Item 6.1 - Traffic - 7/02/20

N O R T H S Y D N E Y C O U N C I L

To the General Manager

Attach: CTMP (ECM 8007264)

SUBJECT: (6.1) 60 Kareela Road, Cremorne Point - Construction Traffic Management Plan - (Demolition Stage only)

AUTHOR: Report of Traffic & Transport Engineer, Iman Mohammadi

DESCRIPTION/SUBJECT MATTER:

Council has received a "Traffic Impact Assessment" prepared by "PTC Consultants", dated 7 January 2020 for the approved development at 60 Kareela Road, Cremorne Point (Development Consent 202/19).

The development of 60 Kareela Road, Cremorne Point will include the demolition of the existing 4 storey residential apartment building at 60 Kareela Road, Cremorne Point.

Condition 1 of the development consent 202/19 states:

Construction Management Program – Local Traffic Committee Approval

1. A Construction Management Program prepared by a suitably qualified and experienced traffic consultant must be submitted and approved in writing by North Sydney Traffic Committee PRIOR TO THE COMMENCEMENT OF ANY WORKS ON SITE. Any use of Council property will require appropriate approvals prior to any work commencing….

The applicant's Construction Traffic Management Plan is discussed in the report overleaf.

RECOMMENDATION:

1. **THAT** subject to no objection from the Traffic Committee members, the traffic aspects of the Traffic Impact Assessment" prepared by "PTC Consultants", dated 7 January 2020 for the approved development at 60 Kareela Road, Cremorne Point (Development Consent 202/19) is approved under delegated authority of Council's Traffic Engineer subject to the conditions outlined in the report.
2. THAT subject to no objection from the Traffic Committee members, the Work Zone as described in this CTMP is approved under delegated authority of Council's Traffic Engineer with the same conditions pending lodgement of a Work zone application and payment of all applicable fees and ssubject to the following changes:

- The "Work Zone 8am-4:30pm Mon-Fri and 9am-3pm Sat" signs on the eastern side of cul-de-sac (opposite the site) be changed to "No Stopping 8am-4:30pm Mon-Fri and 9am-3pm Sat".

DETAIL

Standard or Guideline Used: RMS Traffic Control at Work Sites Manual, AS 1742.3
Signs & Lines Priority: N/A
Precinct and Ward: Cremorne Point, Victoria
Impact on Bicycles: Nil
Impact on Pedestrians: Impacts as outlined in report
Impact on Parking: Work Zone proposed along the entire cul-de sac on Kareela Road (Loss of 8 parking spaces for truck maneuvering) and Proposing No Parking on the Western side of Kareela Rd (No Loss of Parking)

Condition 1 of the development consent states:

1. A Construction Management Program prepared by a suitably qualified and experienced traffic consultant must be submitted and approved in writing by North Sydney Traffic Committee PRIOR TO THE COMMENCEMENT OF ANY WORKS ON SITE. Any use of Council property will require appropriate approvals prior to any work commencing. At a minimum, the Construction Management Program must specifically address the following matters:

a) A plan view (min 1:100 scale) of the entire site and frontage roadways indicating:

   i. Dedicated temporary construction site driveway entrances and exits, controlled by a certified traffic controller, to safely manage pedestrians and construction related vehicles in the frontage roadways and footways;
   ii. The proposed signage for pedestrian management to comply with the relevant Australian Standards, including pram ramps;
   iii. Turning areas within the site for construction and spoil removal vehicles, allowing a forward egress for all construction vehicles on the site;
   iv. The locations of any proposed Work Zones in the frontage roadways (to be approved by Council's Traffic Committee);
   v. Locations of hoardings proposed; vi. Location of any proposed crane standing areas;
   vi. A dedicated unloading and loading point within the site for all construction vehicles, plant and deliveries;
   vii. Material, plant and spoil bin storage areas within the site, where all materials are to be dropped off and collected; and
   viii. The provision of an on-site parking area for employees, tradesperson and construction vehicles as far as possible.

b) A detailed heavy vehicle access route map through the Council area to Arterial Roads. Provision is to be made to ensure through traffic is maintained at all times.
c) The proposed phases of works on the site, and the expected duration of each phase.
d) How access to neighbouring properties will be maintained at all times and the proposed manner in which adjoining property owners will be kept advised of the timeframes for completion of each phase of process.
e) The road is not to be used as a waiting area for trucks delivering to or awaiting pick up of materials.

f) The proposed method of support to any excavation adjacent to adjoining properties, or the road reserve. The proposed method of support is to be designed and certified by an appropriately qualified and practising structural engineer and must not involve any permanent or temporary encroachment onto Councils property.
g) Proposed protection for Council and adjoining properties. Details are to include site fencing and the provision of "B" class hoardings over footpaths and laneways.
h) A Waste Management Plan. The Waste Management Plan must include, but not be limited to, the estimated volume of waste and method of disposal for the construction and operation phases of the development, design of on-site waste storage and recycling area and administrative arrangements for waste and recycling management during the construction process. All traffic control work and excavation, demolition and construction activities must be undertaken in accordance with the approved Construction Management Program and any conditions attached to the approved Program. A certificate of compliance with this condition must be obtained from Council's development engineers. A copy of the approved Construction Management Program and any conditions imposed on that Program, must be kept on the site at all times and made available to any officer of Council upon request. Notes: 1) North Sydney Council's adopted fee for certification of compliance with this condition shall be payable on lodgement, or in any event, prior to the issue of the relevant approval. 2) Any use of Council property will require appropriate approvals and demonstration of liability insurances prior to such work commencing. 3) Failure to provide complete and detailed information may result in delays. It is recommended that your Construction Management Plan be lodged with Council as early as possible, as a minimum six (6) weeks notice is required to refer items to the Traffic Committee. 4) Dependent on the circumstances of the site, Council may request additional information to that detailed above. (Reason: To ensure appropriate measures have been considered for site access, storage and the operation of the site during all phases of the demolition process in a manner that respects adjoining owner's property rights and residential amenity in the locality, without unreasonable inconvenience to the community)

Access and egress

The report states that

"…there are two ways of reaching Bannerman St / Murdoch St intersection via Regional Roads from all directions. Due to the significantly smaller number of turns, the route coming from Military Road would be preferable for construction vehicles. All vehicle routes to site are constrained to existing public roads that have the physical geometry to accommodate the turning movements. All vehicles shall arrive via Military Road and turn southbound into Spofforth Street. Turn right at Rangers Road and then left into Murdoch Street. Passed the roundabout intersection with Bannerman Street, the trucks shall veer left to follow Murdoch Street and then Hodgson Avenue. At Kareela Road intersection, the vehicles shall turn left. The trucks shall utilise the existing footpath, car park entrance and the turning area to undertake a U-turn. The following points need to be considered when planning this manoeuvre:

- *Vehicular access to 68 and 68A Kareela Road needs to be maintained at any time;*
- *A temporary path needs to be provided on the north-east corner of the turning area, to maintain pedestrian access to 68 and 68A Kareela Road.*

Upon leaving the site, all vehicles shall turn right into Hodgson Avenue, follow the road on Murdoch Street and then turn right at the T-intersection. Passed the roundabout intersection with Bannerman Street, the trucks shall turn right into Rangers Rd, followed by a left turn into Spofforth Street. When reached Military Road, the vehicles can either turn left to travel south, west or northbound or turn right to travel north or eastbound."

Through traffic

The report states that:

"Currently, Kareela Road is signposted as "NO Through Traffic" and it provides a turning area at the cul-de-sac end. The proposed Works Zone would lead to a temporary reduction of this turning area while demolition works are being executed. For this reason, it is proposed to close off the road, but allow local access for residents of the adjoining properties. It is proposed to restrict the access to Kareela Road only during hours of work as described in Section 6.1. To achieve this, the sign arrangement as shown in Figure 23 would need to be established each morning prior to commencement of work. Each evening, upon completion of work, the road work signage would need to be either covered or removed."

Council's traffic Engineer Comment:

- Minimum 3m travel lane must be maintained at all times to allow for emergency access along Kareela Road and within the Work Zone Area.
- One Traffic Controller to be positioned at top of Kareela Road at Hodgson Avenue to manage access.

Access to neighbouring properties

The report states that:

"It is noted that there are 3 driveways / access roads to neighbouring properties coming off Kareela Road which need to remain accessible throughout the works. In particular demolition trucks need to take into account the accessibility to 68 and 68A Kareela Road as well as to the footpath going in the northbound direction. When parked in front of the site to load and unload, the demolition trucks need to allow for sufficient space for vehicular and pedestrian traffic to pass. It should be noted that as per the existing arrangement, the driveway to 68 and 68A Kareela Road allows for a one-way vehicular traffic flow and it is shared with pedestrians. This arrangement is proposed to be maintained throughout the demolition works."

Pedestrian management

"…demolition vehicles need to allow for pedestrians to access 68 and 68A Kareela Road and the footpath leading north. To minimise any conflicts, a traffic controller will oversee vehicular and pedestrian movements and will ensure that safe passage can be achieved. In addition, as the footpath in front of the site will be used by demolition vehicles to access 60 Kareela Road, an alternative pedestrian path has been determined. It is proposed to close off the footpath on the western side at the beginning of the Works Zone and guide the pedestrians across the road to use the existing footpath on the other side of the carriageway. As the footpath end before 68 Kareela Road can be reached, a path shall be coned off during demolition works. At any time, pedestrians and vehicular movements will be supervised by traffic controllers. The alternative pedestrian path, together with required traffic management measures to communicate changes in footpath conditions are shown in Figure 26."

Construction phases

This report has been prepared for Demolition stage of development only which takes approximately 2-3 months.

Neighbour notification

The report states that

"Adjoining properties shall be informed approximately 2 weeks in advance of the planned works and the required changes to traffic and parking conditions, in order to make alternative arrangements, if required."

Loading and unloading equipment and materials
The report proposes loading of trucks during demolition to take place from the proposed Work Zone fronting the site.

Site crane
There is no crane proposed for the demolition stage.

Storage of equipment and materials
This has not been addressed however it is a condition of approval that "*Materials are to be stored on-site. At no time, are materials to be stored on any public road or any Council property".*

Works Zone

The report states that:

"It is proposed to dedicate the parking and turning area at the end of Kareela Road as a Works Zone. The temporary reduction of parking provision is considered to be acceptable, as sufficient vacant parking spaces are available in the vicinity of the site. The Works Zone shall be restricted to times of demolition works. The signage and other management measures required to communicate and manage the Works Zone are discussed in Section 6.7."

Council's traffic Engineer Comment:

The "Work Zone 8am-4:30pm Mon-Fri and 9am-3pm Sat" signs on the eastern side of cul-de-sac (opposite the site) as shown on figure 24 "Proposed Temporary Parking Controls" on page 29 of the report shall be changed to "No Stopping 8am-4:30pm Mon-Fri and 9am-3pm Sat"

Staff Parking

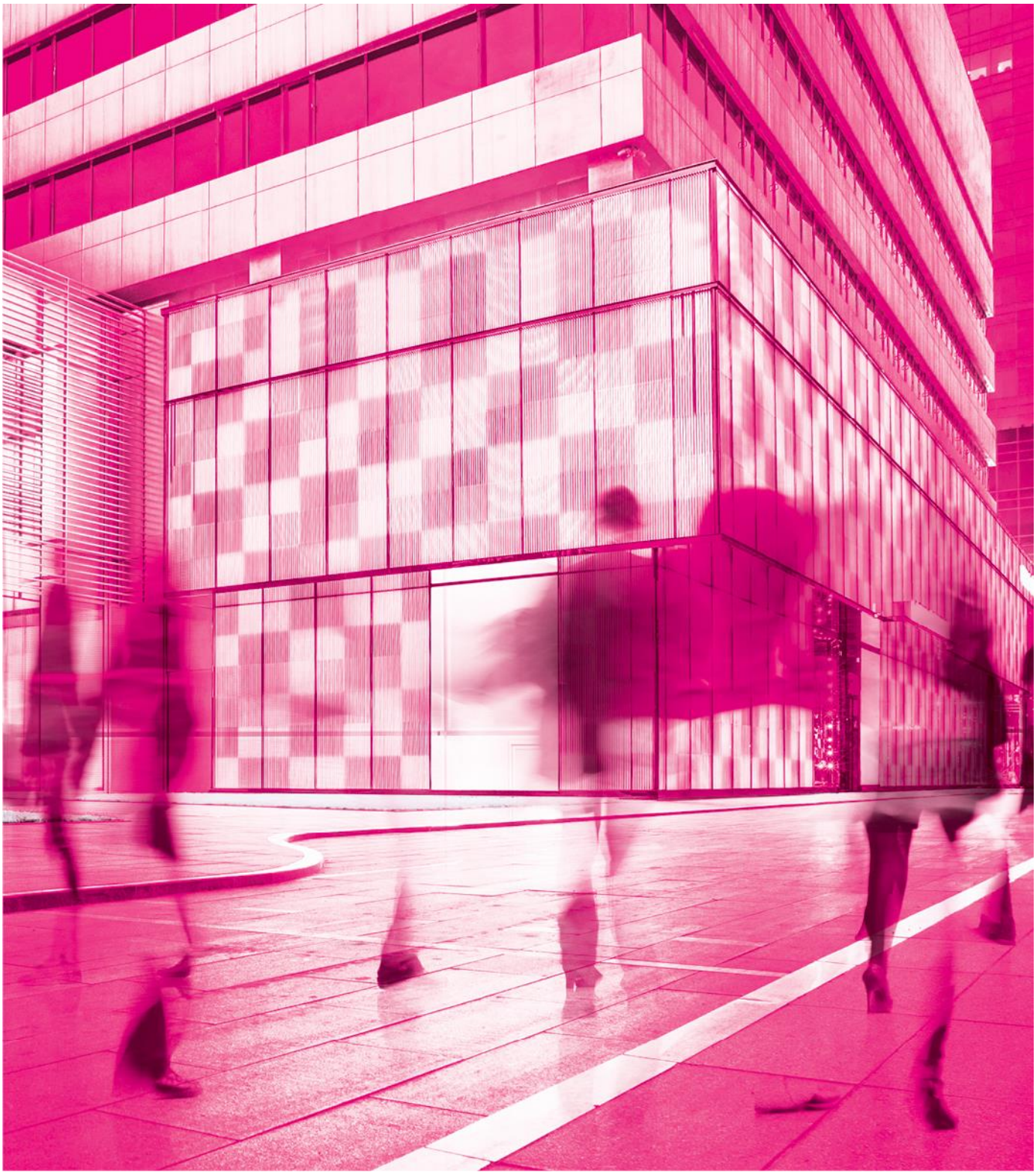
The report states that No parking will be available on site for construction workers. However, there is sufficient parking available in the vicinity of the site. In addition to this there is a number of public transport options available, including a ferry, hence it is recommended to encourage staff and visitors to utilise these when commuting to and from work.

