Reduce vehicle turning speeds
20	The raised threshold at the Wardell Road / Ewart Street intersection	Reduce vehicle travel speeds. Entry thresholds will create a safe environment for pedestrians, with traffic calming creating self-enforcement for the 40km/h area
21	Kerb extension on the northern corner of the Wardell Road / Ewart Street intersection	Reduce vehicle turning speeds

Overall the upgrades proposed by the masterplan are expected to improve the safety and efficiency of the station precinct.

The Dulwich Hill Station Precinct upgrades are shown in **Figure 9-3**.

Figure 9-3 Dulwich Hill Station Precinct Upgrades





9.3.5 Proposed Infrastructure

9.3.5.1 Signage

The 40km/hr HPAA speed limit within the HPAA area, supplemented with signage as shown in **Table 9-4**.

Table 9-4 40 km/hr HPAA Signage

Image	Signage Type	Sign Code	Use
	High Pedestrian Activity Area (40 km/hr)	R4-236	On the entry to a High Pedestrian Activity Area.
	End 40 km/hr HPAA	R4-11	At the end of HPAA onto the road with speed limit other than 40 km/hr road.

The principles adopted in assessing the signage requirement are outlined below:

- > “High Pedestrian Activity Area” signs provided on entry into HPAA;
- > “End 40 km/hr Area” signs provided on exit out of HPAA; and
- > The NSW speed zoning guidelines recommend the distance of the first repeater sign to be 300 m from the start of the zone hence it was assessed that the repeater “High Pedestrian Activity Area 40km/hr” signs are not required given that the proposed HPAA is less than 300 m in length from the start of the zone.

9.3.5.2 Location of Signs

The *NSW speed zoning guidelines* outline the location for signage requirements. The summary of the relevant guidelines are outlined below:

- > At each change of speed limit, two-speed restriction signs are to be provided. Ideally on both sides of the carriageway.

For urban environments

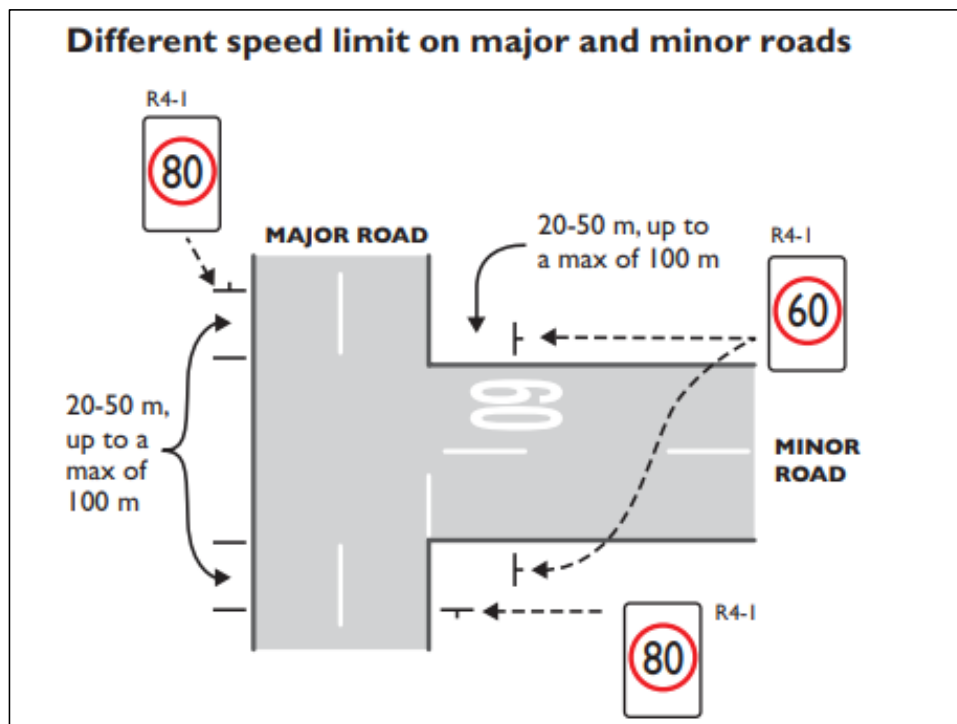
- > The preferred minimum clearances between the ground and the bases of the signs should be 2.5 metres;
- > The minimum lateral clearance between the edge line of the travel lane and the edge of the sign is 0.6 metres; and
- > The maximum lateral clearance between the centre of the left travel lane and the edge of the sign should not exceed 6.6 metres.

Speed limit signs at intersections of major and minor roads should be:

- > On the major road, located 20-50 m up to a maximum of 100 m before and after the edge of the minor road; and
- > On the minor road, located 20-50 m up to a maximum of 100 m before and after the edge of the major road.

See **Figure 9-4** for a diagram of typical sign locations.

Figure 9-4 The typical position of speed signs at intersections



The indicative location for signage for the implementation of 40 km/hr HPAA is shown in **Figure 9-5**. The locations of these signs are indicative only, due to variance in the road environment.



Traffic and Transport Assessment
Dulwich Hill Station Precinct Public Domain Improvements

Figure 9-5 Proposed HPA zone and indicative location of signage



ID : 61087

Item 2

Attachment 1

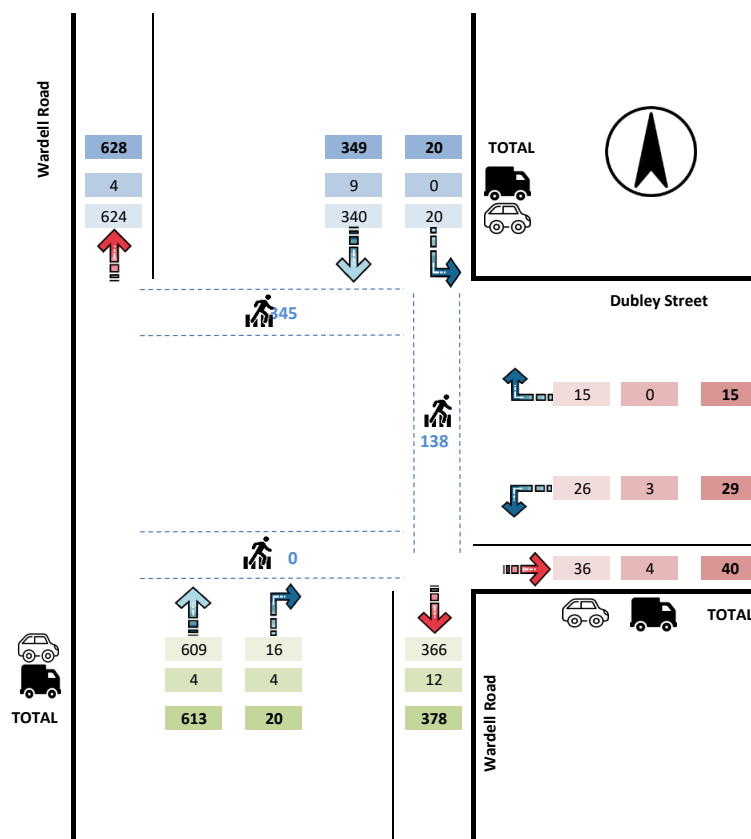


Location	Wardell Road	Duration	6:00 - 10:00
	Dubley Street		15:00 - 19:00
	Wardell Road		-
	-	Day/Date	Wednesday, 19 February 2020
Suburb	DULWICH HILL	Weather	-

DATA SELECTION

Select Time:

TIME RANGE		
PEAK	-	AM
PEAK		
8:15	-	9:15



Traffic Information Specialist

ABN: 42 613 389 923
Email: info@tistraffic.com.au



Location Wardell Road
Dubley Street
Wardell Road
-
Suburb DULWICH HILL

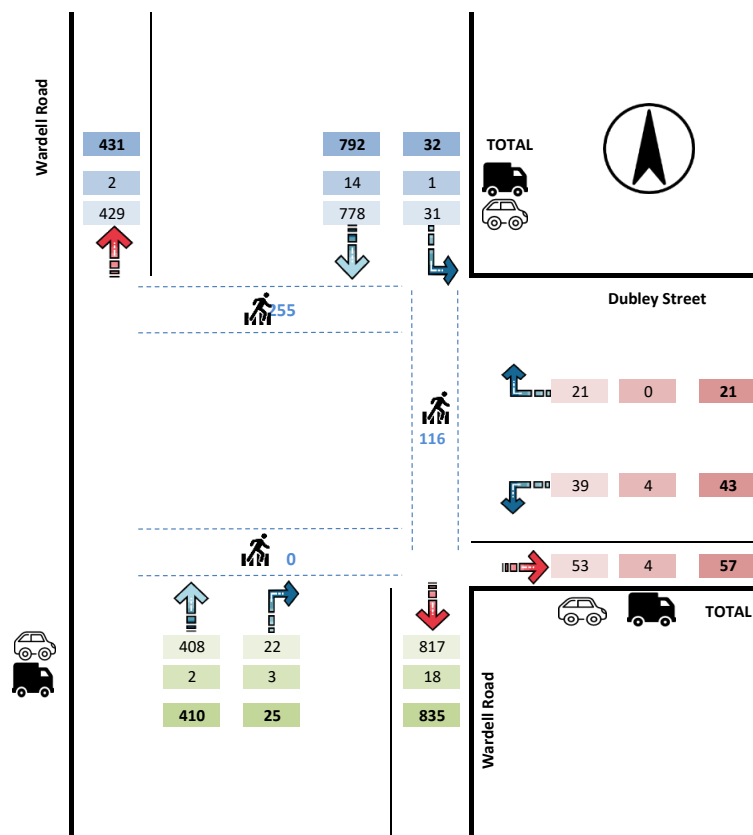
Duration 6:00 - 10:00
15:00 - 19:00
-

Day/Date Wednesday, 19 February 2020

Weather -

DATA SELECTION
Select Time: PEAK

TIME RANGE		
PEAK	-	PM
PEAK		
17:00	-	18:00



Traffic Information Specialist

ABN: 42 613 389 923
Email info@tistraffic.com.au

Location Wardell Road
Ewart Street
Wardell Road
Ewart Street
 Suburb DULWICH HILL

Duration 6:00 - 10:00
15:00 - 19:00
 Day/Date Wednesday, 19 February 2020
 Weather -

All Vehicles Time Per 15 Mins	NORTH EAST Wardell Road										EAST Ewart Street														
	L		T		R		TOTAL	PEDS	L		T		R		TOTAL	PEDS	TOTAL		TOTAL						
	LIGHT	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY			LIGHT	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY			LIGHT	HEAVY							
6:00 - 6:15	4	0	4	20	4	24	7	0	7	35	1	5	0	5	12	0	12	5	0	5	22	5	212	9	221
6:15 - 6:30	6	1	7	26	0	26	2	0	2	35	0	9	0	9	10	0	10	2	0	2	21	2	270	5	275
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6:45 - 7:00	4	0	4	49	0	49	6	0	6	59	3	5	0	5	20	0	20	4	0	4	29	9	302	6	312
7:00 - 7:15	2	0	2	51	1	52	5	0	5	59	3	5	1	6	26	0	26	4	0	4	36	10	304	9	313
7:15 - 7:30	10	0	10	56	0	56	6	0	6	72	6	11	1	12	57	1	58	5	0	5	75	6	380	5	385
7:30 - 7:45	7	0	7	64	4	68	11	0	11	86	1	6	0	6	39	0	39	6	0	6	51	15	397	8	405
7:45 - 8:00	6	1	7	70	1	71	8	0	8	86	2	8	1	9	56	0	56	8	0	8	73	15	390	9	399
8:00 - 8:15	12	0	12	76	1	77	13	0	13	102	0	16	1	17	64	2	66	9	0	9	92	16	441	8	449
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8:30 - 8:45	13	0	13	75	5	80	11	0	11	104	3	10	1	11	44	2	46	5	0	5	62	6	425	12	437
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9:00 - 9:15	10	0	10	60	2	62	7	0	7	79	9	17	1	18	35	0	35	5	0	5	58	8	365	4	369
9:15 - 9:30	10	1	11	48	3	51	9	0	9	71	6	11	0	11	31	0	31	3	0	3	45	8	283	12	295
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9:45 - 10:00	5	0	5	45	2	47	7	1	8	60	6	8	0	8	27	0	27	3	0	3	38	3	243	6	249
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17:30 - 17:45	18	0	18	172	5	177	24	0	24	219	4	20	0	20	78	0	78	20	0	20	118	23	526	6	532
17:45 - 18:00	12	0	12	143	3	146	8	0	8	166	4	24	0	24	83	0	83	11	0	11	118	16	487	5	492
18:00 - 18:15	14	0	14	144	5	149	13	0	13	176	5	16	0	16	71	0	71	8	0	8	95	9	442	6	448
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18:30 - 18:45	6	0	6	120	4	124	15	0	15	145	5	20	1	21	53	0	53	9	0	9	83	14	409	6	415
18:45 - 19:00	10	0	10	90	4	94	11	0	11	115	4	22	0	22	37	1	38	7	0	7	67	8	322	9	331
Period End	149	3	152	2397	70	2467	237	2	225	2844	66	379	5	384	997	9	1006	141	1	142	1532	174	7032	124	7142

All Vehicles Time Per 15 Mins	SOUTH WEST Wardell Road										WEST Ewart Street														
	L		T		R		TOTAL	PEDS	L		T		R		TOTAL	PEDS	TOTAL		TOTAL						
	LIGHT	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY			LIGHT	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY			LIGHT	HEAVY							
6:00 - 6:15	1	0	1	112	3	115	0	1	1	117	1	9	0	9	36	1	37	1	0	1	47	4	212	9	221
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8:45 - 9:00	5	0	5	131	2	133	0	0	0	138	4	23	0	23	76	2	78	6	1	7	108	7	400	8	408
9:00 - 9:15	8	0	8	142	0	142	0	0	0	150	0	11	1	12	60	0	60	10	0	10	82	10	365	4	369
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9:45 - 10:00	3	0	3	93	2	95	0	0	0	98	4	17	1	18	27	0	27	8	0	8	53	6	243	6	249
Period End	70	2	72	1964	50	2014	5	3	8	2094	37	330	5	335	977	19	996	146	5	151	1466	143	5424	137	5545
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16:45 - 17:00	8	0	8	81	2	83	0	0	0	91	2	10	0	10	55	0	55	27	0	27	92	10	465	7	472
17:00 - 17:15	5	0	5	75	0	75	0	0	0	80	1	10	0	10	55	0	55	20	0	20	85	9	473	9	482
17:15 - 17:30	7	0	7	84	2	86	1	0	1	94	8	19	0	19	44	0	44	21</							

Location Wardell Road
Ewart Street
Wardell Road
Ewart Street
Suburb DULWICH HILL

Duration 6:00 - 10:00
15:00 - 19:00
-

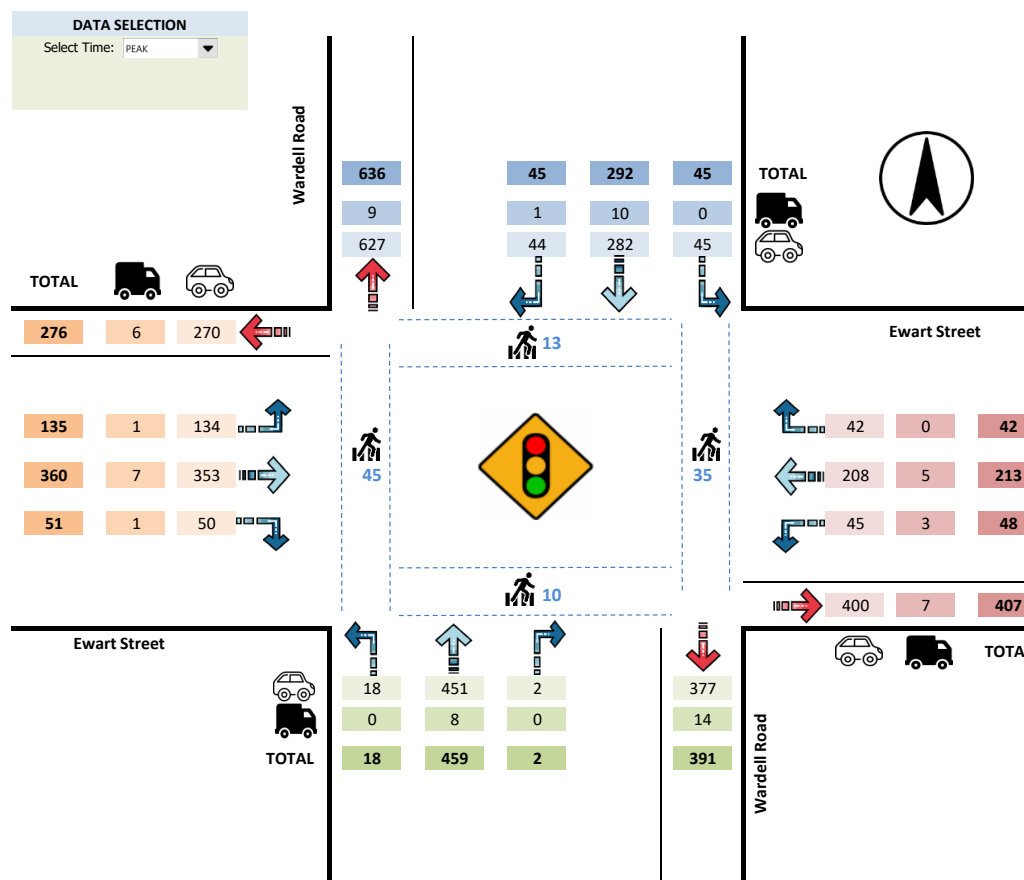
Day/Date Wednesday, 19 February 2020
Weather -

All Vehicles Time Per Hour	NORTH EAST Wardell Road										EAST Ewart Street												TOTAL LIGHT HEAVY	TOTAL	
	L		T		R		TOTAL	PEDS	L		T		R		TOTAL	PEDS									
	LIGHT	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY			LIGHT	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY											
6:00 - 7:00	19	2	21	123	6	129	17	1	18	168	8	25	0	25	67	0	67	16	0	16	108	19	1076	37	1097
6:15 - 7:15	17	2	19	154	3	157	15	1	16	192	10	25	1	26	81	0	81	15	0	15	122	24	1168	37	1189
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8:45 - 9:45	35	1	36	228	10	238	40	0	40	314	23	53	2	55	151	1	152	29	0	29	236	26	1360	35	1395
9:00 - 10:00	32	1	33	208	10	218	40	1	41	292	22	48	1	49	128	1	129	16	0	16	194	22	1203	33	1236
Period End																									
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15:15 - 16:15	25	1	26	577	20	597	58	0	58	681	14	105	1	106	217	5	222	25	0	25	353	36	1645	40	1685
15:30 - 16:30	33	1	34	625	19	644	61	1	62	740	16	102	1	103	219	6	225	25	0	25	353	32	1697	41	1738
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16:00 - 17:00	34	1	35	653	14	667	56	2	58	760	16	97	1	98	240	5	245	29	0	29	372	29	1784	33	1817
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16:45 - 17:45	46	0	46	663	18	681	69	1	70	797	22	101	0	101	312	2	314	40	0	40	455	64	1947	26	1973
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17:15 - 18:15	53	0	53	630	15	645	56	0	56	754	23	89	0	89	311	0	311	47	0	47	447	66	1938	21	1959
17:30 - 18:30	57	0	57	598	14	612	59	0	59	714	14	72	0	72	288	0	288	49	0	49	409	55	1860	19	1865
17:45 - 18:45	45	0	45	546	13	559	50	0	50	640	15	72	1	73	263	0	263	38	0	38	374	46	1743	19	1748
18:00 - 19:00	43	0	43	493	14	507	53	0	53	589	15	70	1	71	217	1	218	34	0	34	323	38	1578	23	1587
Period End																									

All Vehicles Time Per Hour	SOUTH WEST Wardell Road										WEST Ewart Street												TOTAL LIGHT HEAVY	TOTAL	
	L		T		R		TOTAL	PEDS	L		T		R		TOTAL	PEDS									
	LIGHT	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY			LIGHT	HEAVY	LIGHT	HEAVY	LIGHT	HEAVY											
6:00 - 7:00	17	1	18	543	22	565	3	2	5	588	6	48	0	32	173	2	175	25	1	26	233	28	1076	37	1097
6:15 - 7:15	20	1	21	573	24	597	3	1	4	622	6	51	0	35	183	3	186	31	1	32	253	33	1168	37	1189
6:30 - 7:30	16	0	16	572	22	594	3	1	4	614	9	63	0	47	195	5	200	32	1	33	280	50	1278	37	1299
6:45 - 7:45	17	0	17	565	14	579	3	1	4	600	10	76	0	60	230	5	235	33	0	33	328	45	1383	28	1395
7:00 - 8:00	14	0	14	534	13	547	0	1	1	562	16	86	0	86	275	6	281	35	0	35	402	40	1471	31	1502
7:15 - 8:15	16	0	16	472	11	483	1	1	2	501	17	116	0	116	338	5	343	41	0	41	500	45	1608	30	1638
7:30 - 8:30	17	0	17	434	12	446	2	1	3	466	15	135	0	135	363	5	368	47	0	47	550	37	1636	33	1669
7:45 - 8:45	17	0	17	424	11	435	2	0	2	454	15	137	1	138	367	6	373	54	0	54	565	41	1664	37	1701
8:00 - 9:00	18	0	18	451	8	459	2	0	2	479	10	134	1	135	353	7	360	50	1	51	546	45	1674	36	1710
8:15 - 9:15	20	0	20	513	5	518	1	0	1	539	8	103	2	105	304	6	310	47	1	48	463	41	1598	32	1630
8:30 - 9:30	21	1	22	497	7	504	0	0	0	526	7	77	3	80	274	5	279	41	2	43	402	36	1473	36	1509
8:45 - 9:45	23	1	24	474	7	481	0	0	0	505	5	68	3	71	225	6	231	34	4	38	340	30	1360	35	1395
9:00 - 10:00	21	1	22	436	7	443	0	0	0	465	5	62	4	66	176	4	180	36	3	39	285	30	1203	33	1236
Period End																									
15:00 - 16:00	17	0	17	333	9	342	0	0	0	359	13	45	1	46	160	2	162	93	0	93	301	22	1701	44	1745
15:15 - 16:15	21	0	21	311	10	321	0	0	0	342	23	50	1	51	166	2	168	90	0	90	309	35	1645	40	1685
15:30 - 16:30	19	0	19	304	10	314	0	0	0	333	18	53	1	54	168	2	170	88	0	88	312	36	1697	41	1738
15:45 - 16:45	19	0	19	318	11	329	0	0	0	348	14	62	1	63	165	1	166	93	0	93	322	38	1719	33	1752
16:00 - 17:00	23	0	23	320	10	330	0	0	0	353	15	54	0	54	182	0	182	96	0	96	332	43	1784	33	1817
16:15 - 17:15	21	0	21	334	6	340	0	0	0	361	5	48	0	48	197	0	197	96	0	96	341	29	1857	32	1889
16:30 - 17:30	25	0	25	349	7	356	1	0	1	369	13	58	0	58	200	0	200	94	0	94	352	51	1904	27	1931
16:45 - 17:45	22	0	22	342	4	346	1	0	1	361	12	55	1	56	211	0	211	85	0	85	352	55	1947	26	1973
17:00 - 18:00	17	0	17	355	4	359	2	0	2	378	17	57	1	58	218	0	218	92	0	92	368	57	1969	24	1993
17:15 - 18:15	19	0	19	364	5	369	2	0	2	390	17	65	1	66	206	0	206	96	0	96	368	66	1938	21	1959
17:30 - 18:30	17	0	17	357	4	361	1	0	1	379	10	60	1	61	204	0	204	98	0	98	363	55	1860	19	1865
17:45 - 18:45	18	0	18	346	5	351	1	0	1	370	8	71	0	71	194	0	194	99	0	99	364	58	1743	19	1748
18:00 - 19:00	23	0	23	324	5	329	0	0	0	352	2	69	0	69	172	2	174	80	0	80	323	57	1578	23	1587
Period End																									



Location	Wardell Road	Duration	6:00 - 10:00
	Ewart Street		15:00 - 19:00
	Wardell Road		-
	Ewart Street	Day/Date	Wednesday, 19 February 2020
Suburb	DULWICH HILL	Weather	-

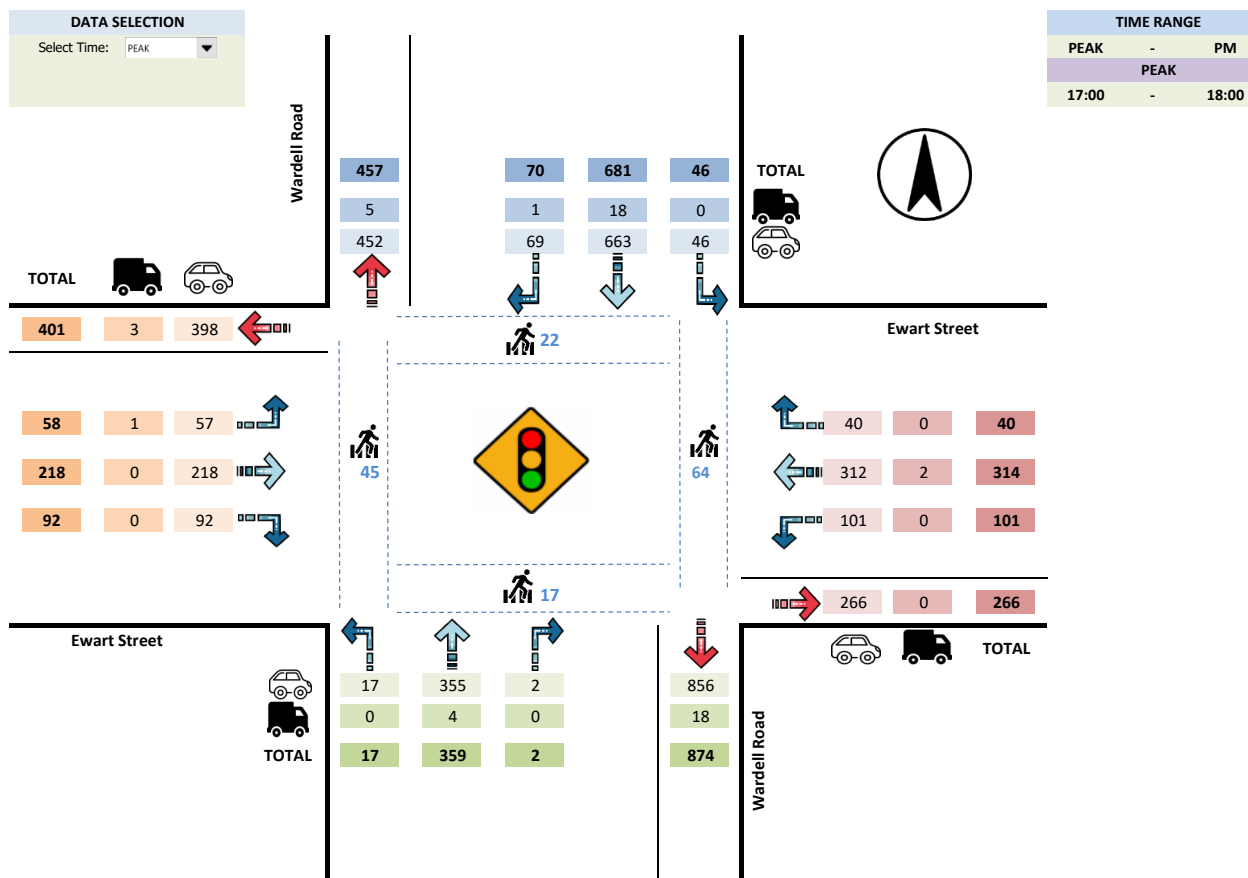


Traffic Information Specialists

ABN: 42 613 389 923
Email info@trafficinfospecialist.com.au



Location	Wardell Road	Duration	6:00 - 10:00
	Ewart Street		15:00 - 19:00
	Wardell Road		-
	Ewart Street	Day/Date	Wednesday, 19 February 2020
Suburb	DULWICH HILL	Weather	-



Traffic Information Specialists

ABN: 42 613 389 923
Email info@trafficinfospecialist.com.au



MOVEMENT SUMMARY

Site: 101 [Wardell Rd/ Dudley St]

Network: N101 [Network1]

2020 AM Base
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles													
Mov ID	Turn	Demand Total	Flows HV	Arrival Total	Flows HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Prop. Distance	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m			km/h
SouthEast: Dudley St (SE)													
21	L2	41	7.7	41	7.7	0.169	7.1	LOS A	0.2	1.6	0.69	0.69	36.9
23	R2	21	0.0	21	0.0	0.169	25.1	LOS B	0.2	1.6	0.69	0.69	41.7
Approach		62	5.1	62	5.1	0.169	13.2	LOS A	0.2	1.6	0.69	0.69	39.1
NorthEast: Wardell Rd (NE)													
24	L2	17	0.0	17	0.0	0.552	11.1	LOS A	2.0	14.0	0.72	1.12	44.8
25	T1	359	2.3	359	2.3	0.552	7.6	LOS A	2.0	14.0	0.72	1.12	41.3
Approach		376	2.2	376	2.2	0.552	7.7	NA	2.0	14.0	0.72	1.12	41.6
SouthWest: Wardell Rd (SW)													
31	T1	642	1.1	642	1.1	0.963	30.6	LOS C	10.6	75.5	0.95	2.12	29.4
32	R2	18	29.4	18	29.4	0.963	35.1	LOS C	10.6	75.5	0.95	2.12	28.6
Approach		660	1.9	660	1.9	0.963	30.7	NA	10.6	75.5	0.95	2.12	29.4
All Vehicles		1098	2.2	1098	2.2	0.963	21.8	NA	10.6	75.5	0.86	1.63	33.0

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

MOVEMENT SUMMARY

 Site: 101 [Wardell Rd/ Ewart St]

 Network: N101 [Network1]