Council's traffic Engineer Comment:
Staff are required to find alternative travel arrangements, i.e Car-pooling, public transport… to avoid reliance on the available on Street parking spaces (reduced from 13 to 5 due to the proposed WZ).

CONDITIONS OF APPROVAL

1. All works on any public road are to be undertaken in accordance with AS 1742.3.
2. Through traffic must be managed at all times by traffic controllers during demolition works.
3. Minimum 3m travel lane must be maintained at all times to allow for emergency access along Kareela Road and within the Work Zone Area.
4. One Traffic Controller to be positioned at the top of Kareela Road at Hodgson Avenue to manage access.
5. Staff are required to find alternative travel arrangements, i.e Car-pooling, public transport to avoid reliance on the available on Street parking spaces.
6. No truck and dog trailers are to be used for the site.
7. The maximum size of deliver and construction vehicles must not exceed a Medium Rigid Vehicle (MRV) of 8.8m in length.
8. Occasional use of larger vehicles accessing the site, requires a Stand Plant Permit from North Sydney Council with supporting Turning Path diagrams to show clear path of travel to and from the site.
9. Approval must be obtained from Council for all temporary construction vehicular crossings.
10. Installation of a Work Zone for 60 Kareela Road is subject to the applicant paying all appropriate Council advertised fees and charges, including the cost of the signage.
11. The "Work Zone 8am-4:30pm Mon-Fri and 9am-3pm Sat" signs on the eastern side of cul-de-sac (opposite the site) as shown on figure 24 "Proposed Temporary Parking Controls" on page 29 of the report shall be changed to "No Stopping 8am-4:30pm Mon-Fri and 9am-3pm Sat"
12. The residents/occupiers of Kareela Road, Hodgson Avenue, Iredale Avenue are to be notified by letter that a Work Zone 7am to 5pm Monday to Friday, 8am to 1pm Saturday is to be installed. The letter should indicate the length of the Work Zone, the existing parking restrictions the Work Zone will replace and the duration of the Work Zone. A copy of the notification is to be provided to Council before the signs are installed. The notification is to have the name and number of the site manager in case of complaints.
13. Any approved Work Zone is to be used only to pick up and drop off materials and equipment. Construction vehicles are not to wait or park in the Works Zone, Truck Zone and Loading Zone.
14. Trucks may only enter and leave the construction site in a forward direction, unless under the direct supervision of two RMS accredited traffic controllers, one to direct heavy vehicle movement in and out of the site and one to ensure no pedestrian enters the path of a heavy vehicle.
15. A minimum of two RMS accredited traffic controllers are to be provided to direct entering and exiting vehicles at the entry/exit to the works zone whilst ensuring no pedestrians or vehicles enter the zone of heavy vehicle movement.
16. Access to adjoining residents and businesses are to be maintained at all times.
17. The adjoining residents and businesses are to be updated on a monthly basis and at key construction stages, particularly in relation to construction vehicle movements, and be provided with a phone number to contact the site manager.

18. The applicant shall provide monthly updates and notices at key stages of development particularly in relation to heavy vehicle movements and traffic changes, including monthly updates posted in a prominent position on the site hoarding including contact details of the site manager.
19. At no time shall Kareela Road, Hodgson Avenue, Iredale Avenue or any other road be blocked by any vehicle or works associated with the construction of the proposed development. Through traffic is to be maintained at all times.
20. Kareela Road, Hodgson Avenue, Iredale Avenue or any other road are not to be used as a waiting area for trucks delivering to or awaiting pick up of materials etc. from the proposed development.
21. Construction vehicles are not to queue in Kareela Road, Hodgson Avenue, Iredale Avenue or any other road.
22. Materials are to be stored on-site. At no time, are materials to be stored on any public road or any Council property.
23. Tower cranes shall be located wholly on-site.
24. Mobile cranes shall be located wholly on-site or with an approved Stand Plant Permit.
25. Concrete pumps shall be located wholly on-site or with an approved Stand Plant Permit, unless the pump and trucks can stand wholly within the signposted Work Zone.
26. All pump lines crossing Council footpaths must be ramped over to allow safe pedestrian/ wheelchair traffic at all times.
27. Pedestrian access on Kareela Road, Hodgson Avenue, Iredale Avenue or any other roads must be maintained at all times.
28. Pedestrian access and the diversion of pedestrians shall be carried out in accordance with Australian Standard 1742.3 and 1742.10.
29. If pedestrians are diverted, pram ramps must be provided in accordance with Australian Standard 1428.1.
30. If a Permit to Stand Plant or Temporary Road Closure is required, application must be made to NSW Police, North Shore Local Area command.
31. If a Permit to Stand Plant is required, application must be made to Council in accordance with Council's Stand Plant Permit Form and Conditions.
32. If a Temporary Road Closure is required, application must be made to Council in accordance with Council's Temporary Road Closure Form and Conditions.
33. A traffic route map and conditions are to be made available to truck drivers engaged for this development.
34. A list of truck drivers' names with their licences and vehicle plate numbers and conditions are to be kept on-site by the applicant at all times, and be made available for inspection by Council Officers, Police Officers and Council Rangers.
35. Repeated failure to comply with these conditions will result in removal of any Work Zone under notice.
36. Staff to find alternative transport to and from the site to avoid reliance on the on-street parking spaces.
37. All Traffic Management Plans and Traffic Control Plans must be endorsed with the name of the person preparing the plan along with their level of certified qualification and certificate number. Only persons with current "Select/Modify Traffic Control Plans" or "Design Audit Traffic Control Plans" tickets are qualified to develop and endorse Traffic Management Plans and Traffic Control Plans.



Traffic Impact Assessment;

60 Kareela Road, Cremorne Point

For Public Works Advisory

7 January 2020

parking;
traffic;
civil design;
wayfinding;

ptc.

Document Control

60 Kareela Road, Cremorne Point, Traffic Impact Assessment

Issue	Date	Issue Details	Author	Reviewed	For the attention of
1	06/05/19	Draft Report	KB	SW	Michelle Moody
2	24/06/19	Final Report	KB	SW	Michelle Moody
3	07/01/20	Revision 1	KB	AM	Michelle Moody
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Contents

1. Introduction

1.1 Project Description

ptc. has been engaged by Public Works Advisory to prepare a Traffic Impact Assessment (TIA) for the proposed demolition of a 4 storey residential apartment building at 60 Kareela Road, Cremorne Point. This report will accompany the Statement of Environmental Effects (SEE), which assesses the potential impact of the proposed demolition on the traffic and parking in the local area. This assessment will be presented to North Sydney Council.

The location of this site is outlined in Figure 1.

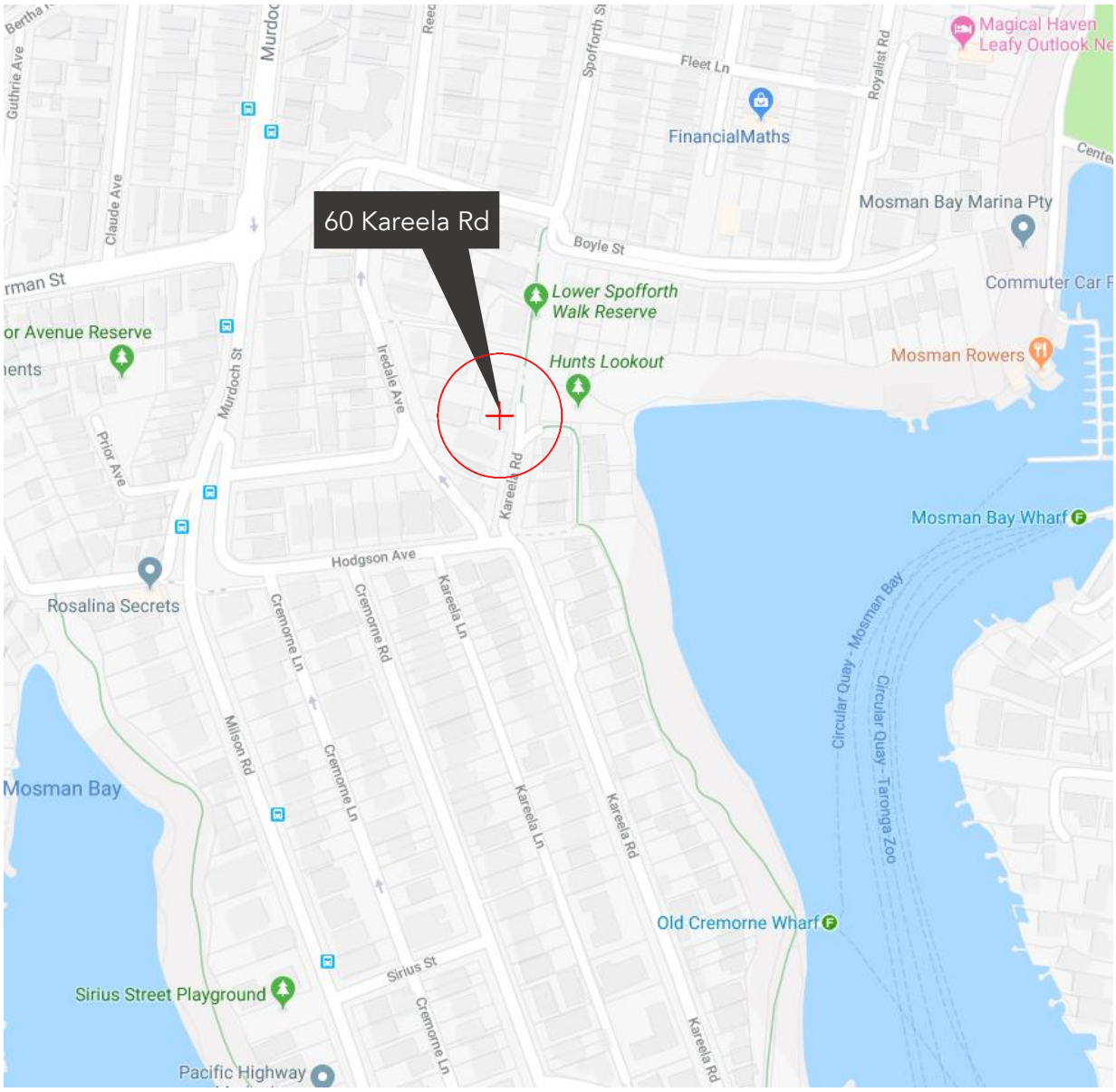


Figure 1 – Site Location (Source: Google Maps)

1.2 Purpose of this Report

This report presents the following considerations relating to the traffic and parking assessment of the development:

Section 1 - Introduction of the project;

Section 2 - Background information, including a description of the site and current use;

Section 3 - A description of the road network serving the development site, the existing transportation options and active transport facilities;

Section 4 - An assessment of the existing parking provision;

Section 5 - Determination of the traffic activity associated with the development proposal, and the adequacy of the surrounding road network;

Section 6 - A description of traffic related arrangements during proposed demolition works;

Section 7 - Summary & Conclusion.

2. Site Context

2.1 Site Location

The subject site has a listed street address of 60 Kareela Road, Cremorne Point, and comprises the lot SP72. The total size of the subject site amounts to approximately 490m^2.

The development area is located in Cremorne Point, which is approximately 7km north-east of the Sydney CBD.

The subject site is bordered only by Kareela Road to the east and is located at the end of a cul-de-sac, as shown in Figure 2.

Figure 2 – Site Location Plan (Source: SIX Maps)

2.2 Surrounding Land Use

In the context of the surrounding land use, the development area is classified as a Low Density Residential Zone (R2) and is surrounded by a variety of different land uses, including other Low Density Residential buildings to the North, West and South and a Public Recreation Zone (RE1) to the East. A Medium Density Residential Zone is located a little further North-East from the subject site.