2020 AM Base

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows Total	Flows HV	Arrival Flows Total	Flows HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Average Cycles Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m			km/h
SouthEast: Ewart St (SE)													
21	L2	51	6.3	51	6.3	0.147	20.6	LOS B	2.1	15.5	0.60	0.58	39.8
22	T1	224	2.3	224	2.3	0.591	28.8	LOS C	5.0	35.5	0.80	0.70	35.4
23	R2	43	0.0	43	0.0	0.591	40.0	LOS C	5.0	35.5	0.91	0.77	25.2
Approach		318	2.6	318	2.6	0.591	29.0	LOS C	5.0	35.5	0.79	0.69	35.0
NorthEast: Wardell Rd(NE)													
24	L2	47	0.0	47	0.0	0.116	24.7	LOS B	1.6	11.5	0.66	0.63	32.8
25	T1	306	3.4	306	3.4	0.572	29.2	LOS C	7.9	57.2	0.86	0.73	29.8
26	R2	47	2.2	47	2.2	0.572	35.1	LOS C	7.9	57.2	0.89	0.74	29.0
Approach		401	2.9	401	2.9	0.572	29.3	LOS C	7.9	57.2	0.84	0.72	30.0
NorthWest: Ewart St (NW)													
27	L2	139	0.8	139	0.8	0.179	10.2	LOS A	1.3	9.3	0.51	0.62	39.9
28	T1	379	1.9	379	1.9	0.894	44.7	LOS D	13.1	93.3	0.90	1.01	30.8
29	R2	54	2.0	54	2.0	0.894	52.4	LOS D	13.1	93.3	0.93	1.04	29.9
Approach		572	1.7	572	1.7	0.894	37.1	LOS C	13.1	93.3	0.81	0.92	31.7
SouthWest: Wardell Rd (SW)													
30	L2	19	0.0	19	0.0	0.227	38.5	LOS C	2.4	17.0	0.85	0.69	33.6
31	T1	474	1.8	474	1.8	0.883	46.8	LOS D	13.0	92.3	0.97	1.00	22.1
32	R2	2	0.0	2	0.0	0.883	53.9	LOS D	13.0	92.3	0.99	1.06	29.7
Approach		495	1.7	495	1.7	0.883	46.5	LOS D	13.0	92.3	0.97	0.99	22.7
All Vehicles		1785	2.1	1785	2.1	0.894	36.5	LOS C	13.1	93.3	0.85	0.85	29.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian	Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P5	SouthEast Full Crossing	37	44.2	LOS E	0.1	0.1	0.94	0.94
P6	NorthEast Full Crossing	14	44.2	LOS E	0.0	0.0	0.94	0.94
P7	NorthWest Full Crossing	47	44.3	LOS E	0.1	0.1	0.94	0.94
P8	SouthWest Full Crossing	11	44.2	LOS E	0.0	0.0	0.94	0.94
All Pedestrians		108	44.2	LOS E			0.94	0.94

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

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Organisation: CARDNO (QLD) PTY LTD | Processed: Friday, 24 April 2020 1:01:38 PM
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Dulwich Hill AM Peak Base .sip8

MOVEMENT SUMMARY

Site: 101 [Wardell Rd/ Dudley St]

Network: N101 [Network1]

2020 PM Base

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows Total	Flows HV	Arrival Flows Total	Flows HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
SouthEast: Dudley St (SE)														
21	L2	44	9.5	44	9.5	0.604	32.1	LOS C	0.5	3.8	0.91	1.06	1.28	25.3
23	R2	22	0.0	22	0.0	0.604	44.2	LOS D	0.5	3.8	0.91	1.06	1.28	33.0
Approach		66	6.3	66	6.3	0.604	36.1	LOS C	0.5	3.8	0.91	1.06	1.28	28.6
NorthEast: Wardell Rd (NE)														
24	L2	34	3.1	34	3.1	0.988	43.5	LOS D	20.0	142.0	1.00	2.41	3.93	32.0
25	T1	803	1.8	803	1.8	0.988	40.0	LOS C	20.0	142.0	1.00	2.41	3.93	23.9
Approach		837	1.9	837	1.9	0.988	40.2	NA	20.0	142.0	1.00	2.41	3.93	24.4
SouthWest: Wardell Rd (SW)														
31	T1	444	0.5	444	0.5	0.584	4.9	LOS A	2.1	14.7	0.50	0.56	0.75	44.2
32	R2	27	11.5	27	11.5	0.584	19.7	LOS B	2.1	14.7	0.50	0.56	0.75	42.7
Approach		472	1.1	472	1.1	0.584	5.8	NA	2.1	14.7	0.50	0.56	0.75	44.1
All Vehicles		1375	1.8	1375	1.8	0.988	28.2	NA	20.0	142.0	0.82	1.71	2.71	29.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

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.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 Site: 101 [Wardell Rd/ Ewart St]

 Network: N101 [Network1]

2020 PM Base

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows Total	Flows HV	Arrival Flows Total	Flows HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Average Cycles Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m			km/h
SouthEast: Ewart St (SE)													
21	L2	109	0.0	109	0.0	0.197	24.1	LOS B	2.9	20.1	0.67	0.68	37.8
22	T1	340	0.0	340	0.0	0.792	36.5	LOS C	9.7	67.8	0.90	0.86	33.1
23	R2	45	0.0	45	0.0	0.792	43.6	LOS D	9.7	67.8	0.93	0.89	24.2
Approach		495	0.0	495	0.0	0.792	34.4	LOS C	9.7	67.8	0.85	0.82	33.4
NorthEast: Wardell Rd(NE)													
24	L2	54	0.0	54	0.0	0.200	22.3	LOS B	3.0	21.7	0.64	0.59	34.5
25	T1	727	2.7	727	2.8	0.891	34.8	LOS C	14.0	100.0	0.86	0.90	27.8
26	R2	66	0.0	66	0.0	0.891	42.6	LOS D	14.0	100.0	0.90	0.96	26.5
Approach		847	2.4	847	2.4	0.891	34.6	LOS C	14.0	100.0	0.85	0.89	28.1
NorthWest: Ewart St (NW)													
27	L2	59	1.8	59	1.8	0.175	17.2	LOS B	2.2	15.6	0.65	0.60	36.1
28	T1	229	0.0	229	0.0	0.877	35.2	LOS C	7.5	52.4	0.83	0.85	33.2
29	R2	97	0.0	97	0.0	0.877	58.3	LOS E	7.5	52.4	0.99	1.06	28.2
Approach		385	0.3	385	0.3	0.877	38.3	LOS C	7.5	52.4	0.84	0.87	31.9
SouthWest: Wardell Rd (SW)													
30	L2	18	0.0	18	0.0	0.086	20.6	LOS B	1.2	8.7	0.59	0.52	40.2
31	T1	367	1.1	367	1.1	0.373	18.8	LOS B	6.1	43.0	0.68	0.59	33.1
32	R2	2	0.0	2	0.0	0.373	23.9	LOS B	6.1	43.0	0.70	0.60	39.2
Approach		387	1.1	387	1.1	0.373	18.9	LOS B	6.1	43.0	0.68	0.59	33.7
All Vehicles		2115	1.2	2114 ^{N1}	1.2	0.891	32.3	LOS C	14.0	100.0	0.82	0.81	31.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate	
P5	SouthEast Full Crossing	74	44.3	LOS E	0.2	0.2	0.94	0.94	
P6	NorthEast Full Crossing	23	44.2	LOS E	0.1	0.1	0.94	0.94	
P7	NorthWest Full Crossing	60	44.3	LOS E	0.2	0.2	0.94	0.94	
P8	SouthWest Full Crossing	18	44.2	LOS E	0.0	0.0	0.94	0.94	
All Pedestrians		175	44.3	LOS E			0.94	0.94	

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

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Dulwich Hill PM Peak Base.sip8

MOVEMENT SUMMARY

Site: 101v [Wardell Rd/ Dudley St - Signalisation]

Network: N101 [Network
Option 2 - Scramble Pedestrian]

AM Peak

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles													
Mov ID	Turn	Demand Total	Flows HV	Arrival Total	Flows HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Average Cycles Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m			km/h
SouthEast: Dudley St (SE)													
21	L2	41	7.7	41	7.7	0.358	29.6	LOS C	1.1	7.9	0.96	0.75	0.96
23	R2	21	0.0	21	0.0	0.358	29.5	LOS C	1.1	7.9	0.96	0.75	0.96
Approach		62	5.1	62	5.1	0.358	29.6	LOS C	1.1	7.9	0.96	0.75	0.96
NorthEast: Wardell Rd (NE)													
24	L2	17	0.0	17	0.0	0.624	32.4	LOS C	9.2	65.8	0.87	0.76	0.87
25	T1	359	2.3	359	2.3	0.624	27.8	LOS B	9.2	65.8	0.87	0.76	0.87
Approach		376	2.2	376	2.2	0.624	28.0	LOS B	9.2	65.8	0.87	0.76	0.87
SouthWest: Wardell Rd (SW)													
31	T1	642	1.1	584	1.2	0.594	6.3	LOS A	6.1	43.1	0.37	0.34	0.37
32	R2	18	29.4	16	29.6	0.594	11.2	LOS A	6.1	43.1	0.37	0.34	0.37
Approach		660	1.9	601 ^{N1}	1.9	0.594	6.5	LOS A	6.1	43.1	0.37	0.34	0.37
All Vehicles		1098	2.2	1038 ^{N1}	2.3	0.624	15.7	LOS B	9.2	65.8	0.58	0.52	0.58

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P5	SouthEast Full Crossing	183	44.5	LOS E	0.5	0.5	0.95	0.95
P6	NorthEast Full Crossing	433	45.0	LOS E	1.2	1.2	0.96	0.96
P8	SouthWest Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
PD	Diagonal Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		721	44.8	LOS E			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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\\Dulwich Hill AM Peak - Signalised(Wardell-Dudley).sip8

Item 2

Attachment 1

MOVEMENT SUMMARY

 Site: 101v [Wardell Rd/ Dudley St - Signalisation]

 Network: N101 [Option 1 - Scramble Pedestrian]

PM Peak

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	% HV	veh/h	% HV	v/c	sec		veh	m				km/h
SouthEast: Dudley St (SE)														
21	L2	44	9.5	44	9.5	0.533	35.0	LOS C	1.5	10.9	0.98	0.78	1.03	25.7
23	R2	22	0.0	22	0.0	0.533	34.9	LOS C	1.5	10.9	0.98	0.78	1.03	33.4
Approach		66	6.3	66	6.3	0.533	35.0	LOS C	1.5	10.9	0.98	0.78	1.03	29.0
NorthEast: Wardell Rd (NE)														
24	L2	34	3.1	34	3.1	0.789	24.6	LOS B	18.3	130.5	0.80	0.73	0.80	38.8
25	T1	803	1.8	803	1.8	0.789	20.0	LOS B	18.3	130.5	0.80	0.73	0.80	32.3
Approach		837	1.9	837	1.9	0.789	20.2	LOS B	18.3	130.5	0.80	0.73	0.80	32.7
SouthWest: Wardell Rd (SW)														
31	T1	444	0.5	444	0.5	0.684	16.1	LOS B	9.0	63.4	0.68	0.61	0.68	36.4
32	R2	27	11.5	27	11.5	0.684	20.8	LOS B	9.0	63.4	0.68	0.61	0.68	35.4
Approach		472	1.1	472	1.1	0.684	16.4	LOS B	9.0	63.4	0.68	0.61	0.68	36.4
All Vehicles		1375	1.8	1375	1.8	0.789	19.6	LOS B	18.3	130.5	0.77	0.69	0.77	33.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian	Queue Distance m	Prop. Queued	Effective Stop Rate	
P5	SouthEast Full Crossing	122	44.4	LOS E	0.3	0.3	0.94	0.94	
P6	NorthEast Full Crossing	268	44.7	LOS E	0.7	0.7	0.95	0.95	
P8	SouthWest Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94	
PD	Diagonal Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94	
All Pedestrians		496	44.5	LOS E			0.95	0.95	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

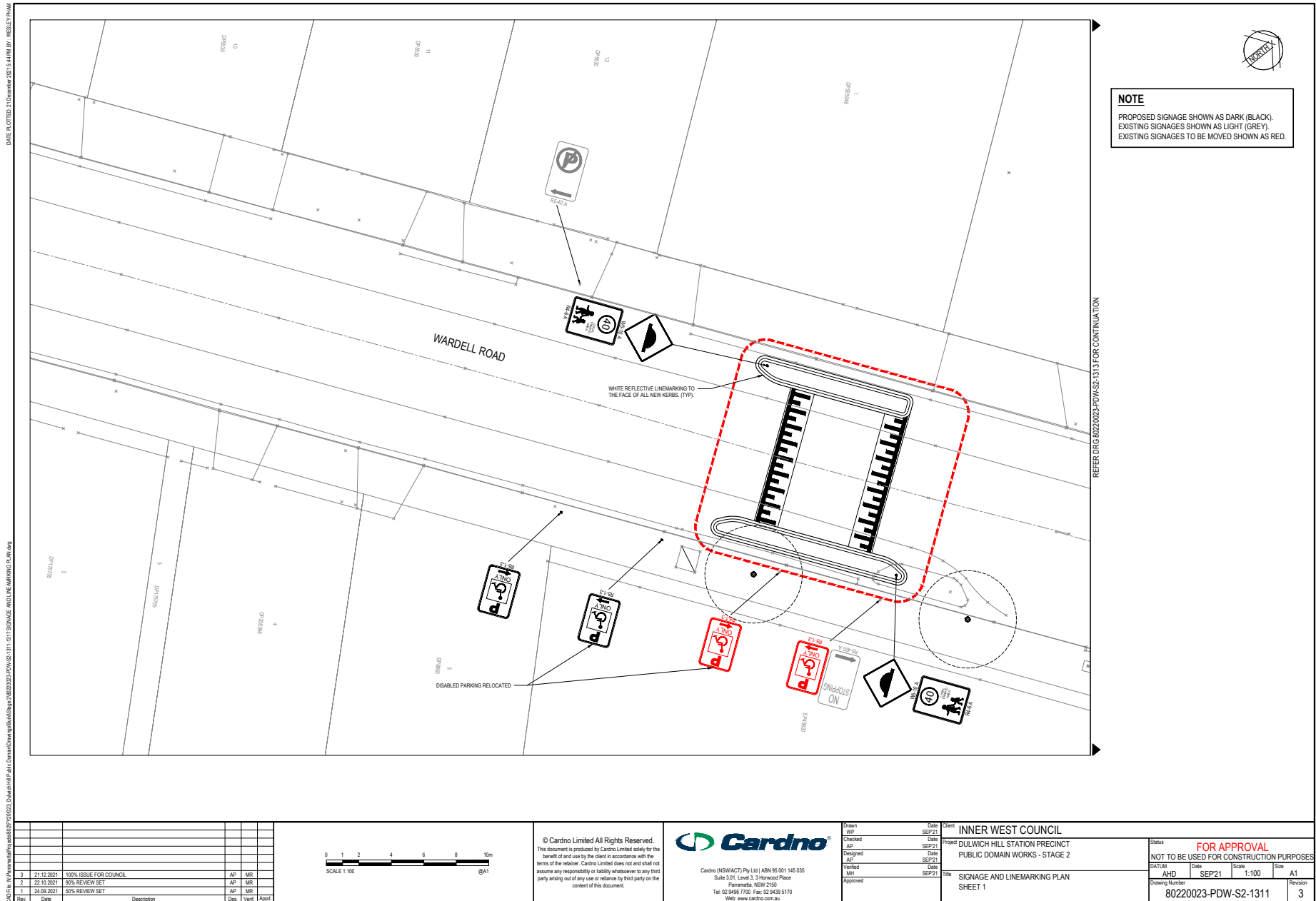
Pedestrian movement LOS values are based on average delay per pedestrian movement.

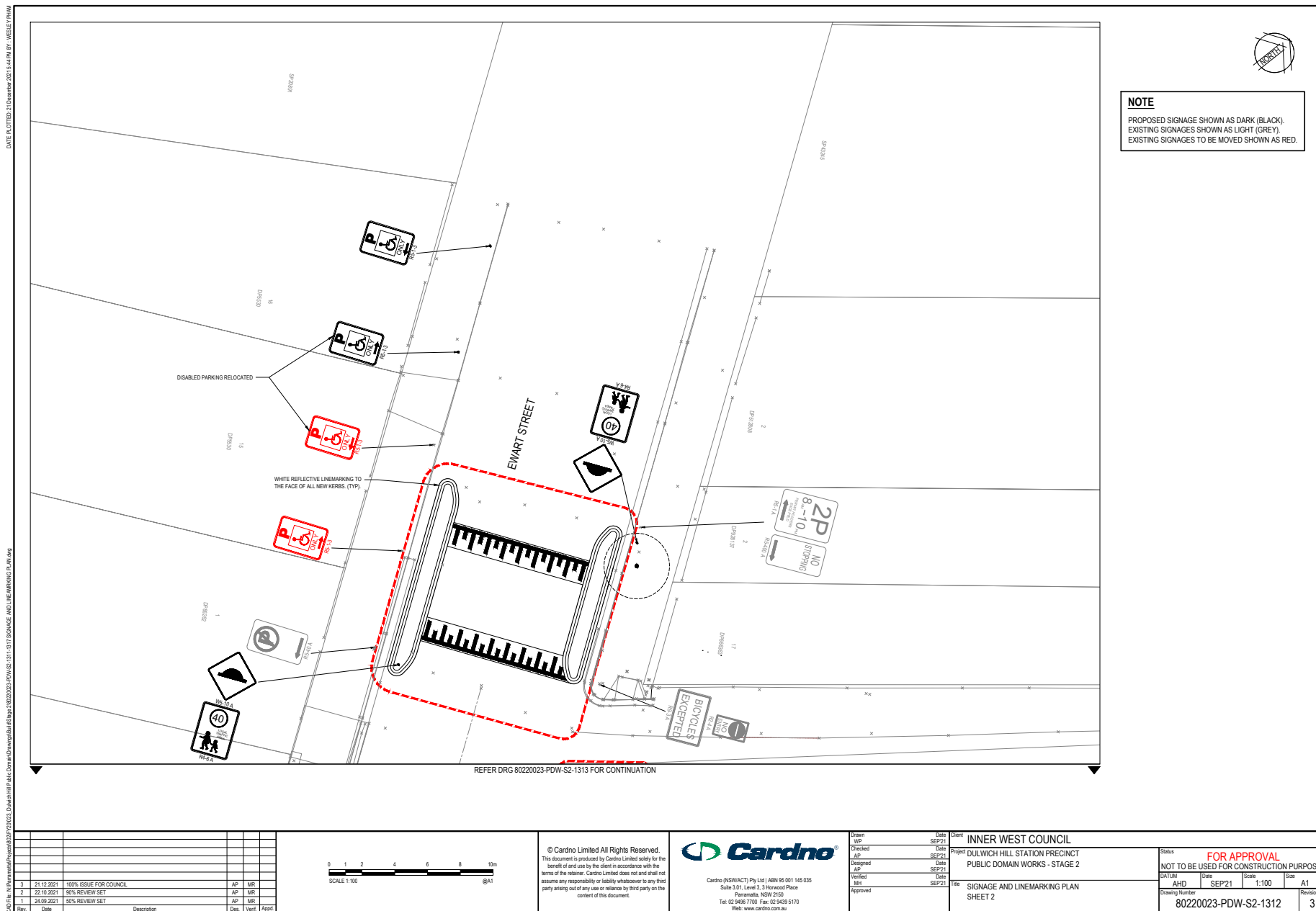
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

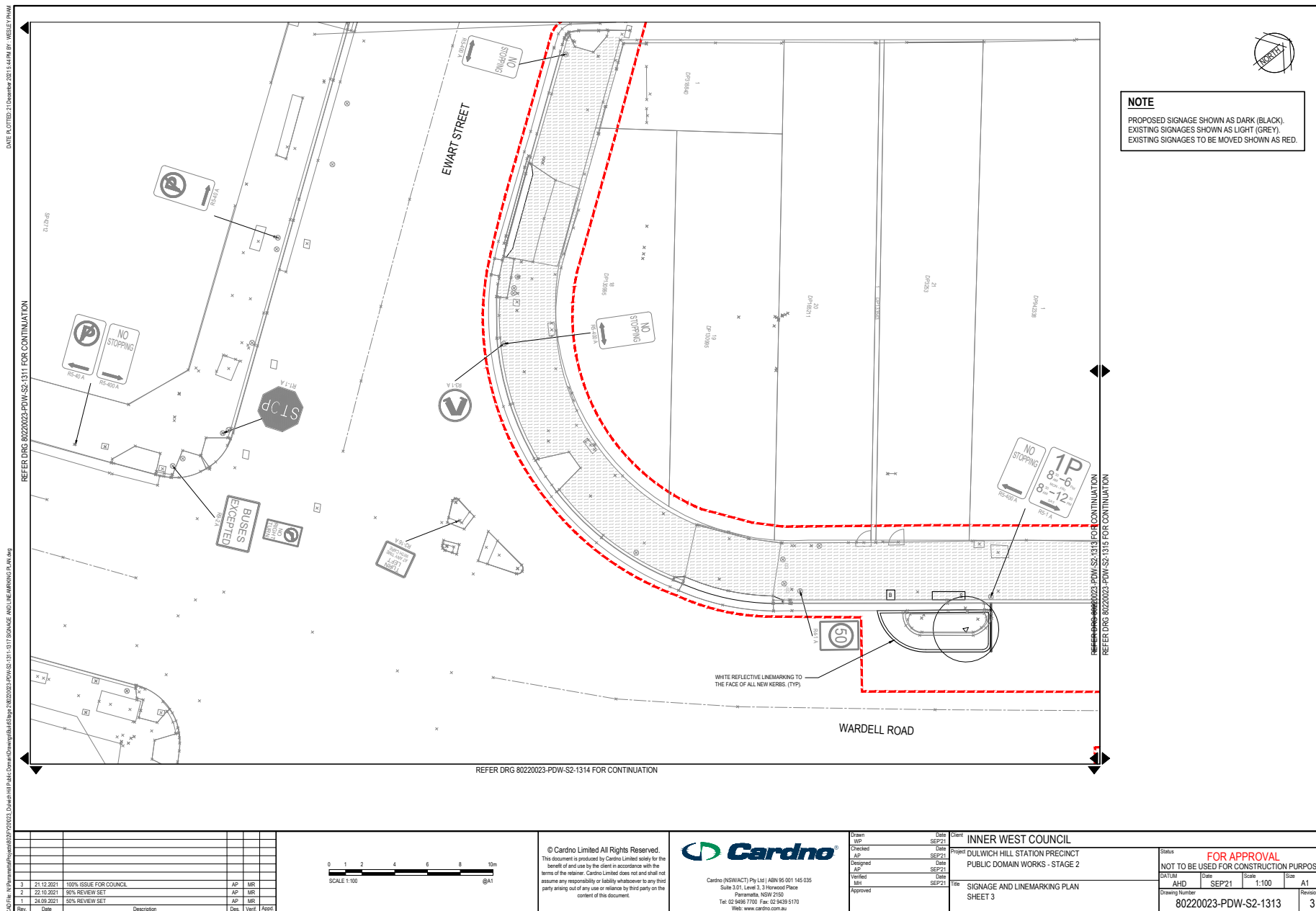
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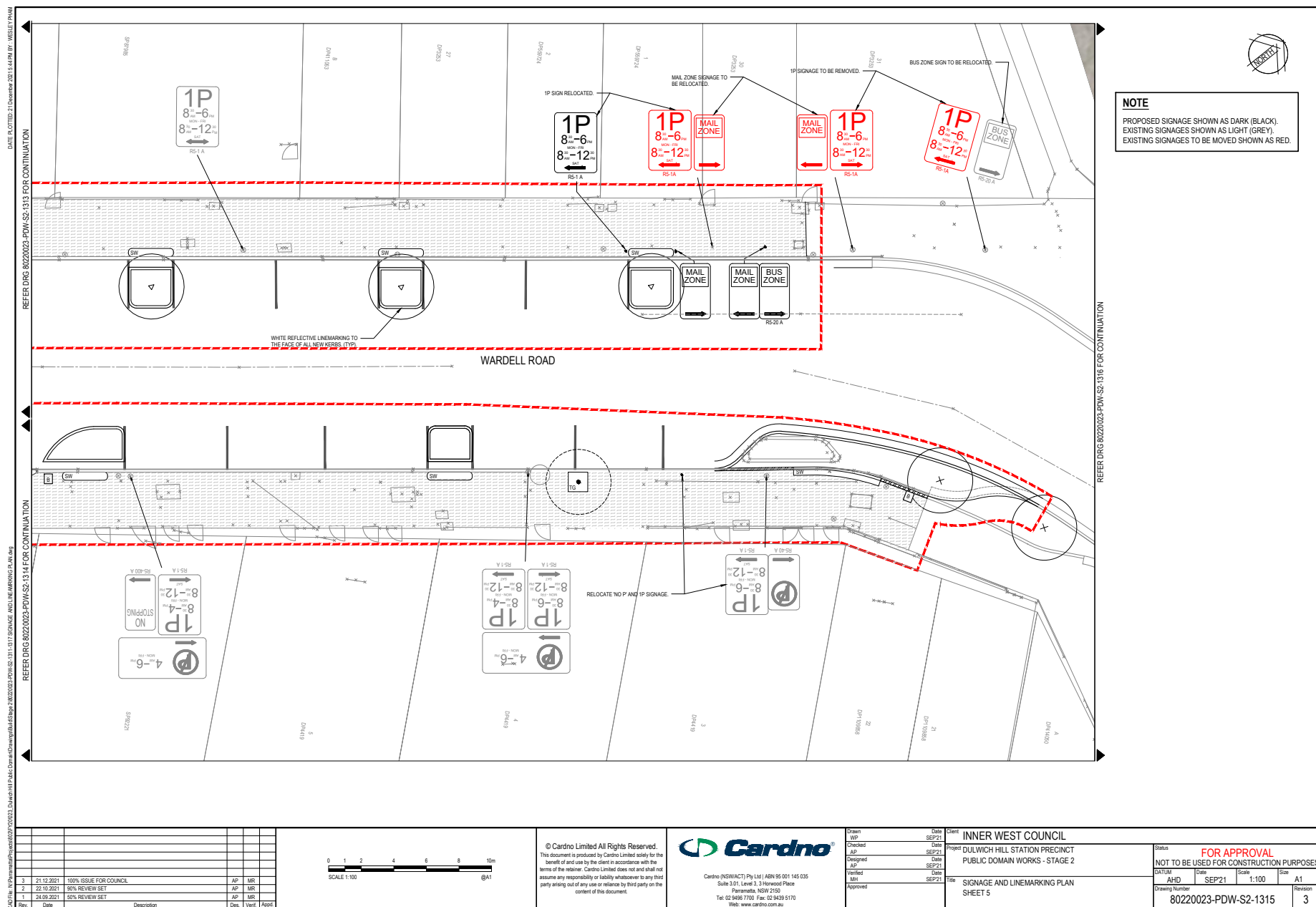
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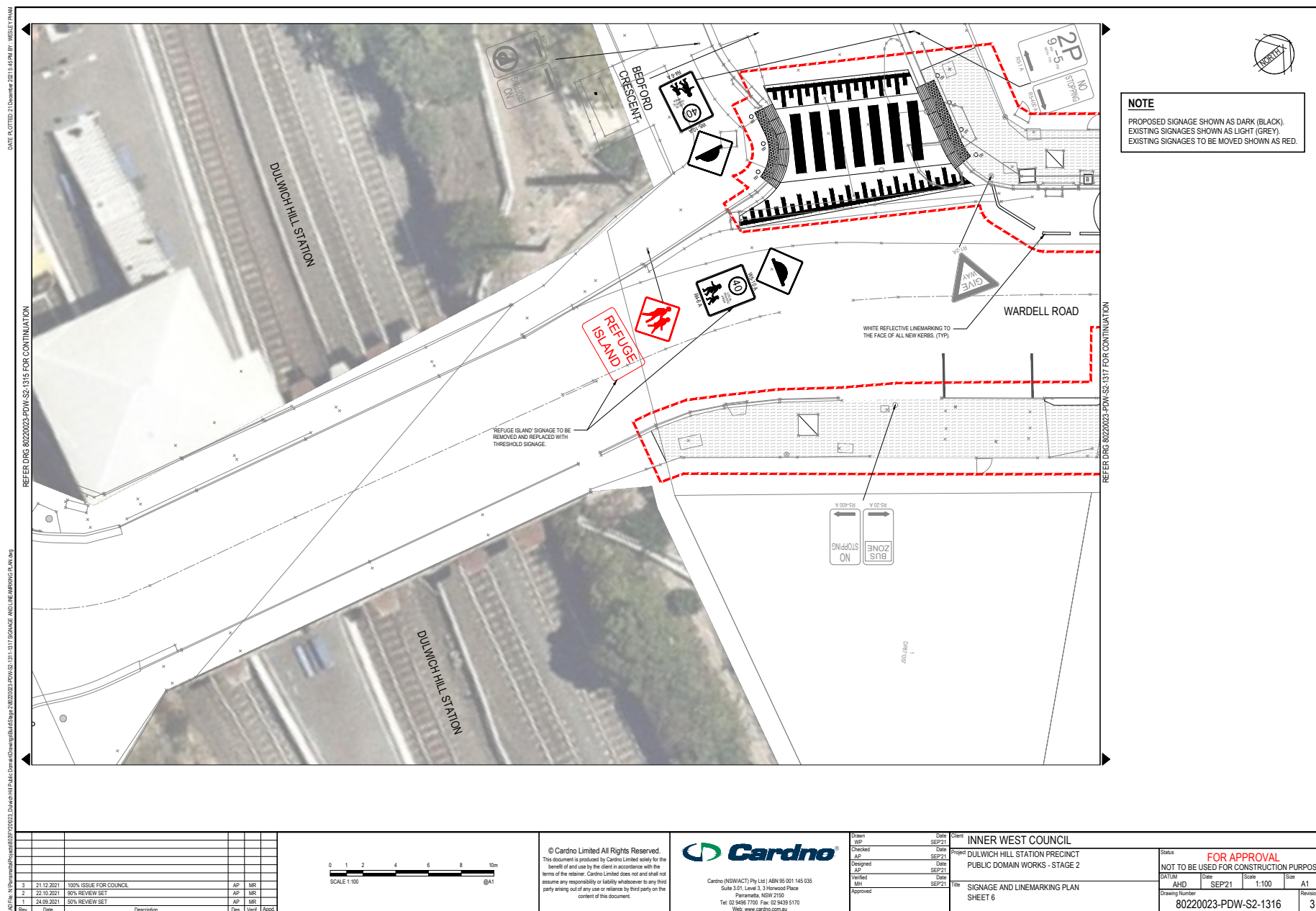