Figure 3 shows the surrounding land use.

Figure 3 – Surrounding Land Use (Source: NSW Planning Portal)

2.3 Current Site Use

Currently the site is occupied by a 4 storey residential apartment building with an access to undercover parking off Kareela Rd.

3. Existing Transportation Facilities

3.1 Road Hierarchy

The site is primarily serviced by Kareela Road. The broader road network servicing the area comprises state roads (Military Road and the M1 Freeway) and regional roads (Murdoch Street and Bannerman Street), making the site accessible from different parts of Sydney. The road network in this area also comprises local roads, providing direct access to the surrounding land uses and the site. The surrounding road network is illustrated in Figure 4.

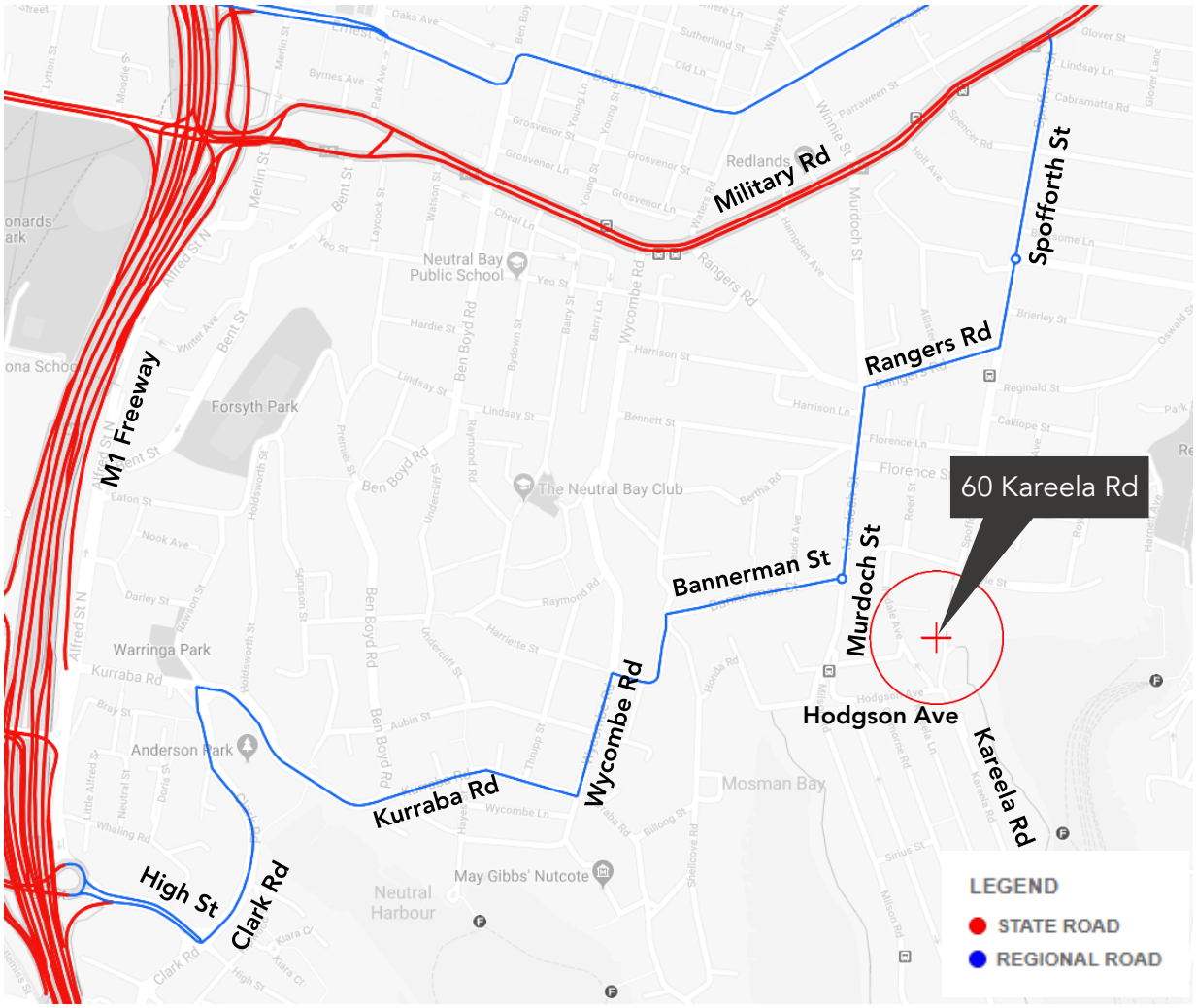


Figure 4 – Road Classification (Source: RMS State and Regional Roads Viewer)

The NSW administrative road hierarchy comprises the following road classifications, which align with the generic road hierarchy:

- State Roads: Freeways and Primary Arterials (RMS Managed);
- Regional Roads: Secondary or sub-arterials (Council Managed, Part funded by the State);
- Local Roads: Collector and local access roads (Council Managed).

Within the vicinity, the road network serving the site includes:

Bannerman Street	
Road Classification	Regional Road
Alignment	East – West
Number of Lanes	1 lane in each direction, plus parking lane on each side
Carriageway Type	Un-divided
Carriageway Width	13 metres
Speed Limit	50 km/h
School Zone	No
Parking Controls	Unrestricted parking
Forms Site Frontage	Yes

Figure 5 – Streetview of Bannerman Street, westbound (Source: Google Maps)

Murdoch Street	
Road Classification	Partially regional, partially local road
Alignment	North - South
Number of Lanes	1 lane in each direction, plus parking lane on each side
Carriageway Type	Un-divided
Carriageway Width	13 metres
Speed Limit	50 km/h
School Zone	No
Parking Controls	Mostly unrestricted parking, with some bus zones
Forms Site Frontage	Yes

Figure 6 – Streetview of Murdoch Street, Soutbound (Source: Google Maps)

Hodgson Avenue	
Road Classification	Local Road
Alignment	East – West
Number of Lanes	Unmarked 1 lane in each direction, plus parking on each side
Carriageway Type	Un-divided
Carriageway Width	11 metres
Speed Limit	50 km/h
School Zone	No
Parking Controls	Unrestricted parking
Forms Site Frontage	Yes

Figure 7 – Streetview of Hodgson Avenue, Eastbound (Source: Google Maps)

Kareela Road	
Road Classification	Local Road
Alignment	North - South
Number of Lanes	Unmarked 2-way cul-de-sac
Carriageway Type	Un-divided
Carriageway Width	5 metres
Speed Limit	50 km/h
School Zone	No
Parking Controls	Unrestricted parking
Forms Site Frontage	Yes

Figure 8 – Streetview of Kareela Road, Northbound (Source: Google Maps)

3.2 Key Intersections

The following key intersections have been identified in the vicinity of the site:

- Bannerman Street / Murdoch Street: 3-arm, priority controlled roundabout;
- Murdoch Street / Milson Road: 3-arm, priority controlled intersection;
- Murdoch Street / Iredale Avenue: 3-arm, priority controlled intersection;
- Hodgson Avenue / Cremorne Road: 3-arm, priority controlled intersection;
- Hodgson Ave / Kareela Rd / Iredale Ave: 2 x 3-arm, priority controlled intersections, with Iredale Ave being a one-way street in the northbound direction;

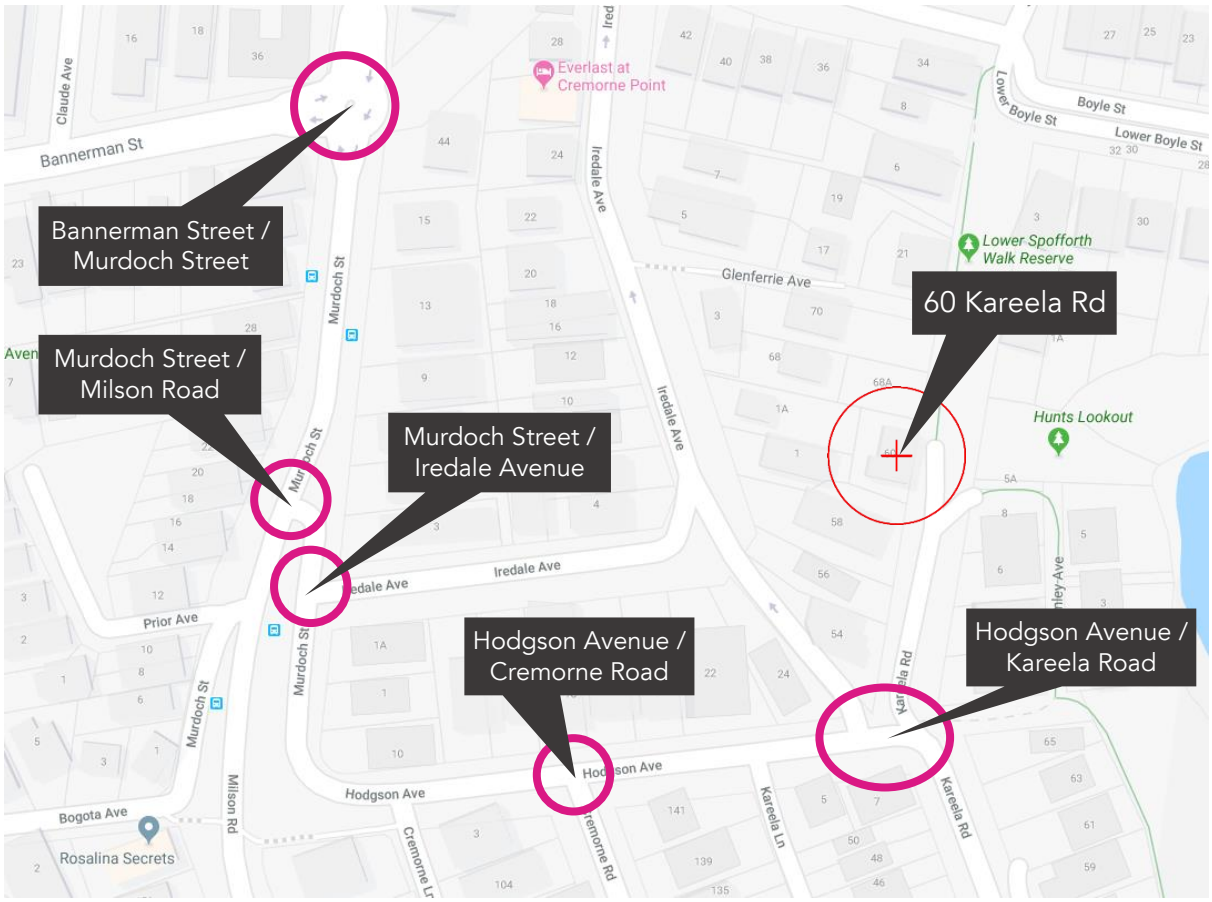


Figure 9 – Key intersections

3.3 Public Transport

The locality has been assessed in the context of available forms of public transport that may be utilised by prospective workers. When defining accessibility, reference is made to the NSW Planning Guidelines for Walking and Cycling (2004) (the Cycling and Walking Guide), where a distance of 400-800m is recommended as a comfortable walkable catchment to access public transport and local amenities. The document also suggests a distance of 1500m as a suitable catchment for cycling.

Figure 10 illustrates the walkable 400m and 800m catchments from the development site, together with a number of public transport options which are available in the vicinity of the site, such as ferry and bus services. Details of the public transport options available are outlined in the following sections.

Figure 10 – 400m and 800m Walkable Catchment Map

3.3.1 Ferry

As shown in Figure 10, there are 2 Ferry Wharfs within the 800m catchment, 1 of which – Old Cremorne – is accessible within 8 minutes walking (Source: Google).

The ferry services, including coverage, approximate operation times and frequency, are summarised in the table below:

Table 1 – Ferry Service Summary (Source: Transport NSW)

Ferry Route	Coverage	Approximate operation time frame and frequency
F6	Mosman Bay - Circular Quay	Mon-Fri: 30 minutes intervals, between 6am and 12am Sat-Sun: 60 minutes intervals, between 7am and 12am

3.3.2 Bus Services

As shown in Figure 10, there is a number of bus services within the 800m catchment, 1 of which lie within the 400m catchment. The closest bus stop to the development site is the 'Milson Rd opp Prior Ave'. With about 350 m distance from the site, this bus stop can be reached by walking in 7 minutes (source: google).

The bus services, including coverage, approximate operation times and frequency, are summarised in the table below.

Table 2 – Bus Service Summary (Source: Transport NSW)

Bus Route	Coverage	Approximate operation time frame and frequency
225	Cremorne Point Wharf - Neutral Bay Wharf	Mon-Sat: 15-60 minutes intervals, between 6am and 12am Sun: 30-60 minutes intervals, between 8:30am and 9:30pm
566N	Middle Harbour Public School to Cremorne Wharf – School Bus	

The development is relatively well serviced by bus, with regular services (every 15 to 30 throughout the day on weekdays), and therefore provides an alternative mode share option for staff, subject to the availability of convenient bus stops close to their home location.

3.4 Active Transport

The locality was reviewed for features that would attract active transport trips (walking and cycling), with reference to the NSW Guidelines for Walking and Cycling (2004).