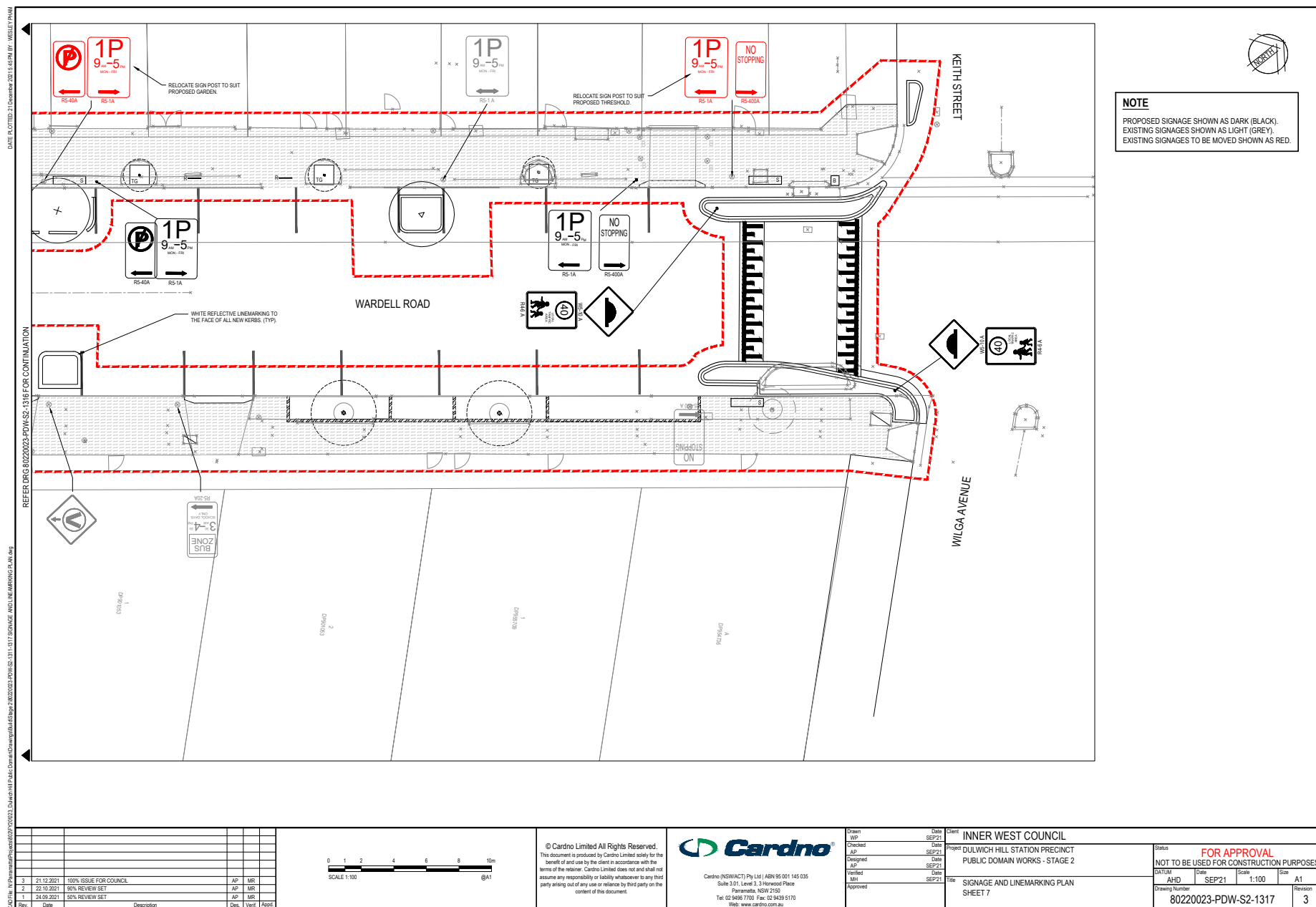












Our Ref: 80220023:MR
Contact: Mohammad Rahman

20 January 2022

Inner West Council
PO Box 14

Petersham NSW 2049

Attention: Stephen Joannidis

Dear Stephen,

**DULWICH HILL STATION PRECINCT PUBLIC DOMAIN IMPROVEMENTS
TRAFFIC AND TRANSPORT ASSESSMENT REVISION**

Cardno has been commissioned by Inner West Council (Council) for a traffic and transport assessment for the detailed design of the Dulwich Hill Station Precinct Public Domain Improvements.

Since the previous Cardno assessment (Traffic and Transport Assessment Revision 2, 24/06/2020), the remaining works have been consolidated into one stage (known as Stage 2) and designs have been amended. This letter only considers Stage 2 of works. The updated area of works is shown in **Figure 1-1**.

Works for Stage 2 involve:

- 2 x Raised entry thresholds at the approach roads to Wardell Road and Ewart Street intersection (i.e. one on Wardell Road and a second one on Ewart Street – west of the intersection)
- Converting the existing threshold on Ewart Street to the east of Wardell Road - Ewart Street intersection to a raised entry threshold, in line with the other thresholds built for the Dulwich Hill Station Precinct Public Domain Improvements.
- Street tree planting, garden beds and rain garden; and
- New Bluestone paving for footpaths.



now



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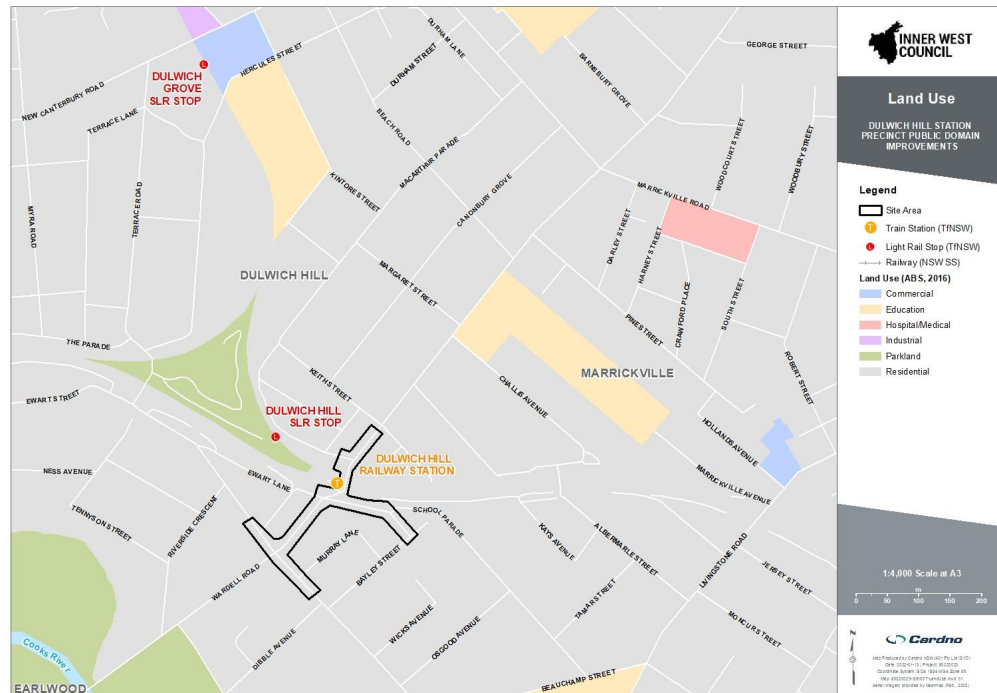


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20 January 2022

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Figure 1-1 Study area



1.1 Proposed Dulwich Hill Station precinct improvements

The proposed Dulwich Hill Station precinct improvements have remained unchanged from the detailed design published in Dulwich Hill Station Detailed Master Plan (2018) except for:

- The raised thresholds have been relocated to better accommodate for the existing road environment
- The raised threshold at Bedford Crescent has been converted to a raised zebra crossing.

These proposed improvements in the context of the existing and planned active transport infrastructure are shown in **Figure 1-2**.

80220023:MR
20 January 2022

3



Figure 1-2 Proposed Dulwich Hill Station precinct improvements



A summary of the active transport impacts of these proposed works and the pedestrian and cycling issues addressed are shown in **Table 1-1**.

Table 1-1 Active transport impacts of proposed works

Item	Proposed upgrade	Active transport impacts	Issue(s) addressed
1 and 2	A raised entry threshold at Wardell Street with garden beds	Improved pedestrian safety and connections	Pedestrian amenity and safety
3	New Bluestone Pavers for the footpath at Wardell Street	Improved pedestrian amenity	Pedestrian amenity
4	A raised entry threshold at Bedford Crescent	Improved pedestrian safety and connections	Pedestrian amenity and safety
7	Raised signalised intersection at Wardell Road / Dudley Street	Improved pedestrian safety and connections	Lack of safe crossings of Wardell Road and Dudley Street
11	New in-road trees and footpath treatments on the southern side of Dudley Street	Improved pedestrian amenity	Pedestrian amenity
12	Kerb extension on the southern corner of the Wardell Road / Dudley Street intersection	Additional space for pedestrian circulation and queuing	Lack of footpath space for people to dwell, gather and dine, poor amenity
20	A raised entry threshold at Wardell Street	Improved pedestrian safety and connections	Pedestrian amenity and safety
21 and 22	A raised entry threshold at Ewart Street with garden beds	Improved pedestrian safety and connections	Pedestrian amenity and safety

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Item 2

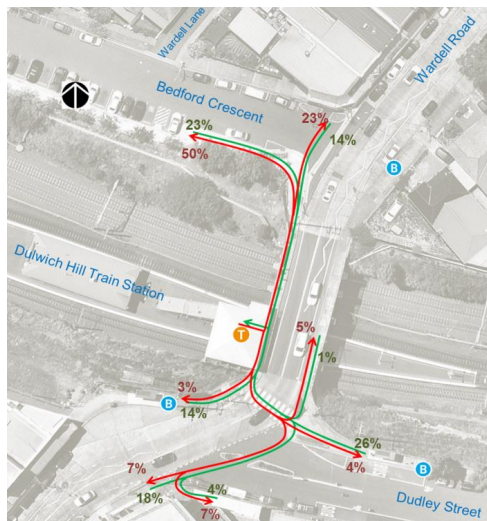
23	Converting the existing threshold on Ewart Street intersection to a raised entry threshold, in line with items 1, 20 and 21	Improved pedestrian safety and connections	Pedestrian amenity and safety
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1.2 Bedford Crescent Crossing

The New South Wales Government is committed to delivering the Sydenham to Bankstown City Metro and Southwest with a planned stop at Dulwich Hill Station. Based on information supplied by Sydney Metro, during the AM peak in 2026, it is predicted that there will be some 1,889 pedestrians entering and 300 exiting Dulwich Hill Metro Station. From initial studies, it is estimated 23 percent will be exiting the station and 14 percent will be entering across Bedford Crescent as shown in **Figure 1-3**. This suggest around 333 pedestrians will cross Bedford Crescent while entering and exiting Dulwich Hill Metro Station (Draft WAD 3 Technical Note extracts, Sydney Metro, 2019).

This proposed threshold had to be aligned to the existing pram ramp locations. Both the Traffic Safety Assessment and feedback from public raised concern that with elevated levels of the threshold similar to the footpath levels, pedestrians is likely to mistake this threshold for a designated pedestrian crossing. This would promote unsafe pedestrian movement and lead to fatal accidents. With nearly 400 pedestrians crossing this intersection, this risk has been identified as "Catastrophic" in the Safety in Design exercise. Unlike other thresholds, a barrier to pedestrian entry was not feasible in this case, and this risk can be suitably mitigated by designating this threshold as a zebra crossing.

Figure 1-3 AM Peak pedestrian distribution



Source: Draft WAD 3 Technical Note extracts, Sydney Metro, 2019

The traffic volume in and out of Bedford Crescent is relatively low and is unlikely to be of the magnitude to satisfy the pedestrian crossing warrants. Nevertheless, based on the significant number of pedestrians at this location coupled with the desired low speed and pedestrian friendly environment, the raised threshold across Bedford Crescent is proposed to be a raised zebra crossing.

1.3 Conclusion

In summary, the consolidation of the staging and changes to the Dulwich Hill Station precinct improvements do not change the findings of the previous report. This addendum does suggest that the raised threshold at Bedford Crescent be a raised zebra crossing.

Yours sincerely,

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Attachment 3

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20 January 2022

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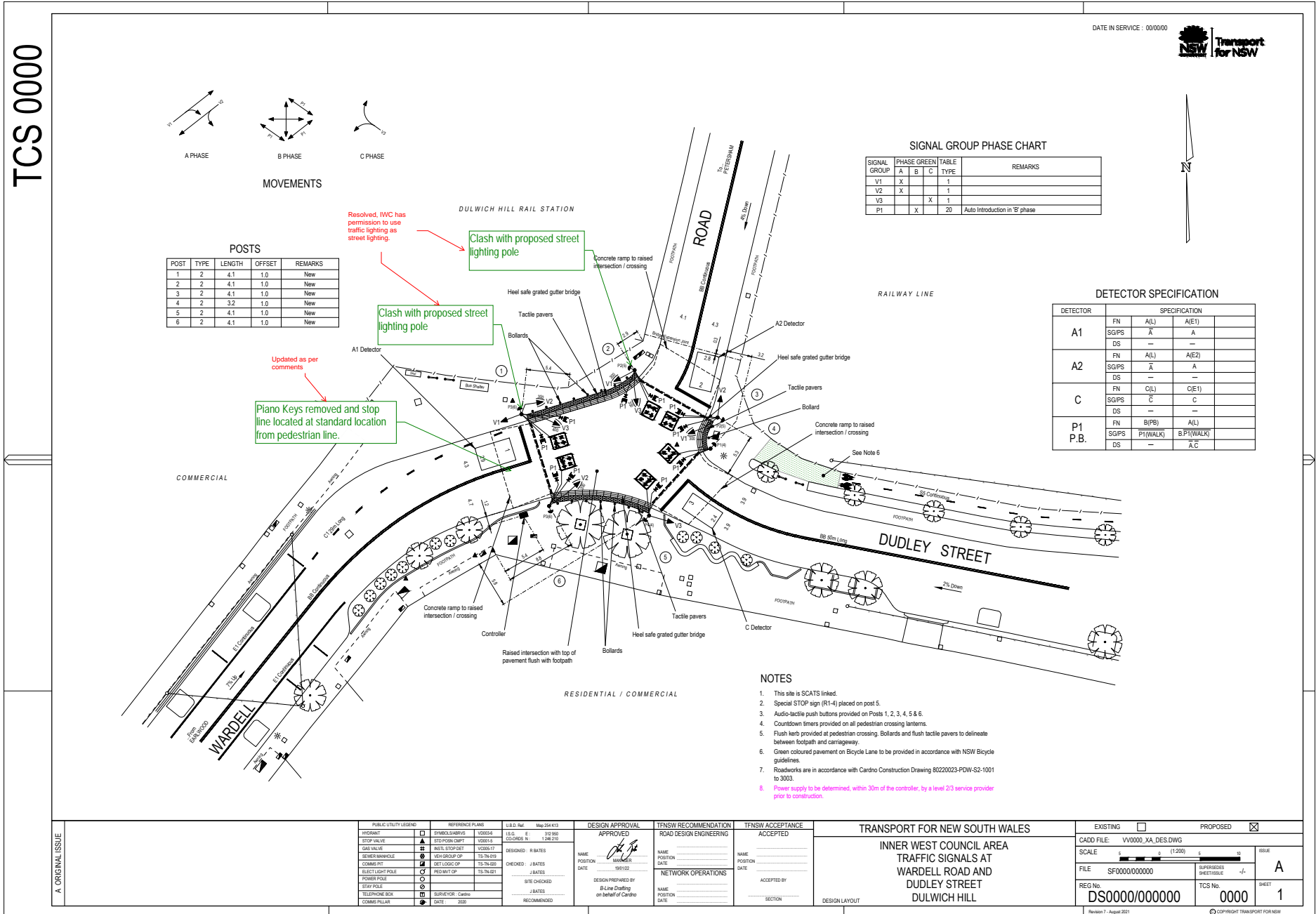