3.4.1 Cycling

Figure 11 shows the local bicycle network surrounding the development site.

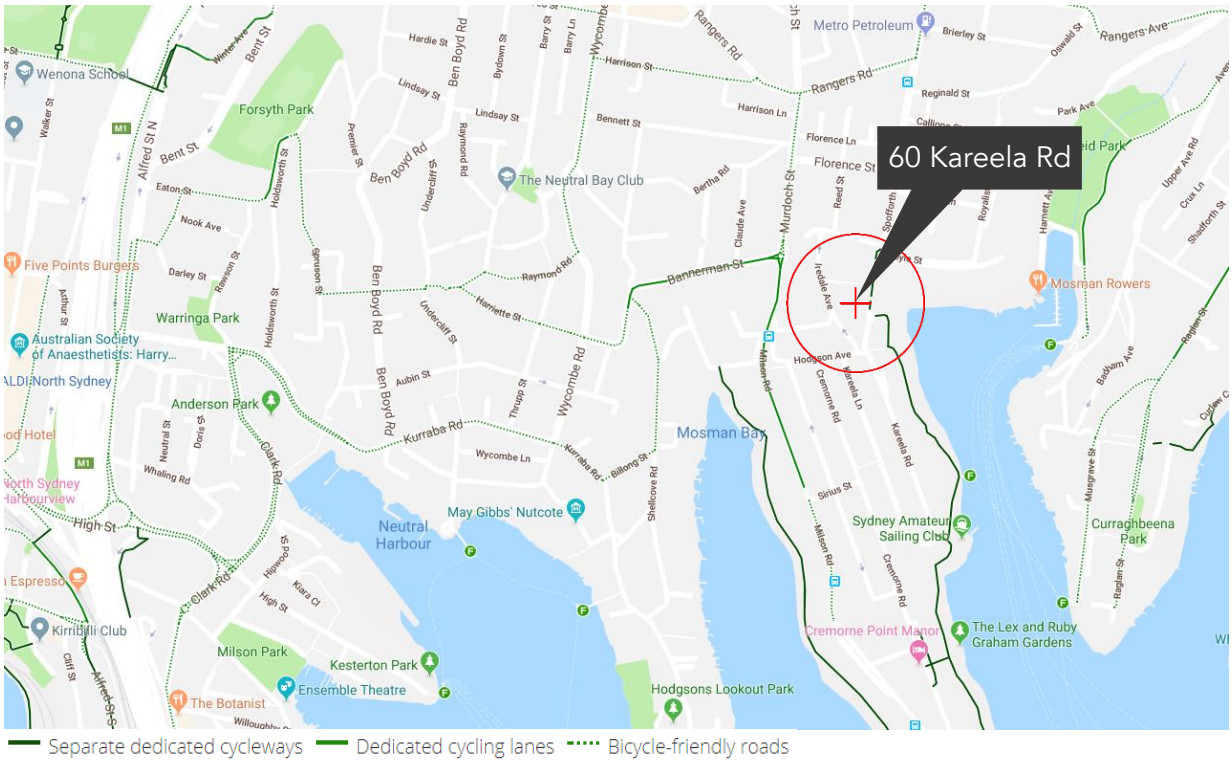


Figure 11 – Local Bicycle Network (Source: Google)

3.4.2 Walking

Walking is a viable transport option for distances under one kilometre (approximately 15-20min) and is often quicker for short trips door to door. Walking is also the most space efficient mode of transport for short trips and presents the highest benefits. Co-benefits where walking replaces a motorised trip include improved health for the individual, reduced congestion on the road network and reduced noise and emission pollution.

The local road network comprises local residential streets with relatively low traffic volumes, and most offering paved foot paths on at least one side of the road. The majority of footpaths are staggered with trees and some adjoin grassy verges.

Pedestrian infrastructure is generally relatively well developed in the vicinity of the subject site. There are no pedestrian crossings in form of zebra crossings or signalised crossings, however, there are pram ramps at almost each intersection and refuge islands on larger roads. Given the residential character of the area and thus the relatively low traffic volumes, the infrastructure is considered to be appropriate.

4. Parking Provision

4.1 Analysis Methodology

When analysing the parking provision in the vicinity of the development site, reference has been made to the NSW Planning Guidelines for Walking and Cycling (2004) (the Cycling and Walking Guide), where a distance of 400-800m is recommended as a comfortable walkable catchment to access public transport and local amenities.

With this in mind and considering the residential type of the surrounding area as well as the generally unrestricted parking arrangements, it has been assumed that 250m is an acceptable distance for residents to park their vehicles away from home, which equals an approximately 4 minute walk (Source: Google).

The proposed demolition works are likely to affect parking spaces along Kareela Road, between Hodgson Avenue and the development at 60 Kareela Road. Considering the above, it is assumed that these spaces can potentially serve homes up to 250m away.

In order to determine the current parking provision in the vicinity of the site, all streets of approximately 300m walking distance away from the development site have been analysed in regard to the overall number of parking spaces and the occupation rate over the past 5 years. The analysed street sections are shown in Figure 12.

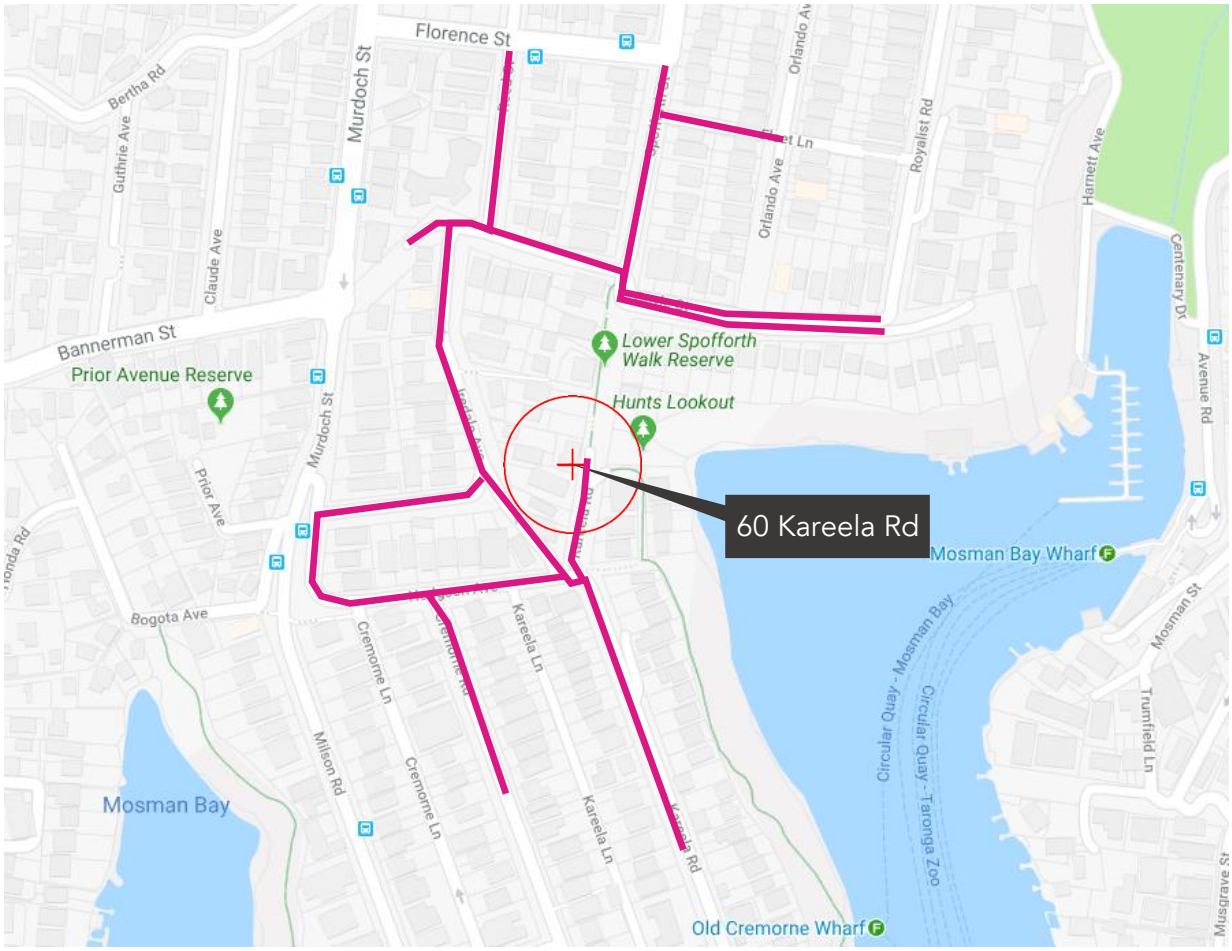


Figure 12 – Street Section Analysed for Parking Provision

The analysis has been undertaken utilising NearMap imagery. In regard to days chosen, it has been considered that the demolition works will occur on weekdays. The imagery analysis included the following days:

- Monday, 21 April 2014;
- Friday, 21 November 2014;
- Tuesday, 28 April 2015;
- Tuesday, 17 November 2015;
- Thursday, 5 May 2016;
- Friday, 4 November 2016;
- Tuesday, 18 July 2017;
- Thursday, 18 October 2017;
- Thursday, 18 January 2018;
- Tuesday, 21 August 2018;
- Thursday, 27 December 2018;
- Monday, 4 March 2019.

The majority of parking spaces in the vicinity of the site are parallel parking spaces, where parking on both sides of the carriageway is permitted. A small number of parking spaces are restricted to 45 degree angle parking.

As the majority of parking areas are not line marked, the following average dimensions for parking envelopes have been assumed:

- Parallel parking spaces: 2m wide x 6m long
- 45 degree parking spaces: 2.4m wide x 5.4m long

4.2 Analysis Results

Overall, there are approximately 348 marked and unmarked parking spaces in the vicinity of the development. Table 3 summarises the results of the imagery analysis, showing the number of occupied parking spaces in relation to the total number of parking spaces available in road sections outlined in Figure 12.

Table 3 – Parking Provision Analysis Results

Date	Total No. of Parking Spaces	No. of Occupied Parking Spaces	Occupancy Rate	No. of Vacant Parking Spaces
Monday, 21 April 2014	**348**	**175**	**50.3%**	**173**
Friday, 21 November 2014		**220**	**63.2%**	**128**
Tuesday, 28 April 2015		**144**	**41.4%**	**204**
Tuesday, 17 November 2015		**175**	**50.3%**	**173**
Thursday, 5 May 2016		**176**	**50.6%**	**172**
Friday, 4 November 2016		**175**	**50.3%**	**173**
Tuesday, 18 July 2017		**204**	**58.6%**	**144**
Thursday, 18 October 2017		**170**	**48.9%**	**178**
Thursday, 18 January 2018		**198**	**56.9%**	**150**
Tuesday, 21 August 2018		**196**	**56.3%**	**152**
Thursday, 27 December 2018		**183**	**52.6%**	**165**
Monday, 4 March 2019		**159**	**45.7%**	**189**
Overall Average:	**348**	**181**	**52.1%**	**167**

In summary, the occupancy rate fluctuated between 41.4% and 63.2% over the past 5 years, leaving at least 128 vacant parking spaces in 300m distance from the development site.

4.3 Conclusion

The demolition works are likely to affect parking spaces at the cul-de-sac end of Kareela Road, between Hodgson Avenue and 60 Kareela Road. This section currently accommodates a total of 7 parking spaces.

As determined in Section 4.2, Table 3, at least 128 parking spaces are expected to be vacant in approximately 300m walking distance from the development site. This is deemed to be sufficient to accommodate the temporary loss of 7 parking spaces.

5. Traffic Impact Assessment

5.1 Traffic Surveys

In order to determine the traffic activity associated with the current land use, traffic surveys were undertaken on Tuesday, 9th April 2019 at the key intersections described in Section 3.2. The results indicate that the peak periods at each intersection are as followed:

- Bannerman Street / Murdoch Street: 7:30 – 8:30 AM Peak 4:45 – 5:45 PM Peak;
- Murdoch Street / Milson Road: 7:00 – 8:00 AM Peak 4:45 – 5:45 PM Peak;
- Murdoch Street / Iredale Avenue: 8:00 – 9:00 AM Peak 4:45 – 5:45 PM Peak;
- Hodgson Avenue / Cremorne Road: 7:00 – 8:00 AM Peak 4:45 – 5:45 PM Peak;
- Hodgson Ave / Kareela Rd / Iredale Ave: 7:15 – 8:15 AM Peak 4:30 – 5:30 PM Peak.

For reasons of conservatism, traffic volumes of each individual peak hour period have been used for further calculations.

The results of the surveys are demonstrated in Attachment 1 and a detailed assessment of the traffic condition is described in Section 5.2.

5.2 Existing Traffic - SIDRA-Calculations

The surveyed intersections have been modelled with SIDRA Intersection software, a micro-analytical tool for individual intersections and whole-network modelling. Typically, there are three performance indicators used to summarise the performance of an intersection, being:

- Degree of Saturation (DoS) – The total usage of the intersection expressed as a factor of 1, with 1 representing 100% vehicles/capacity (v/c). (e.g. 0.8 = 80% saturation)
- Average Delay – The average delay encountered by all vehicles passing through the intersection. It is often important to review the average delay of each approach as a side road could have a long delay time, while the large free flowing major traffic will provide an overall low average delay.
- 95% Queue Lengths (Q95) – is defined to be the queue length in metres that has only a 5-percent probability of being exceeded during the analysis time period. It transforms the average delay into measurable distance units.
- Level of Service (LoS) – This is a categorization of average delay, intended for simple reference. The RMS adopts the following bands:

Table 4 – Level of Service (LoS) Definitions by RMS

LoS	Average Delay (secs/vehicle)	Traffic Signals & Roundabouts	Give Way & Stop Signs
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and 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 with excessive queuing. Requires additional capacity	Unsatisfactory with excessive queuing; requires other control mode

A summary of the SIDRA results on the existing situation is displayed in Table 5. The full movement summary outputs from SIDRA are provided in Attachment 1

Table 5 – Summary of Existing Traffic Conditions

Intersection	Time	LoS	Average Delay (s)	DoS (v/s)	Q95 (m)
Bannerman Street / Murdoch Street	AM Peak	A	7.9	0.547	37.8
	PM Peak	A	6.7	0.507	30.1
Murdoch Street / Milson Road	AM Peak	A	2.0	0.146	3.6
	PM Peak	A	2.1	0.165	4.8
Murdoch Street / Iredale Avenue	AM Peak	A	0.4	0.064	0.1
	PM Peak	A	0.5	0.079	0.1
Hodgson Avenue / Cremorne Road	AM Peak	A	3.5	0.051	1.5
	PM Peak	A	3.4	0.069	2.2
Hodgson Ave / Kareela Rd / Iredale Ave	AM Peak	A	5.3	0.025	0.8
	PM Peak	A	5.3	0.021	0.6

The existing traffic conditions at all intersections are at a Level of Service A, indicating an overall good operation of the surrounding roads. The highest captured Degree of Saturation is 0.547 vehicles per capacity at the Bannerman Street / Murdoch Street intersection, with the other intersections lying below 0.2000 vehicles per capacity. The Average Delay does not exceed 8 seconds at any intersection.

5.3 Demolition Traffic Generation

5.3.1 Current Land Traffic Generation

For the purpose of this report it has been assumed that the current traffic generation of the demolition site is 0.

This approach lies on the conservative site, as any traffic generated by the demolition works will have a potential impact on the surrounding traffic conditions.

5.3.2 Proposed Demolition Works Traffic Generation

As described later in detail in Section 6.2 and Section 6.3, demolition works should incur in a maximum of approximately 12 truck movements per day (6 inbound and 6 outbound). Taking into account proposed hours of work (refer to Section 6.1), the number of truck movements equates to approximately 2 per hour (1 inbound and 1 outbound).

5.3.3 Net Trip Generation

Net traffic generation is calculated by subtracting the current traffic generation from the proposed traffic generation. This figure illustrates the number of trips that are anticipated to be generated solely by the proposed demolition works in addition to the current traffic (see table below).

Table 6 – Net Trip Generation

Location	Current Trip Generation	Proposed Trip Generation	Net Trip Generation
60 Kareela Road	0	2	2

Considering the expectedly low trip generation, it is assumed that the truck movements will fall under the typical daily traffic variations, thus SIDRA modelling is not required.

5.4 Traffic Impact Summary

The above intersection assessment has been undertaken in isolation of any other planned developments within proximity of the site. The assessment indicated that the traffic activity associated with the proposed demolition works can be adequately accommodated in the existing road network.

In this regard, the proposed works are not anticipated to result in any notable impacts to the local road network.

6. Traffic Management Plan

6.1 Hours of Work

It is proposed to restrict the demolition works to times outside of morning and afternoon peak hours. Considering the peak hours determined during traffic surveys undertaken at key intersections in the vicinity of the site (refer to Section 5.1 for more detail), the following hours of work are proposed:

- Monday to Friday 8:00am to 4:30pm;
- Saturdays 9:00am to 3:00pm;
- Sunday & Public Holiday No work to be undertaken at any time.

6.2 Likely Demolition Program

The following likely demolition program has been assumed:

Table 7 – Likely Demolition Program

Phase	Works	Duration	Demolition Traffic
1	**Asbestos removal**	**3 days**	**1 truck per day = 2 truck movements per day (1 inbound and 1 outbound)**
2	**Demolition of top 2 levels**	**8 days per level**	**4 trucks per day = 8 truck movements per day (4 inbound and 4 outbound)**
3	**Demolition of bottom levels**	**5 days per level**	**15-20t excavator 6 trucks per day = 12 truck movements per day (6 inbound and 6 outbound)**

6.3 Construction Traffic Activity

Based on Table 7, demolition works are expected to last for approximately 2-3 months and should incur in a maximum of approximately 12 truck movements per day (6 inbound and 6 outbound). Taking into account proposed hours of work, the number of truck movements equates to approximately 2 per hour (1 inbound and 1 outbound).

As summarised in Section 5.4, it is not anticipated that the demolition works would cause a notable impact upon the wider road network capacity or operation of the road network and this activity would fall within typical daily traffic variations.

In regard to the local road network in close vicinity of the site, the area is mainly residential thus it can be assumed that the residential traffic movements are tidal (leaving in the morning and returning in the afternoon). Therefore, it is not anticipated that the demolition works will have a negative impact on the local road network, particularly if works are scheduled outside the morning and evening peak hours (refer to Section 5.1).

6.4 Construction Vehicle Types

Due to the geometry of roads and the cul-de-sac arrangement of Kareela Road at the site, the largest vehicle able to access, turn around and leave the site is an up to 8.8m long Medium Ridged Vehicle (MRV).

Any larger vehicles that would be required to travel to the project would need to be dealt with separately, with the submission of required permits to and subsequent approval by North Sydney Council prior to any delivery.

6.5 Demolition Vehicle Routes

As shown in Section 3.1, Figure 4, there are two ways of reaching Bannerman St / Murdoch St intersection via Regional Roads from all directions. Due to the significantly smaller number of turns, the route coming from Military Road would be preferable for constructions vehicles.

All vehicle routes to site are constrained to existing public roads that have the physical geometry to accommodate the turning movements.

All vehicles shall arrive via Military Road and turn southbound into Spofforth Street. When arrived at Rangers Rd, the vehicles shall turn right and then left into Murdoch Street. Passed the roundabout intersection with Bannerman Street, the trucks shall slide left to follow Murdoch Street and then Hodgson Avenue. At Kareela Road intersection, the vehicles shall turn left.

The trucks shall utilise the existing footpath, car park entrance and the turning area to undertake a U-turn. The following points need to be considered when planning this manoeuvre:

- Vehicular access to 68 and 68A Kareela Road needs to be maintained at any time;
- A temporary path needs to be provided on the north-east corner of the turning area, to maintain pedestrian access to 68 and 68A Kareela Road.

This arrangement is shown in Figure 14.

Upon leaving the site, all vehicles shall turn right into Hodgson Avenue, follow the road on Murdoch Street and then turn right at the T-intersection. Passed the roundabout intersection with Bannerman Street, the trucks shall turn right into Rangers Rd, followed by a left turn into Spofforth Street. When reached Military Road, the vehicles can either turn left to travel south, west or northbound or turn right to travel north or eastbound.

The vehicle routes are shown in Figure 13.

The following Figure 14 to Figure 20 show turning manoeuvres of MRVs at relevant intersections.