Mohammad Rahman

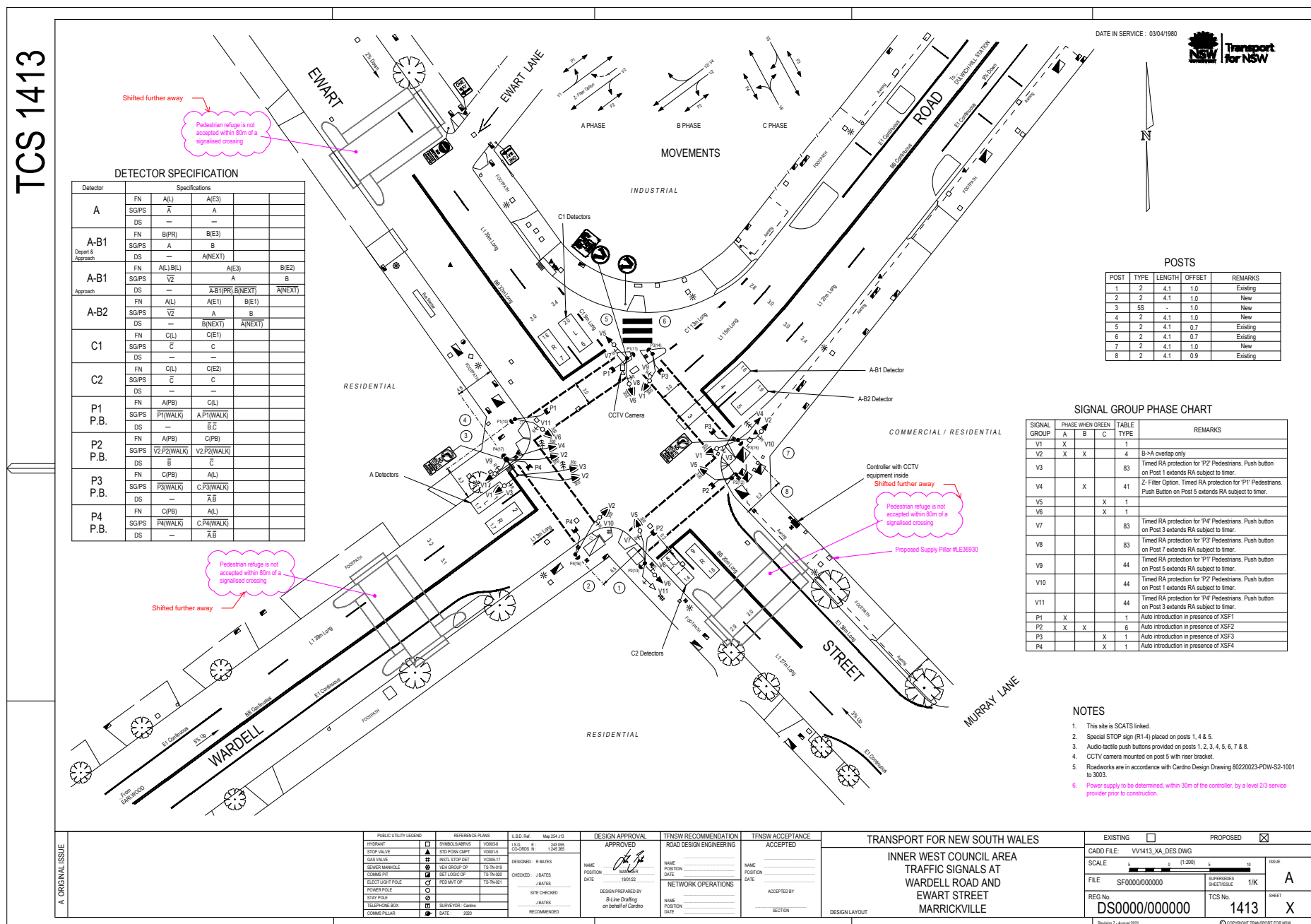
Mohammad Rahman
SENIOR CIVIL ENGINEER / TEAM LEADER URBAN INFRASTRUCTURE
for Cardno
Direct Line: 61 2 9496 7796
Email: mohammad.rahman@cardno.com.au

Enc: Traffic and Transport Assessment
80220023-PDW-1311-1317 - Signage and Landmarking plans, Cardno

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Item No: LTC0222(1) Item 3

Subject: ADDISON ROAD, MARRICKVILLE – PROPOSED NEW PEDESTRIAN REFUGE - DESIGN PLAN 10117_A ((MIDJUBURI-MARRICKVILLE WARD / NEWTOWN AND SUMMER HILL ELECTORATES / INNER WEST PAC)

Prepared By: Jennifer Adams - Engineer – Traffic and Parking Services

Authorised By: Manod Wickramasinghe - Traffic and Transport Planning Manager

SUMMARY

Council has finalised an amended design plan for the proposed construction of a new pedestrian refuge on Addison Road, Marrickville near Denby Street. Council received funding from the TfNSW Blackspot Program and the proposed works will improve pedestrian safety and motorist safety in the area. It is recommended that the proposed detailed design plan be approved.

RECOMMENDATION

THAT the detailed design plan for the proposed new pedestrian refuge on Addison Road, Marrickville near Denby Street and associated signs and line markings (as per Plan No.10117_A) be APPROVED.

BACKGROUND

Council is planning to improve pedestrian safety in Addison Road, Marrickville near Denby Street by constructing a new pedestrian refuge island. The proposed works address concerns about pedestrian safety and driver behaviour in the area. The proposed works are part of recommendations endorsed in August 2019 and listed in the Newington Local Area Traffic Management (LATM) report.

A Blackspot funding application was submitted in 2020 to install a pedestrian refuge in Addison Road at Denby Street and this was successful.

A design plan (10117) was developed for the proposed new pedestrian refuge and consultation was undertaken in September 2021 and a report went to the 18 October 2021 Local Traffic Committee. The Traffic Committee subsequently deferred this item for further investigation noting concerns raised during the consultation. These primarily related to the loss of parking outside of residential properties.

Further investigation was undertaken, and a revised proposal was developed relocating the bus stop westward resulting in no loss of parking outside of residential properties. The revised plan (100117_A) was sent out for consultation to nearby owners and occupiers of properties along Addison Road in early December 2021 and the outcomes of the consultation are summarized in this report.

FINANCIAL IMPLICATIONS

Funding of \$70,000 was received as part of the Australian Government's Black Spot Program for these works and has been allocated to this project under the 2021/2022 Traffic Facilities Capital Works Program.

OTHER STAFF COMMENTS

Addison Road is a Regional Road running east-west between Victoria Road and Livingstone Road, Marrickville. Addison Road is used as a bus route and carries a traffic volume of approximately 12,500 vehicles per day. It provides one traffic lane in each direction, in addition to kerbside parking.

Many pedestrians cross Addison Road in the vicinity of Denby Street and over the years local residents continually requested a pedestrian facility at this location. Bus stops are located on both sides of the road and residents cross to access these. This was also identified in the Newington Local Area Traffic Management (LATM) report (Area 8).

Data submitted for the Blackspot submission identified five injury crashes on Addison Road near Denby Street, Marrickville. Two of these involved pedestrians and one involved a cyclist.



Proposed new pedestrian refuge

The following works are proposed and are illustrated on the attached Consultation Plan (Plan No.10117_A) which illustrates the proposed works and amendment:

- Installing new Pedestrian Refuge Islands.
- Installing associated pavement line marking and signage as required;
- Constructing new concrete kerb ramps on both sides of the proposed refuge island;
- Reconstructing some damaged sections of concrete footpath with new concrete footpath;
- Implementing new “No Stopping” zones and signage and relocating the Bus Stop and “Bus Zone” signs as shown on the plan.

The Amendment

- In Addison Road: Relocating the existing bus shelter and Bus Zone west from its current location to the other side of Denby Street, as shown on the plan (**Attachment 1**);

Parking Changes

The proposal will affect existing on-street parking by removing some spaces. Overall, six (6) legal car parking space will be removed in Addison Road as a result of the proposed works; There is no loss of parking outside of residential properties.

PUBLIC CONSULTATION

Consultation was conducted between 3 December 2021 and 21 December 2021. A letter along with a copy of the amended design plan was sent to residents/businesses in Addison Road, as highlighted in the plan below. A total of 49 letters were distributed. There was one response.



Resident's Comments	Officer's response
<p>The revised proposal moving the bus stop west of Denby Street is a significant improvement on the first proposal which would have seriously effected the amenity of the residents.</p> <p>We note that the parking spaces (two not one) between the current bus stop and the driveway to 38 Addison Road will still be removed. This will leave only four spaces in front of the residences 28 to 36 Addison Road. We suggest that a resident parking scheme be introduced for these houses. It should also apply to the three spaces around the corner in Cook Road.</p> <p>The report does not address the question of when and where the accidents in Addison Road occurred. We would still like this information.</p> <p>Overall we are no longer opposed to the proposal subject to the introduction of a resident parking scheme</p>	<p>The relocation of the bus stop is a result of the introduction of a Pedestrian Refuge. The proposed new bus stop location is the only feasible location.</p> <p>Loss of Parking is a result of the statutory No Stopping required with the introduction of a Pedestrian Refuge. Possible residential parking was a consideration when the bus stop was proposed to be situated in front of the residential properties and because that is now no longer the situation any further request for a residential permit parking scheme would have to be in accordance with Council's Parking Policy.</p> <p>Noted and addressed in this report.</p> <p>Noted and addressed above.</p>

Transit Systems was consulted as the proposed works involved relocation of an existing Bus Zone and bus shelter. They raised no objection to the amended plan and relocation of the bus stop. Transit Systems responded that the relocation would have a financial cost of

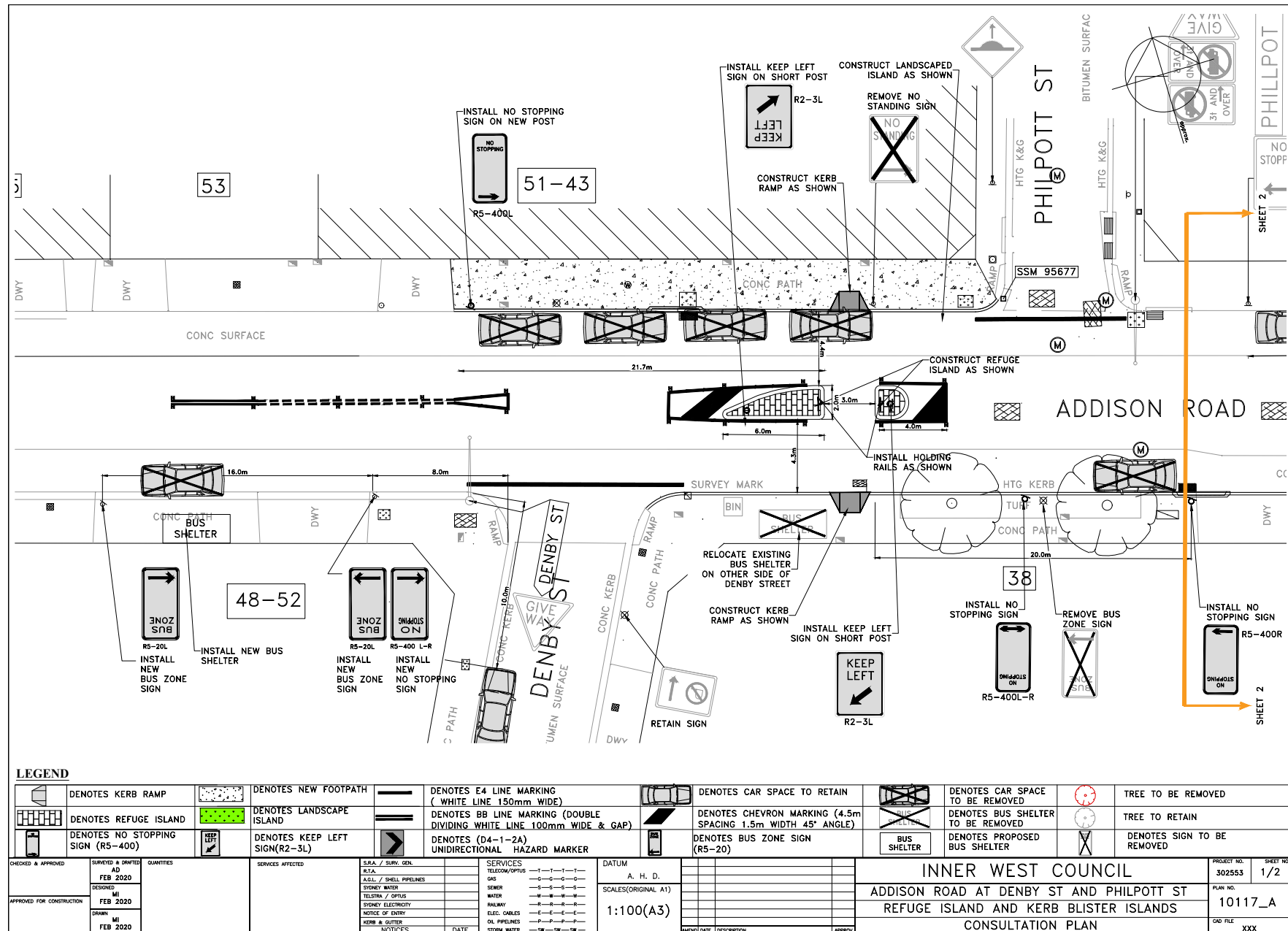
approximately \$420 for the installation of new B/Pole at the relocated stop and for the installation of tactiles. Transit Systems will provide details of their contractor or they will have it installed and invoice Council accordingly. Installation plans for DDA compliancy were supplied and reproduced below.