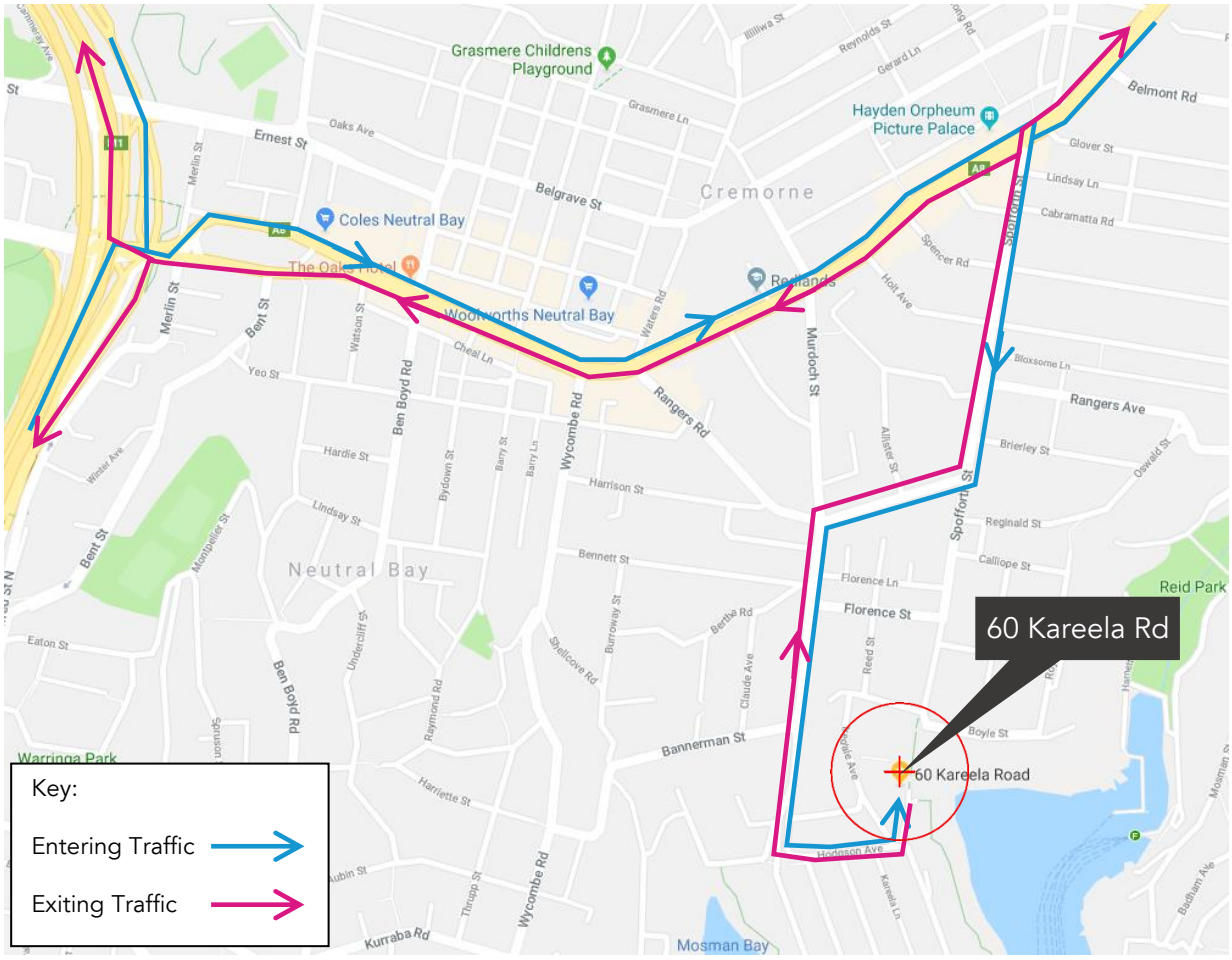


Figure 13 – Construction Vehicle Access and Egress Routes

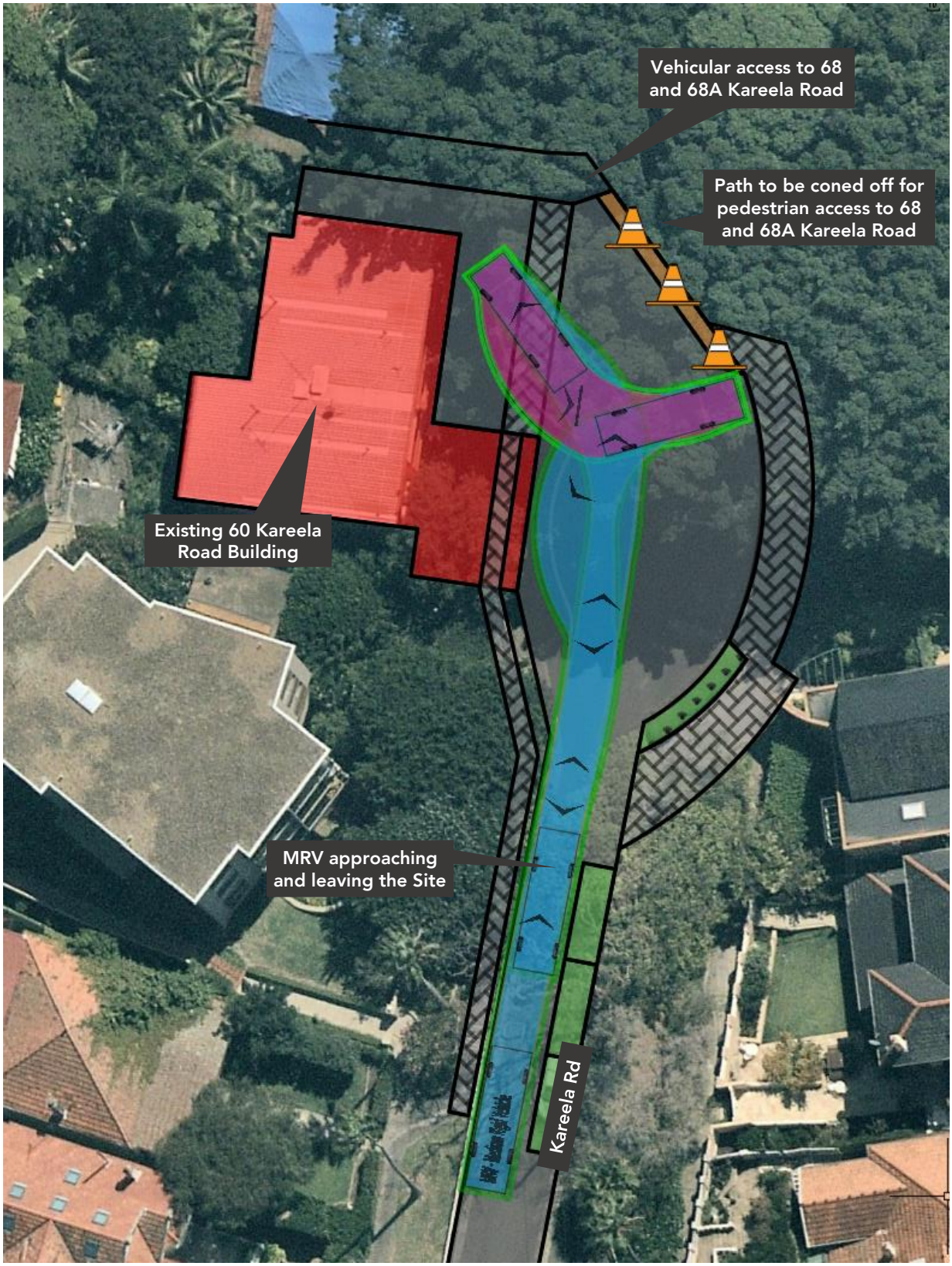


Figure 14 – MRV at 60 Kareela Rd

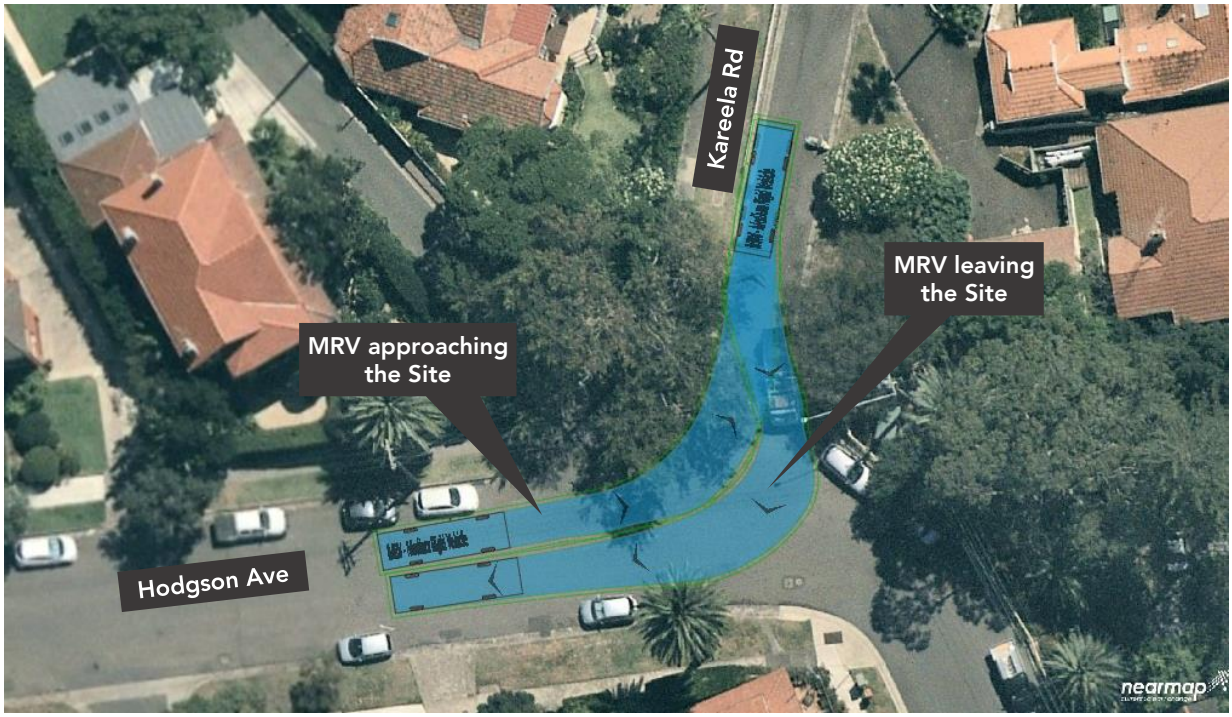


Figure 15 – MRV at Kareela Rd / Hodgson Ave Intersection

Figure 16 – MRV at Murdoch St / Milson Rd Intersection

Figure 17 – MRV at Banneman St / Murdoch St Intersection

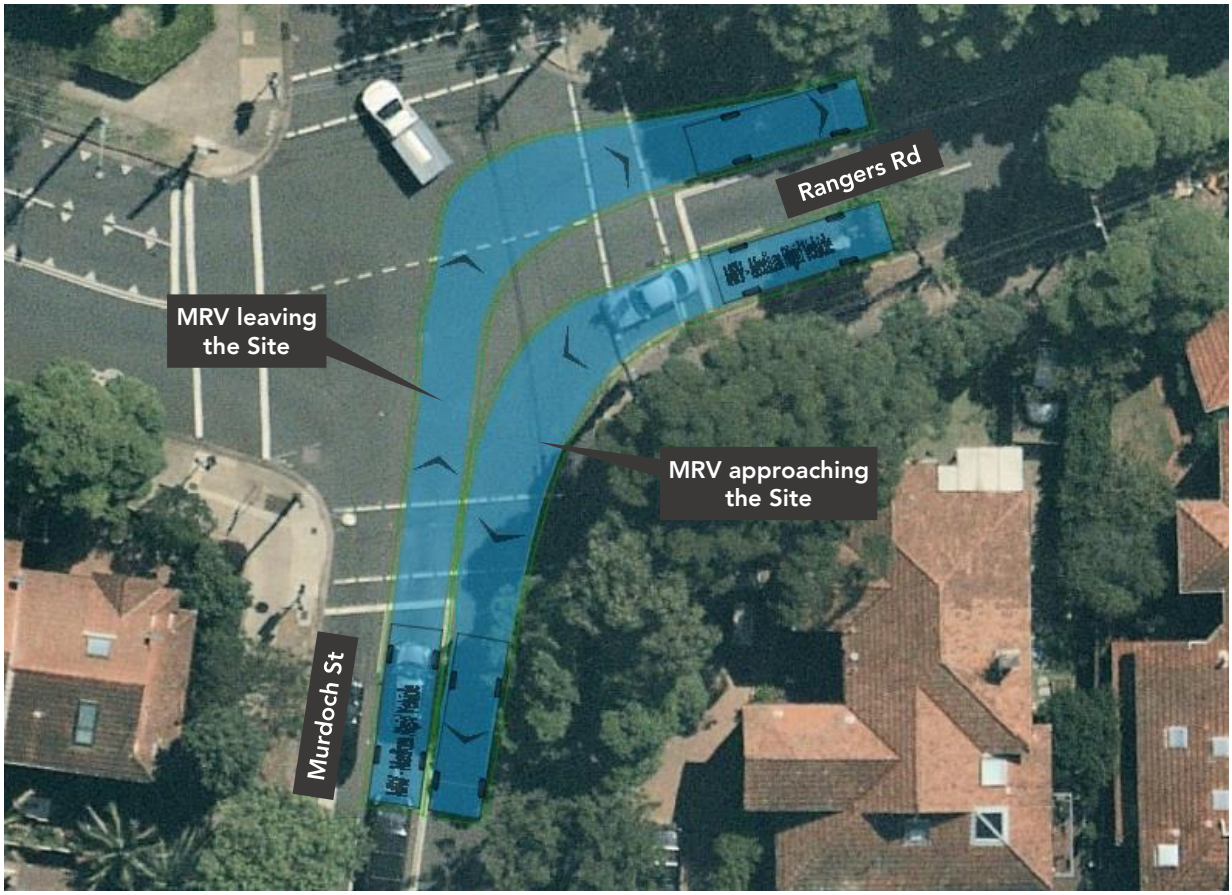


Figure 18 – MRV at Murdoch St / Rangers Rd Intersection

Figure 19 – MRV at Rangers Rd / Spofforth St Intersection

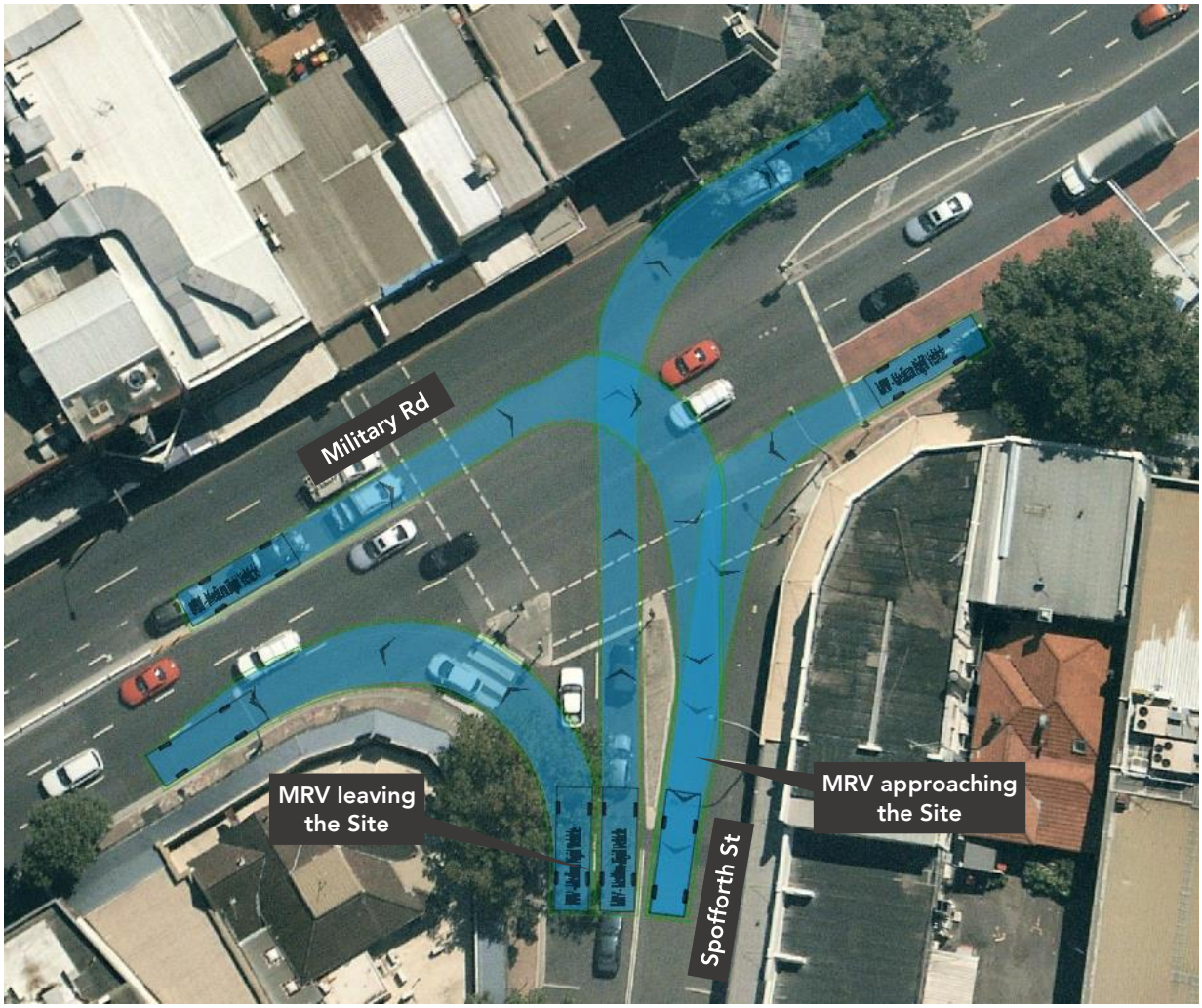


Figure 20 – MRV at Spofforth St / Military Rd Intersection

6.6 Works Zone

It is proposed to dedicate the parking and turning area at the end of Kareela Road as a Works Zone, as shown in Figure 21.

The temporary reduction of parking provision is considered to be acceptable, as sufficient vacant parking spaces are available in the vicinity of the site (refer to Section 4 for details on parking provision).

The Works Zone shall be restricted to times of demolition works, as specified in Section 6.1.

The signage and other management measures required to communicate and manage the Works Zone are discussed in Section 6.7.

Figure 21 – Proposed Works Zone

6.7 Traffic Control Measures

A Traffic Control Plan (TCP) outlines proposed traffic management to inform road users of the changed traffic conditions in the vicinity of the works site.

The TCPs as described in the following sections have been set out in accordance with the RMS Traffic Control at Works Site.

6.7.1 Driveways and Access Roads off Kareela Road

It is noted that there are 3 driveways / access roads to neighbouring properties coming off Kareela Road as shown in Figure 22, which need to remain accessible throughout the works.

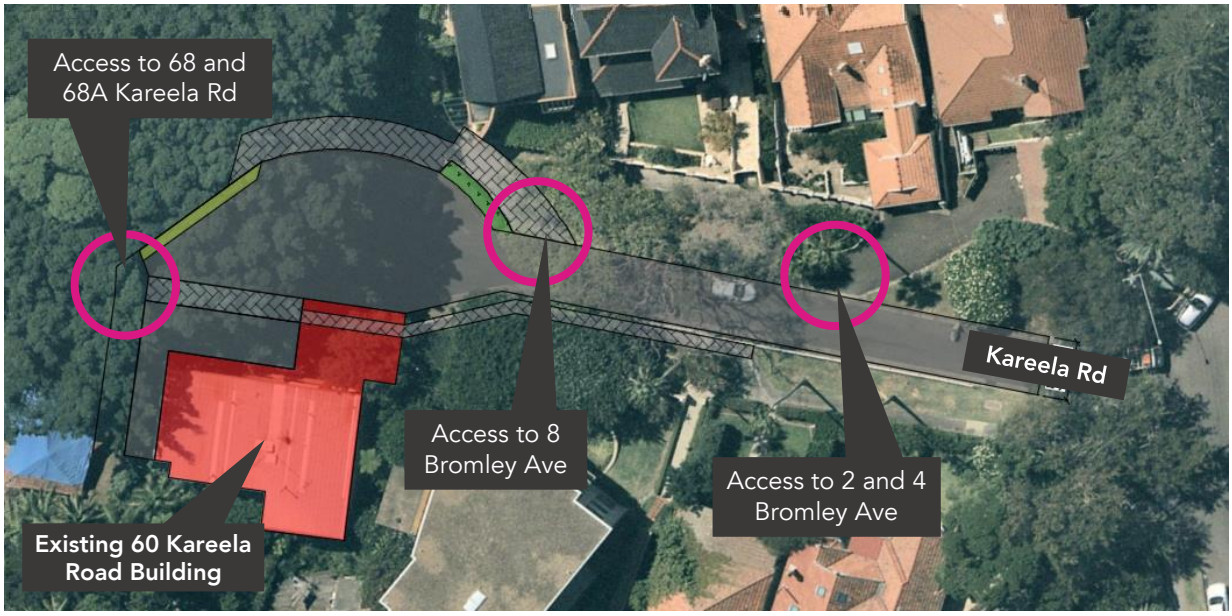


Figure 22 – Access Points off kareela Road

In particular, as mentioned in Section 6.5, demolition trucks need to take into account the accessibility to 68 and 68A Kareela Road as well as to the footpath going in the northbound direction. When parked in front of the site to load and unload, the demolition trucks need to allow for sufficient space for vehicular and pedestrian traffic to pass.

It should be noted that as per the existing arrangement, the driveway to 68 and 68A Kareela Road allows for a one-way vehicular traffic flow and it is shared with pedestrians. This arrangement is proposed to be maintained throughout the demolition works. The vehicular and pedestrian management at this driveway is described further in Section 6.7.5, Section 6.7.6 and Section 6.7.7.

6.7.2 Access to Kareela Road

Currently, Kareela Road is signposted as "NO Through Traffic" and it provides a turning area at the cul-de-sac end. The proposed Works Zone (refer to Section 6.6) would lead to a temporary reduction of this turning area while demolition works are being executed. For this reason, it is proposed to close off the road, but allow local access for residents of the adjoining properties.

It is proposed to restrict the access to Kareela Road only during hours of work as described in Section 6.1. To achieve this, the sign arrangement as shown in Figure 23 would need to be established each morning prior to commencement of work. Each evening, upon completion of work, the road work signage would need to be either covered or removed.

Figure 23 – Access to Kareela Road

6.7.3 Works Zone and Parking Controls

In order to minimise possible conflicts between the demolition trucks and light vehicles, it is recommended to impose "No Parking" controls along the western kerb of Kareela Road, between Hodgson Avenue and the cul-de-sac and a "Works Zone" within the cul-de-sac, during hours of work as determined in Section 6.1. As discussed in Section 4.3, the turning area accommodates a total of 7 parking spaces, and their temporary loss can be sufficiently accommodated in 300m walking distance from the site as shown in Section 4.2 and concluded in Section 4.3. Signage required to communicate changed parking controls and the Works Zone is shown in Figure 24.

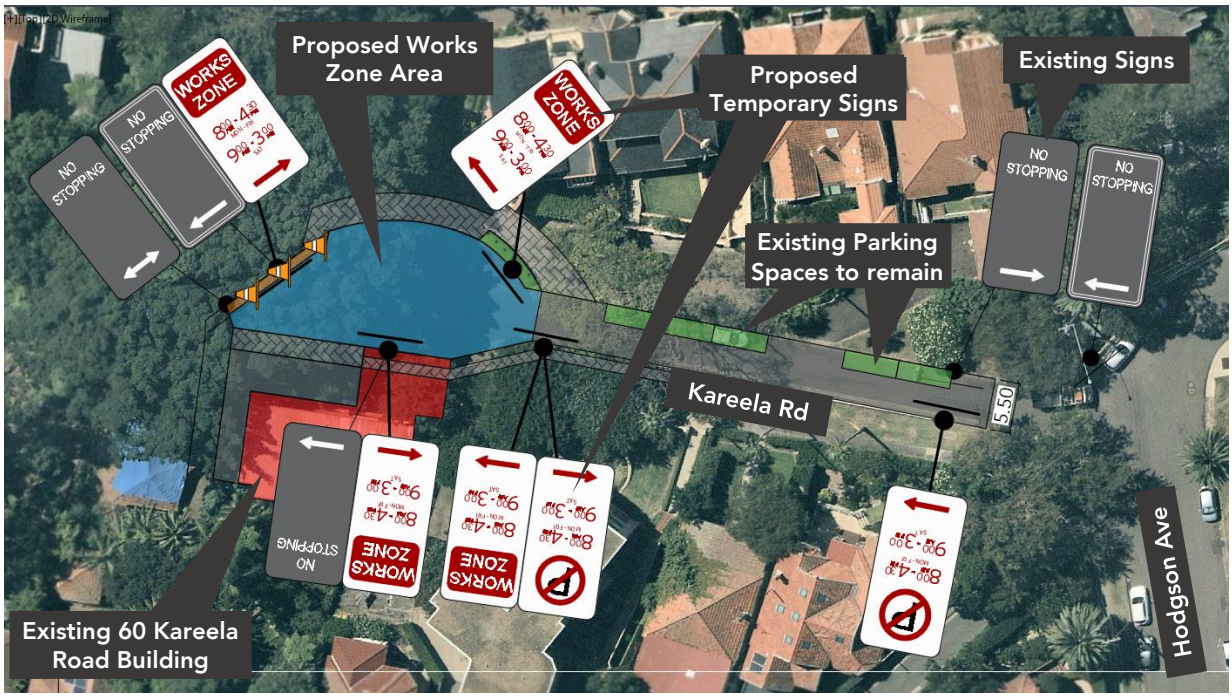


Figure 24 – Proposed Temporary Parking Controlls

6.7.4 Two-Way Traffic Flow

Currently, Kareela Road between Hodgson Avenue and the cul-de-sac has a two-way arrangement with only one lane width due to the unrestricted on-street parking along the eastern kerb. In order to maintain the 5 parking spaces within this section (shown in green in Figure 24), it is proposed to retain the existing traffic arrangement along Kareela Road. Although simultaneous two-way traffic is not possible, considering the overall low traffic volumes (refer to Section 5 and Attachment 1) and the expected small number of MRV truck movements per hour (refer to Section 6.3) it is considered adequate for the prospective trucks and light vehicles to wait for the other to pass, should such a situation occur. Nevertheless, this should be taken into consideration when planning deliveries, so as to minimise the possible occurrence of the described situation.

6.7.5 Traffic Controllers

It is proposed to have 2 traffic controllers overlooking the work zone area during demolition works. One traffic controller is to direct heavy vehicle movement in and out of the site and one to ensure no pedestrian enters the path of a heavy vehicle. When the Works Zone is approached by pedestrians or private vehicles, the traffic controller shall prompt demolition workers to interrupt their work in order to allow safe passage.

When taking into account the small size of the Works Zone area, the expectedly low pedestrian and vehicular traffic as well as the clear layout of the Works Zone, the above described arrangement is considered appropriate.

6.7.6 Vehicular Management at 68 Kareela Road

As discussed in Section 6.7.1, demolition vehicles need to allow for a light vehicle to access 48 and 48A Kareela Road. To minimise any conflicts, a traffic controller will oversee vehicular movements and will ensure that safe manoeuvrability can be achieved.

Figure 25 shows MRV and light vehicle swept paths, which demonstrates that when the demolition vehicle is parked in front of the site, the light vehicle is able to pass.

Figure 25 also shows a B99 vehicle undertaking a U-turn within the cul-de-sac in order to access parking spaces along Kareela Road.

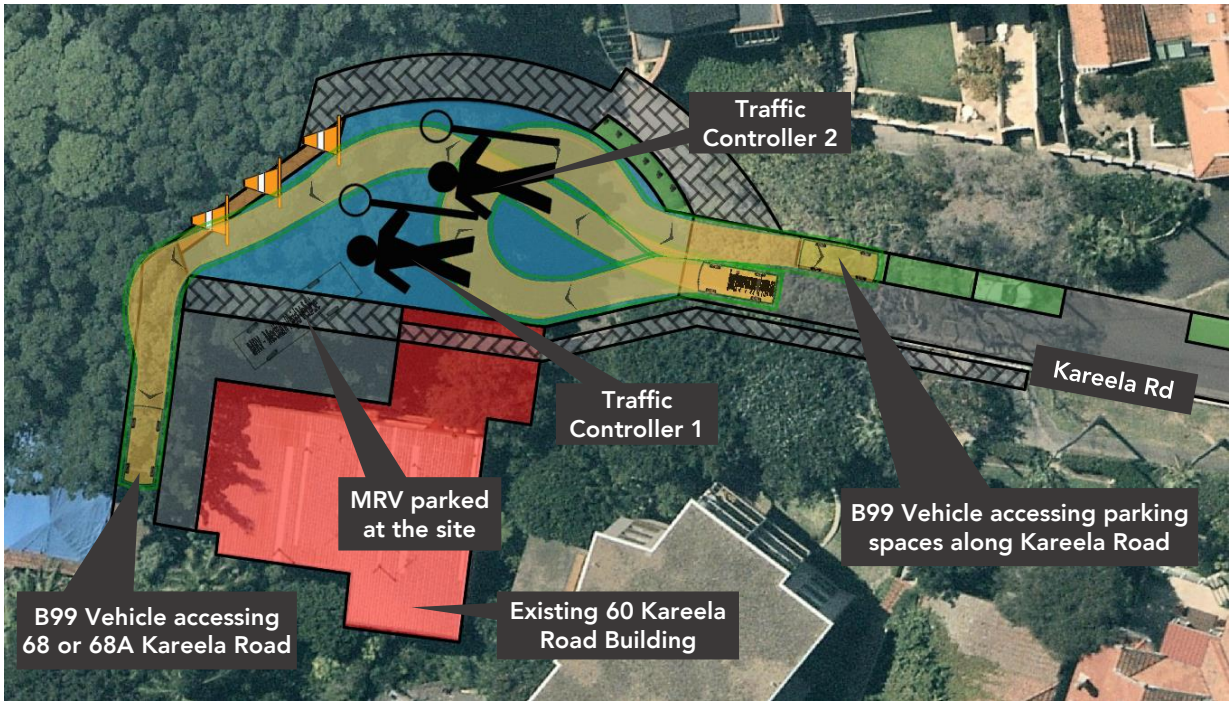


Figure 25 – Vehicular Management at 68 Kareela Road

6.7.7 Pedestrian Management

As discussed in Section 6.7.1, demolition vehicles need to allow for pedestrians to access 48 and 48A Kareela Road and the footpath leading north. To minimise any conflicts, a traffic controller will oversee vehicular and pedestrian movements and will ensure that safe passage can be achieved.

In addition, as the footpath in front of the site will be used by demolition vehicles to access 60 Kareela Road, an alternative pedestrian path has been determined. It is proposed to close off the footpath on the western side at the beginning of the Works Zone and guide the pedestrians across the road to use the existing footpath on the other side of the carriageway. As the footpath end before 68 Kareela Road can be reached, a path shall be coned off during demolition works. At any time, pedestrians and vehicular movements will be supervised by traffic controllers.

The alternative pedestrian path, together with required traffic management measures to communicate changes in footpath conditions are shown in Figure 26.