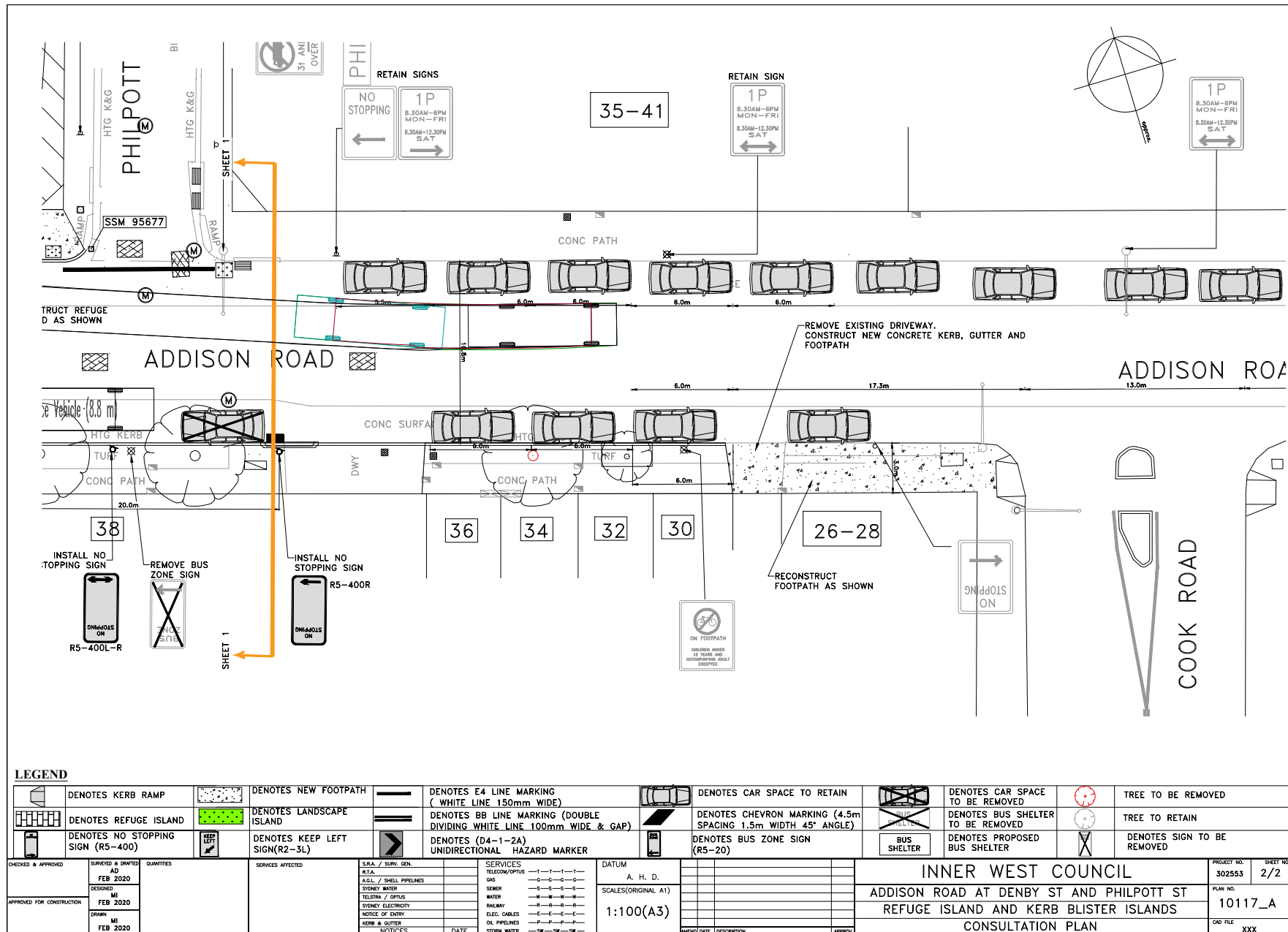
CONCLUSION

It is recommended that the amended detailed design plans (10117_A) for the proposed construction of a new pedestrian refuge on Addison Road, Marrickville near Denby Street. and associated works, signs and line markings be approved, to improve road safety at this location.

ATTACHMENTS

1. [↓](#) Detailed design plans (10117_A) - construction of a new pedestrian refuge on Addison Road, Marrickville near Denby Street





Item No: LTC0222(1) Item 4

Subject: O'NEILL STREET, LILYFIELD (WEST OF FOUCART STREET) - PROPOSED 'NO PARKING' RESTRICTIONS (BALUDARRI-BALMAIN WARD/BALMAIN ELECTORATE/LEICHHARDT PAC)

Prepared By: Vinoth Srinivasan - Engineer - Traffic and Parking Services

Authorised By: Sunny Jo - Coordinator Traffic Engineering Services (North)

SUMMARY

Council has received concerns regarding vehicles parking on the northern side of O'Neill Street, west of Foucart Street and subsequently causing localised traffic congestion and queuing on both O'Neill Street and Foucart Street.

RECOMMENDATION

THAT a 13m 'No Parking' zone be installed in the northern side of O'Neil Street, Lilyfield between the existing 'No Stopping' zone and the driveway access of No. 82 Foucart Street, Rozelle.

BACKGROUND & OTHER STAFF COMMENTS

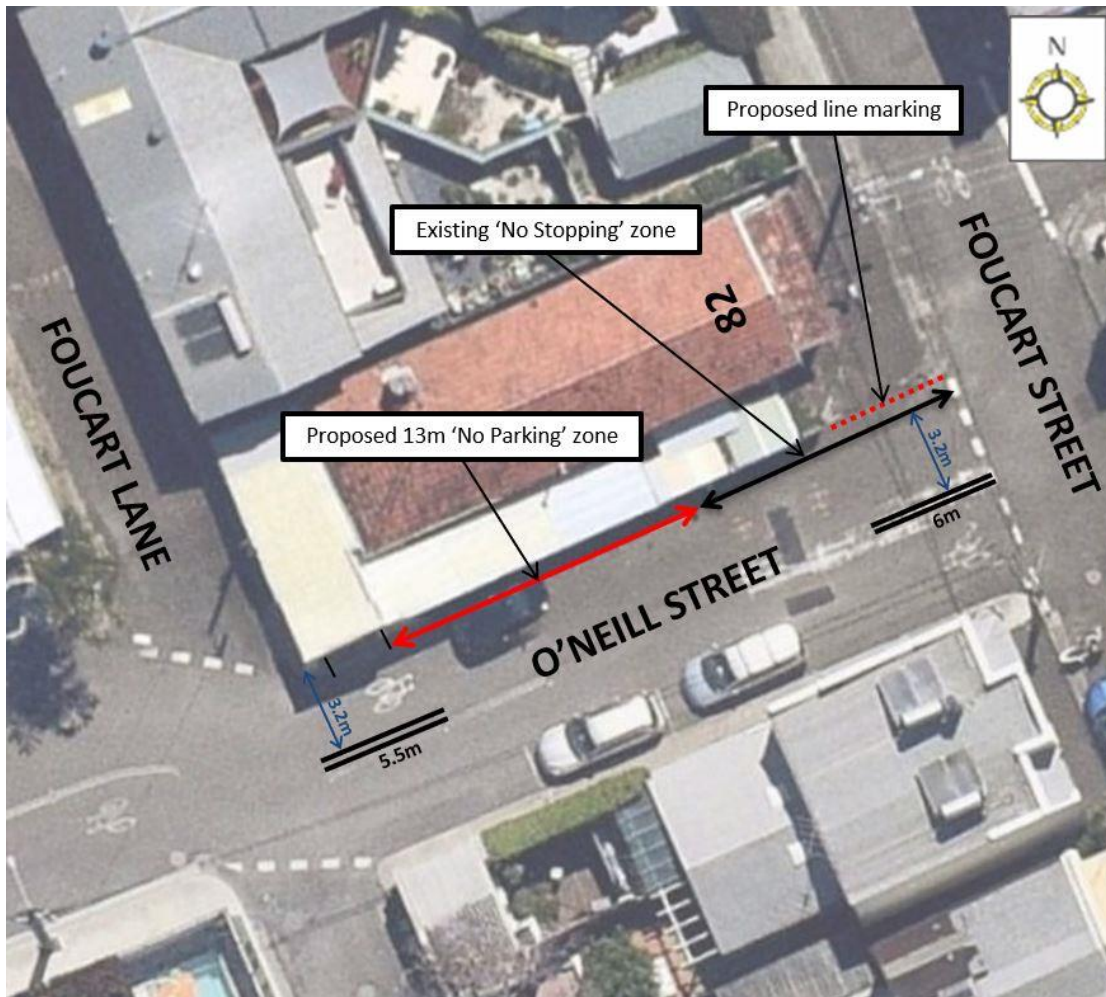
Council has received requests from residents raising concerns regarding the existing traffic arrangement in O'Neill Street, Lilyfield. Currently vehicles parked on the northern side of O'Neill Street, between Foucart Street and Foucart Lane only allow for a single travelling lane for passing which subsequently causes minor delays and at times queuing along both O'Neill Street and Foucart Street.

This section of O'Neill Street comprises of kerb and gutter only on the south side and has a variable carriageway width of between 7.5 and 8.3m. With the existing street having a narrow road profile and a horizontal curve at Foucart Lane, there is limited sight distance at intersections at Foucart Street and at Foucart Lane. Further traffic delays are experienced in instances where two or more vehicles are queued from each approach.

In order to alleviate this issue and allow for two-way passing on O'Neill Street, it is proposed to install a 13m 'No Parking' zone in the northern side of O'Neill Street, Lilyfield between the existing 'No Stopping' zone and the driveway access of No. 82 Foucart Street, Rozelle. Slight adjustments to the existing linemarking and a holding line for pedestrians are proposed along the north side of O'Neill Street at Foucart Street as there is no defined footpath boundary.

The proposed changes will result in the loss of two (2) on-street parking spaces.

Further details of the proposal are shown in the signage and linemarking plan below.



FINANCIAL IMPLICATIONS

Nil.

PUBLIC CONSULTATION

A letter outlining the proposal was mailed out to the affected properties (8 properties) in O'Neil Street, Cecily Street, Foucart Street and Cheltenham Street, Lilyfield. Two (2) responses were received, in objection to the proposal. The main concerns are outlined below:

- Parking spaces are scarce and are in demand in this area due to WestConnex workers.
- Removing parking spaces will create safety concerns as it will allow vehicles to speed through O'Neill Street.

Council has provided additional comments in regard to the residents' concerns. These are detailed below:

- The Give-Way line marking on O'Neill Street at the intersection of Foucart Street and the bend on O'Neill Street at the intersection of Foucart Lane will reduce travel speeds in that particular part of O'Neill Street.

ATTACHMENTS

Nil.

Item No: LTC0222(1) Item 5

Subject: KEGWORTH STREET, LEICHHARDT AT INTERSECTION WITH TEBBUTT STREET-INTERSECTION DEVELOPMENT FOR PEDESTRIAN AND CHILDREN SAFETY-TRAFFIC FACILITIES (GULGADYA-LEICHHARDT WARD/BALMAIN ELECTORATE/LEICHHARDT PAC)

Prepared By: David Yu - Engineer - Traffic and Parking Services

Authorised By: Sunny Jo - Coordinator Traffic Engineering Services (North)

SUMMARY

Council is planning to improve pedestrian safety in Kegworth Street at the intersection of Tebbutt Street, Leichhardt by constructing kerb extensions at this location. The proposed works aim to improve pedestrian safety by reducing the crossing distance.

RECOMMENDATION

THAT the attached detailed design plan (Design Plan No.10184) for the proposed kerb extensions and associated works at Kegworth Street, Leichhardt at the intersection of Tebbutt Street be approved.

BACKGROUND & OTHER STAFF COMMENTS

The detailed design plan shown in **Attachment 1** outlines the proposed upgrade works on Kegworth Street and Tebbutt Street, Leichhardt and includes the following treatments:

- Construction of new kerb extension on both sides of Kegworth Street;
- Reconstruction of existing concrete footpath;
- Construction of new landscaped area (with low height plants);
- Constructing two (2) kerb ramps;
- Installing new and repainting existing pavement line marking; and
- Relocating signage associated with the works.

The proposal will not result any loss of on-street parking space.

The modification of the existing intersection will improve safety for pedestrians and school children by reducing the crossing distance, improving sight lines and controlling vehicle speeds when turning into the street.

FINANCIAL IMPLICATIONS

The 2021-22 budget allocation for this project is \$35,000.

PUBLIC CONSULTATION

A letter outlining the proposal was mailed out to 52 properties in Kegworth Street and Tebbutt Street, Leichhardt. Three (3) responses were received in regard to the proposal, two in support and one in objection.

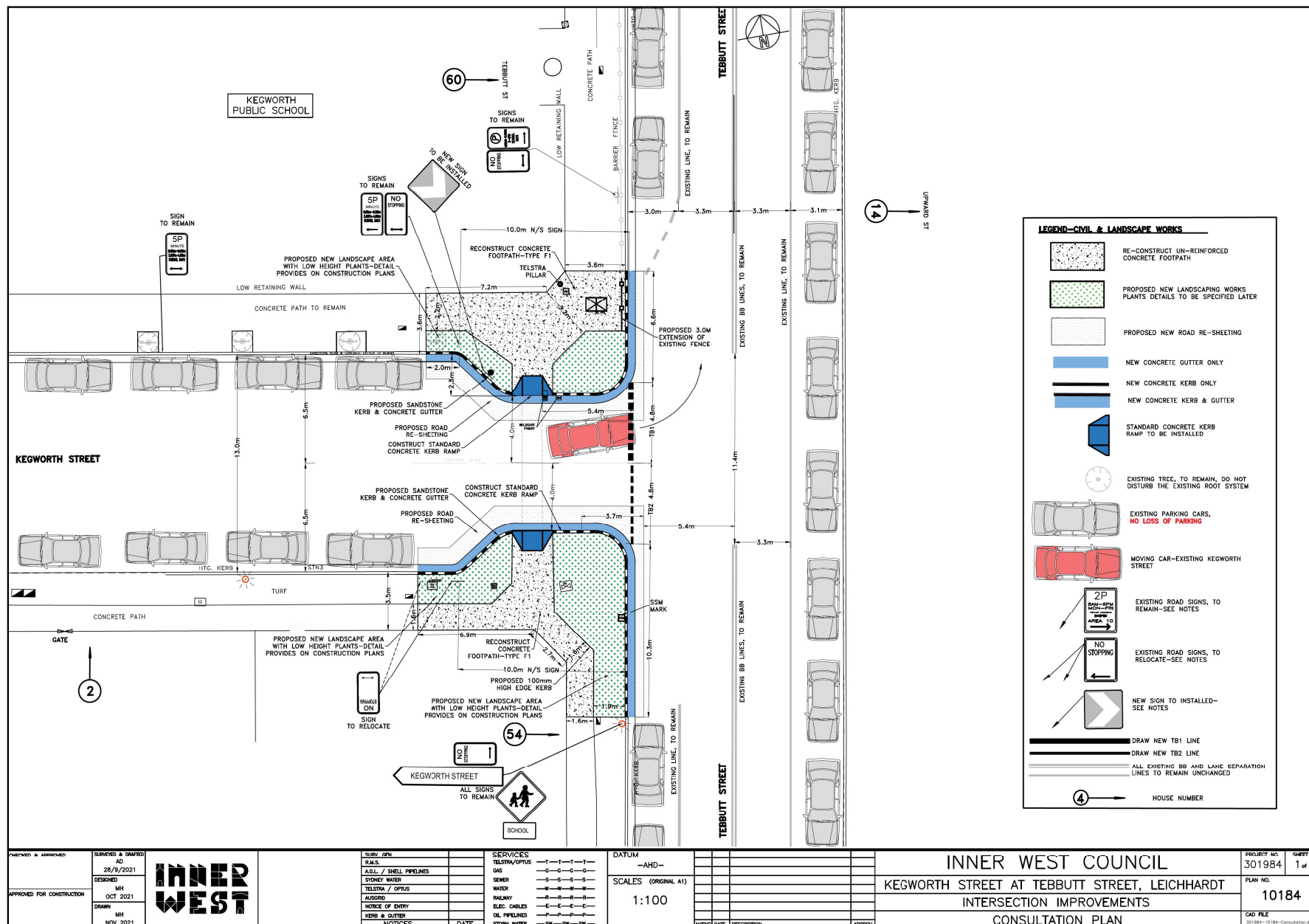
The main objections raised during the consultation are summarised below:

- request made to install speed humps in Kegworth Street.
- concern regards increased pedestrian danger with reduced road width and creation of traffic congestion with the narrow street.

In response, it is noted that the proposed device will have a traffic calming impact on vehicles entering the street, and the device will improve pedestrian safety at this location by shortening the crossing distance. Additionally, there is an existing 40km/h School Zone in operation which is considered to be adequate given the low traffic volume in the street. It is further noted that traffic peaks only during the morning and afternoon school hours for short period of time.

ATTACHMENTS

1. [↓](#) Detailed Design Plan – Kegworth Street and Tebbutt Street, Leichhardt – Proposed Intersection Improvements



Item No: LTC0222(1) Item 6
Subject: INTERSECTION OF EDWARD STREET AND MUNGO SCOTT PLACE/WELLESLEY STREET-INTERIM TREATMENT OF INTERSECTION FOR IMPROVED SIGHT LINE. (DJARRAWUNANG-ASHFIELD WARD/SUMMER HILL ELECTORATE/ASHFIELD PAC)

Prepared By: Boris Muha - Engineer – Traffic and Parking Services

Authorised By: Manod Wickramasinghe - Traffic and Transport Planning Manager

SUMMARY

Council has received numerous concerns from the community (via councillor and requests alone) regarding sight line obstruction at the crossroad intersection of Edward Street and Wellesley Street /Mungo Scott Place, Summer Hill.

The intersection has been captured under the Ashfield Traffic Management Strategy (ATMS) and is listed under the capital works program to investigate a permanent treatment to the intersection in view of traffic and pedestrian safety, and any other perceived developments to the intersection.

To alleviate this issue in the interim, it is proposed that the intersection be treated via signs and line marking by building out the corners of Edward Street in paint and introduce STOP control markings in Wellesley Street and Mungo Scott Place out in/near line of the build outs. Associated variation to parking, edge line and centreline introduction with advance warning 'Pedestrian' signs in Edward Street will further enhance traffic and pedestrian safety through the intersection.

RECOMMENDATION

THAT the interim works for treatment (via signs and markings) of the intersection of Edward Street and Wellesley Street/Mungo Scott Place, Summer Hill BE APPROVED as follows:

1. Provide painted built outs to all corners in Edward Street,
2. Provide STOP control markings for Wellesley Street and Mungo Scott Place out in/near line of the painted build outs in Edward Street, with new STOP signs added,
3. Provide edge lines (E1) and double barrier centrelines (BB) in Edward Street at 24 metres to both sides of the intersection,
4. The first unrestricted car space on the eastern side of Edward Street, north of Mungo Scott Place be converted to angled parking for motorcyclists, and
5. Provide advance 'Pedestrian' warning signs in Edward Street on both approach sides to the intersection.

BACKGROUND

The intersection in question was previously a T-intersection with Wellesley Street serving as the minor local Street and Edward Street being the major local street.

Mungo Scott Place is a private road constructed under the Floor Mill development. The intersection now acts as a crossroad with Wellesley Street and Mungo Scott Place needing to Give-way to traffic in Edward Street.

Edward Street and Wellesley Street measure approximately 10.2m from kerb to kerb with parking to both sides of the streets. Mungo Scott Place is narrower measuring approximately

6-8.5m kerb to kerb (6m being near the junction with Edward Steet). Parking is permitted to the northern side of Mungo Scott Place. Mungo Scott Place serves as a major access to units south of the Floor Mill complex.

Traffic counts in Edward Street (taken in 2018) show volumes around 3200 vehicles per day with 85% speeds around 46km/h. No accidents are identified in the last 5 years from available TfNSW accident records for the intersection. Residents have claimed near miss or minor unreported incidences and are concerned with likely build-up of traffic and speeding in Edward Street once traffic lights are installed south at the intersection at Edward Steet and Old Canterbury Road (under the DA conditions for the Floor Mill). There is also concern as to who should clearly give-way at the intersection.

Council has also recently received a pre-DA for a hotel development on the corner of Edward Street and Mungo Scott Place. The proposed hotel is in the early stage of design development and currently includes loading and car parking from the rear.



View north bound in Edward Street

View southbound in Edward Street

FINANCIAL IMPLICATIONS

The proposed interim works to the intersection of Edward Street and Wellesley Street/Mungo Scott Place is estimated at around \$7,500 and will be funded under the Council's general signs and line marking budget.



Proposed interim works at the intersection of Edward Street and Wellesley Street/Mungo Scott Place.

OTHER STAFF COMMENTS

The intersection has been captured under the Ashfield Traffic Management Strategy (ATMS) and listed under the capital works program to investigate a permanent intersection treatment revolving around traffic and pedestrian safety, and any other perceived developments at the intersection.

Given that there is community concern to resolve the main issue of sight lines, the following interim works are proposed (at this point of time) in treatment of the intersection.

1. Provide painted built outs to all corners in Edward Street.
Painted islands area only marked out to the extent of the existing 'No Stopping' at the corners of the intersection. No parking is lost because of this.
2. Provide STOP control markings for Wellesley Street and Mungo Scott Place out in/near line of the painted built outs in Edward Street, with new STOP signs added.
Clear indication is required for vehicles in Wellesley Street and Mungo Scott Place to give-way to traffic in Edward Street. STOP control is proposed over GIVE-WAY control as lines are marked out in near line to the painted built outs close to traffic in Edward Street.
3. Provide edge lines (E1) and double barrier centrelines (BB) in Edward Street at 24 metres to both sides of the intersection.
This will assist to guide and control traffic and reduce the speed in Edward Street through the intersection.
4. The first unrestricted car space on the eastern side of Edward Street, north of Mungo Scott Place be converted to angled parking for motorcyclists.

To further enhance the sight line view for Floor Mill residents exiting out of Mungo Scott Place, the first unrestricted car space north on the approach to Mungo Scott Place and outside the units is proposed to be removed and altered for motorcycle parking. Cars can view over parked motorcycles. This measure will allow parking to be retained in the area rather whilst improving sightlines. The use of the motorcycle parking would be further monitored and considered if still required under investigation for permanent treatment of the intersection.

5. Provide advance 'Pedestrian' warning signs in Edward Street on both approach sides to the intersection.

Certain requests were also raised to providing pedestrian crossings at the location. Observations on site do not reveal high pedestrian usage to warrant pedestrian crossings. 'Pedestrian' warnings signs are considered in this case as an alternative. Pedestrian movement would be further investigated in line with any permanent treatment to the intersection.

It should be noted that any permanent treatment may involve either to physically reinforce the build outs and retain line marking and STOP control as proposed under interim, or devise a different treatment based on the speed, traffic/pedestrian safety and any development at the intersection.

CONSULTATION

Nil. The proposal is of an interim measure. Parking is only varied with the one car space on the eastern side of Edward Street, north of Mungo Scott Place on basis of traffic safety. No other parking is lost in the area.

Residents in the vicinity will be notified on the interim works prior to implementation.

CONCLUSION:

In view of the above, it is recommended that interim works, at this point of time, be carried out in the treatment of the intersection of Edward Street and Wellesley Street/Mungo Scott Place as shown in the recommendation above.

ATTACHMENTS

Nil.

Item No: LTC0222(1) Item 7

Subject: ANNANDALE STREET, ANNANDALE - REMOVAL OF 'NO PARKING POLICE VEHICLES EXCEPTED' RESTRICTIONS (GULGADYA-LEICHHARDT WARD/BALMAIN ELECTORATE/LEICHHARDT PAC)

Prepared By: Vinoth Srinivasan - Engineer - Traffic and Parking Services

Authorised By: Sunny Jo - Coordinator Traffic Engineering Services (North)

SUMMARY

Council has been notified by NSW Police that the three (3) existing 'No Parking Police Vehicles Excepted' angle parking spaces on the west side of Annandale Street north of Collins Street, Annandale in front of the Police Station may be reverted to unrestricted parking.

RECOMMENDATION

THAT three (3) 'No Parking Police Vehicles Excepted' angle parking spaces on the west side of Annandale Street, Annandale near No.21 Collins Street, Annandale be reverted back to unrestricted angle parking.

BACKGROUND & OTHER STAFF COMMENTS

Council has been notified by NSW Police that the utilization of the existing 'No Parking Police Vehicles Excepted' angle spaces on the eastern side of Annandale Street, Annandale in front of the Police Station is low and the spaces can be reverted to unrestricted parking.

The removal of three (3) 'No Parking Police Vehicles Excepted' angle parking spaces will increase on-street parking supply for the community.

NSW Police has advised that the existing 'No Parking Police Vehicle Excepted' parking spaces on the northern side of Collins Street, Annandale, west of Annandale Street is still required.

The proposal is shown in the following plan.



FINANCIAL IMPLICATIONS

Nil.

PUBLIC CONSULTATION

Nil.

ATTACHMENTS

Nil.

Item No: LTC0222(1) Item 8

Subject: MARRICKVILLE ROAD, MARRICKVILLE NEAR LIVINGSTONE ROAD -
IMPLEMENTATION OF SHORT-TERM PARKING RESTRICTIONS
(MIDJUBURI- MARRICKVILLE WARD/ SUMMER HILL ELECTORATE/
INNER WEST PAC)

Prepared By: Jennifer Adams - Engineer – Traffic and Parking Services

Authorised By: Manod Wickramasinghe - Traffic and Transport Planning Manager

SUMMARY

Council is proposing to introduce a section of time-restricted parking along Marrickville Road, Marrickville, in order to improve parking turnover along the frontage of Marrickville Library and in the vicinity of the local businesses along the above-mentioned road.

RECOMMENDATION

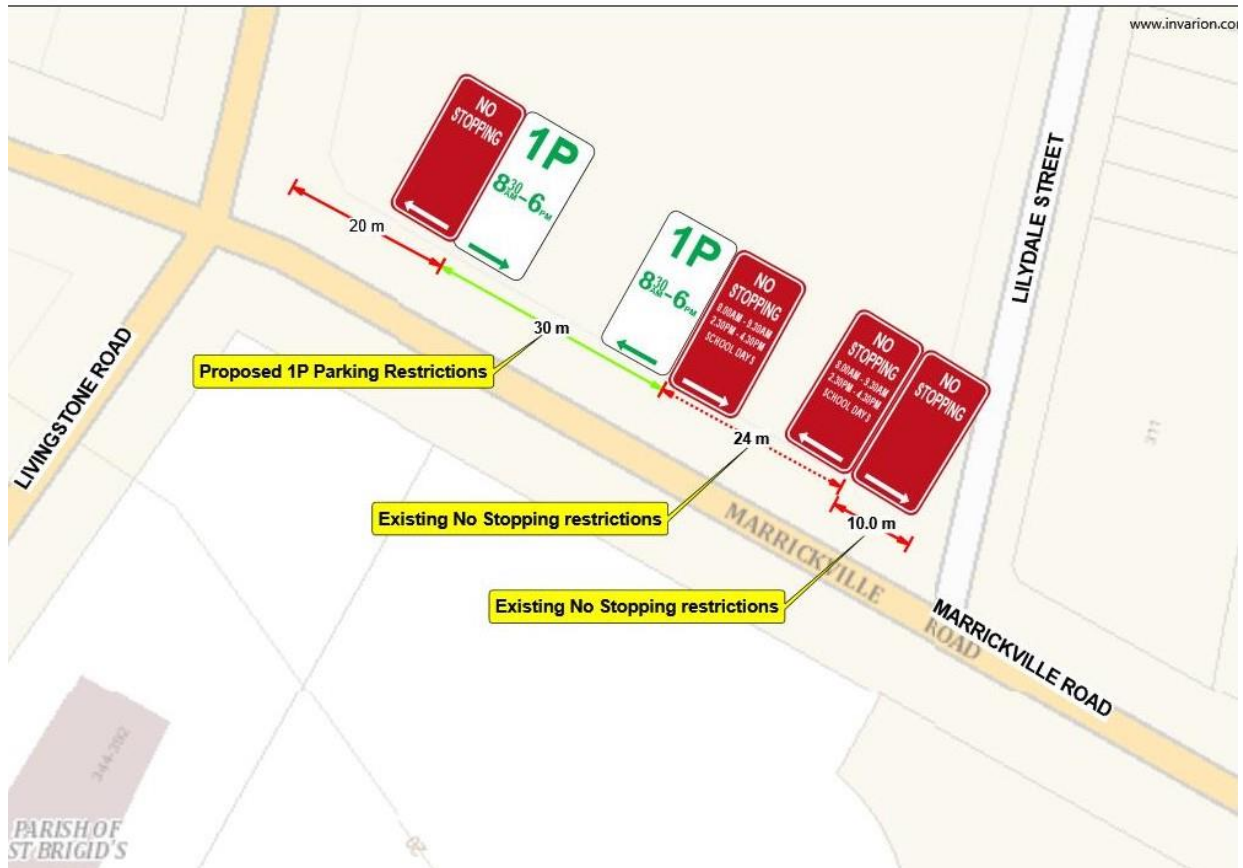
THAT thirty (30) metre section of unrestricted parking be converted to '1P 8.30am – 6pm' on northern side of Marrickville Road, Marrickville between the signalized intersection of Marrickville Road/Livingstone Road and existing 'No Stopping 8am-930am 2.30pm-4.30pm School Days' located 23.6m west of Lilydale Street.

BACKGROUND & OTHER STAFF COMMENTS

Council is proposing to introduce a section of time-restricted parking along Marrickville Road, Marrickville, in order to improve parking turnover along the frontage of Marrickville Library and in the vicinity of the local businesses along the above-mentioned road.

Please note, there will be no change to existing 'No Parking' restrictions during peak hour traffic thoroughfare.

The proposal is shown in the following plan.



FINANCIAL IMPLICATIONS

Nil.

PUBLIC CONSULTATION

A letter outlining the proposal was mailed out to properties in close proximity to the proposed parking restriction location. To date, (3) three responses were received, all against the proposal. All responses indicate the lack of unrestricted parking within the area for staff, residents and visitors with the library having off-street parking to cater for visitors.

CONCLUSION

It is noted that the proposed restrictions would be consistent with parking restrictions along other commercial sections of Marrickville Road and will improve parking turnover for nearby business including the library, it is therefore recommended for approval.

ATTACHMENTS

Nil.