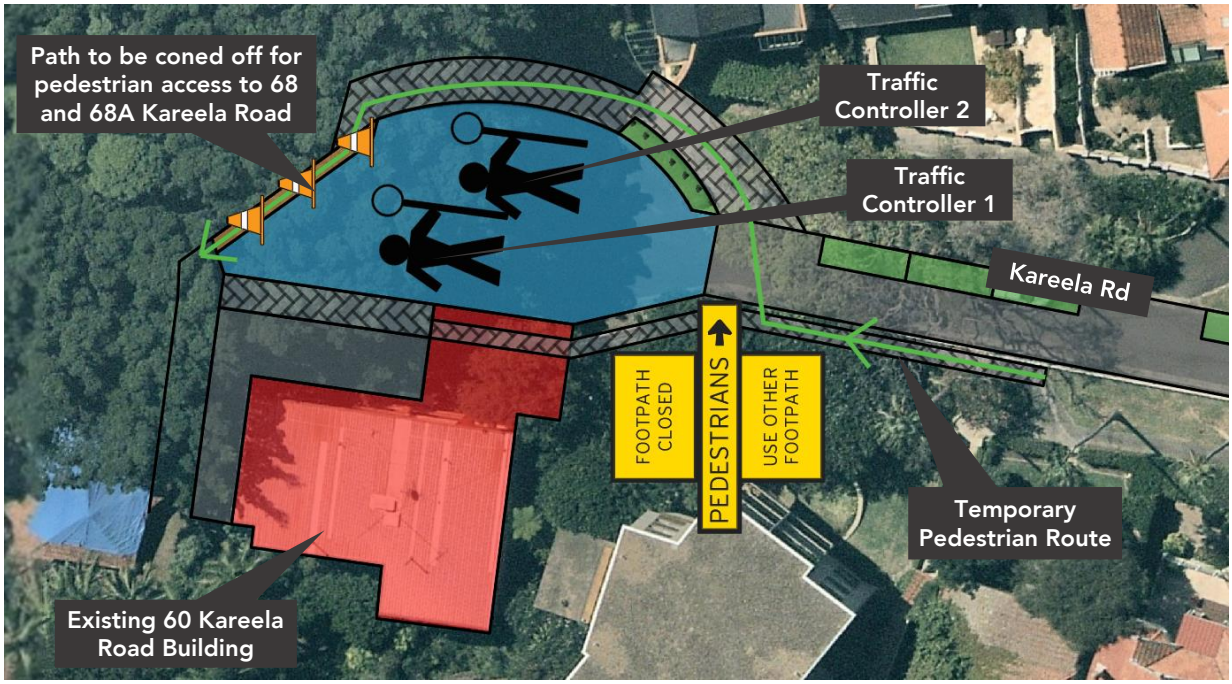


Figure 26 – Pedestrain Management

6.8 Staff Parking

No parking will be available on site for construction workers. However, as discussed and shown in Section 4.2, there is sufficient parking available in the vicinity of the site.

In addition to this, as shown in Section 3.3 there is a number of public transport options available, including a ferry, hence it is recommended to encourage staff and visitors to utilise these when commuting to and from work.

6.9 Emergency Vehicle Access

The proposed traffic control arrangements do not propose closure of any local roads. Any emergency vehicles requiring access to the project site will be able to do so via the existing site access along Kareela Road.

6.10 Access to Adjoining Properties

Access to all adjoining properties will be maintained throughout the works. In particular, the property located just north of the demolition side at 68A Kareela Road needs to be kept accessible at all times.

6.11 Communication with Adjoining Properties

Adjoining properties shall be informed approximately 2 weeks in advance of the planned works and the required changes to traffic and parking conditions, in order to make alternative arrangements, if required.

7. Summary

ptc. has been engaged by Public Works Advisory to prepare a Traffic Impact Assessment (TIA) for the proposed demolition of a 4 storey residential apartment building at 60 Kareela Road, Cremorne Point. This report will accompany the Statement of Environmental Effects (SEE), which assesses the potential impact of the proposed demolition on the traffic and parking in the local area. This assessment will be presented to North Sydney Council.

In regard to accessibility, the site is located within a residential area at the end of a local cul-de-sac road. Public transport options consist of a ferry wharf, which can be reached within 8 walking minutes from the site, and a number of bus stops, which are serviced by 2 bus routes. Pedestrian amenities are well developed considering the residential character of the area, with footpaths on at least one side or the roads and pram ramps at the majority of intersections.

Parking provision was analysed in approximately 300m walking distance of the site to ensure that potentially lost parking spaces can be sufficiently accommodated is the surroundings. In the course of the analysis, it has been determined that over the past 5 years on average approximately 52% of the total 348 parking spaces were occupied. On the day of the highest occupancy rate of 63.2%, 128 parking spaces were vacant. In addition to this, it has been assumed that 13 parking spaces will need to be relocated during the planned demolition works, which can be easily accommodated in the surrounding parking provision.

A traffic impact assessment has been conducted in order to analyse the vehicular impact of the proposed demolition works on the surrounding road network. Firstly, traffic count surveys were undertaken on 5 key intersections and the result of it were analysed with SIDRA. These results indicate that existing traffic conditions at all intersections are good, with a sufficiently high level of spare degree of saturation (0.453 and more). In regard to the proposed demolition works traffic generation, it has been assumed that only 2 trips per hour will be conducted by demolition trucks. This is considered to be a very low impact, which is assumed to fall under the typical daily traffic variations. Therefore, it is not anticipated that the demolition works would cause a notable impact upon the road network capacity or operation of the road network.

In regard to traffic management for the demolition works, based on a swept path analysis it has been determined that the largest vehicle that can enter and exit the Kareela Road cul-de-sac in forward direction is a Medium Ridged Vehicle. In addition, it has been shown that the surrounding road network can physically accommodate this size of vehicle while keeping to all road rules. Traffic controllers around the site are not required, as at no time 2 or more lanes will be required for truck turning manoeuvres. However, it is proposed to have 2 traffic controllers overlooking the proposed Works Zone in front of 60 Kareela Road, to coordinate vehicular and pedestrian movements.

A number of traffic control measures has been proposed to mitigate any possible conflicts between the demolition workers and residents, including appropriate signage at Kareela Road / Hodgson Avenue, parking controls along Kareela Road and pedestrian management.

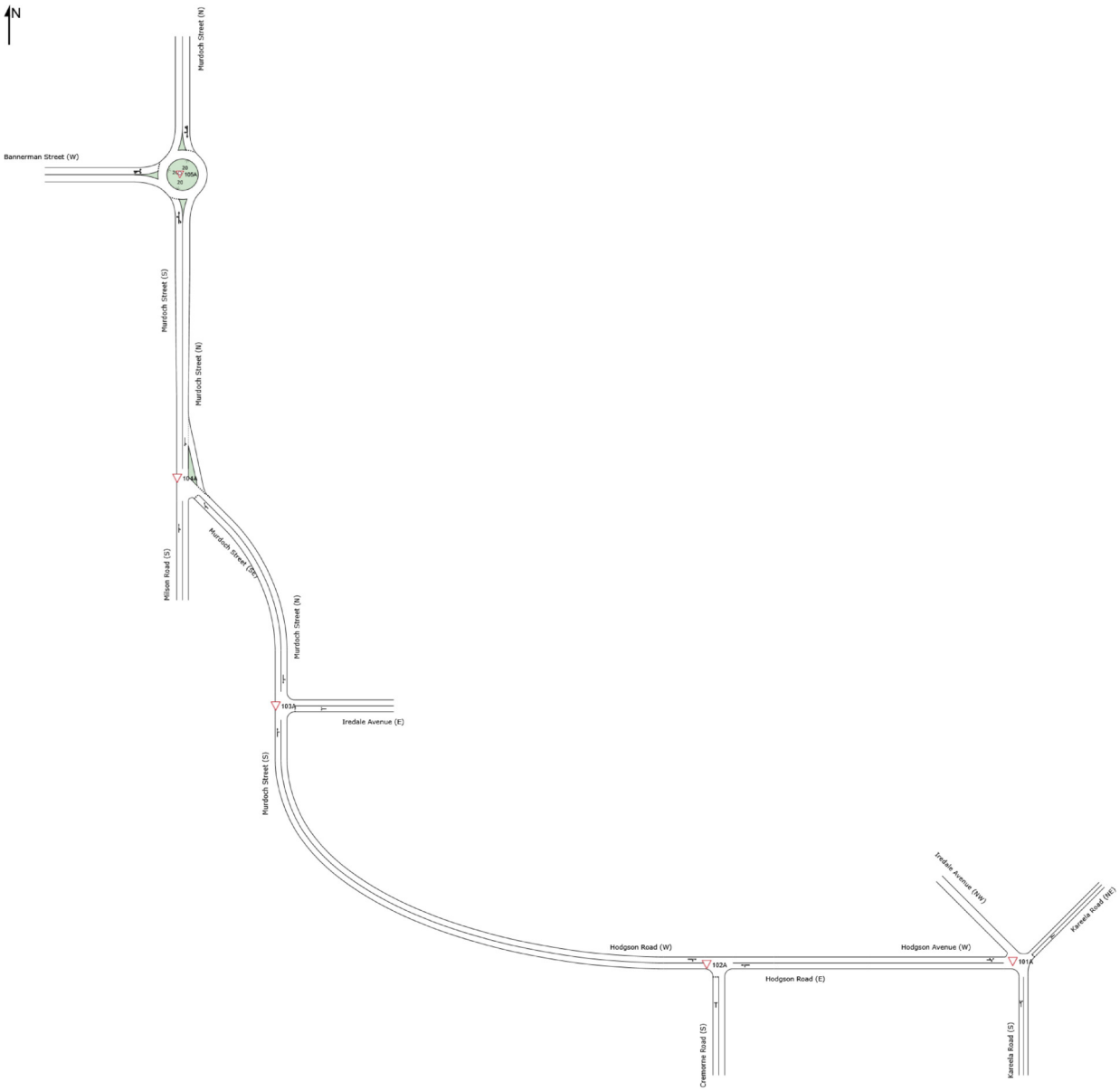
To conclude on the above, the proposal is considered acceptable from a parking and traffic context.

Attachment 1 SIDRA Calculations

NETWORK LAYOUT

Network: N101 [Existing AM Peak]

Existing AM Peak
Network Category: (None)



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
▽101A	NA	Existing AM - Kareela Road & Hodgson Avenue & Iredale
▽102A	NA	Existing AM - Hodgson Avenue & Cremorne Road
▽103A	NA	Existing AM - Murdoch Street & Iredale Avenue
▽104A	NA	Existing AM - Murdoch Street & Milson Road
▽105A	NA	Existing AM - Murdoch Street & Bannerman Street

MOVEMENT SUMMARY

Site: 101A [Existing AM - Kareela Road & Hodgson Avenue & Iredale]

Network: N101 [Existing AM Peak]

Existing AM Peak
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kareela Road (S)														
1	L2	17	0.0	17	0.0	0.013	5.5	LOS A	0.0	0.1	0.00	0.57	0.00	51.2
1a	L1	5	0.0	5	0.0	0.013	4.5	LOS A	0.0	0.1	0.00	0.57	0.00	49.3
3a	R1	1	0.0	1	0.0	0.013	5.2	LOS A	0.0	0.1	0.00	0.57	0.00	48.8
Approach		23	0.0	23	0.0	0.013	5.3	NA	0.0	0.1	0.00	0.57	0.00	50.6
NorthEast: Kareela Road (NE)														
24a	L1	1	100.0	1	100.0	0.008	5.0	LOS A	0.0	0.2	0.10	0.54	0.10	46.4
26a	R1	5	20.0	5	20.0	0.008	4.1	LOS A	0.0	0.2	0.10	0.54	0.10	31.2
26	R2	2	0.0	2	0.0	0.008	5.3	LOS A	0.0	0.2	0.10	0.54	0.10	19.0
Approach		8	25.0	8	25.0	0.008	4.6	LOS A	0.0	0.2	0.10	0.54	0.10	31.0
West: Hodgson Avenue (W)														
10b	L3	17	0.0	17	0.0	0.025	6.1	LOS A	0.1	0.8	0.04	0.58	0.04	19.6
10a	L1	3	66.7	3	66.7	0.025	4.5	LOS A	0.1	0.8	0.04	0.58	0.04	18.8
12	R2	18	5.9	18	5.9	0.025	5.2	LOS A	0.1	0.8	0.04	0.58	0.04	48.4
Approach		38	8.3	38	8.3	0.025	5.5	NA	0.1	0.8	0.04	0.58	0.04	35.7
All Vehicles		69	7.6	69	7.6	0.025	5.3	NA	0.1	0.8	0.03	0.57	0.03	40.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 102A [Existing AM - Hodgson Avenue & Cremorne Road]

Network: N101 [Existing AM Peak]

Existing AM Peak
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cremorne Road (S)														
1	L2	66	1.6	66	1.6	0.051	5.7	LOS A	0.2	1.5	0.13	0.55	0.13	50.2
3	R2	9	11.1	9	11.1	0.051	6.1	LOS A	0.2	1.5	0.13	0.55	0.13	50.2
Approach		76	2.8	76	2.8	0.051	5.8	LOS A	0.2	1.5	0.13	0.55	0.13	50.2
East: Hodgson Road (E)														
4	L2	4	0.0	4	0.0	0.029	5.1	LOS A	0.0	0.0	0.00	0.04	0.00	56.7
5	T1	53	0.0	53	0.0	0.029	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	56.1
Approach		57	0.0	57	0.0	0.029	0.4	NA	0.0	0.0	0.00	0.04	0.00	56.3
West: Hodgson Road (W)														
11	T1	32	6.7	32	6.7	0.048	0.1	LOS A	0.2	1.5	0.14	0.36	0.14	41.0
12	R2	53	0.0	53	0.0	0.048	5.6	LOS A	0.2	1.5	0.14	0.36	0.14	51.5
Approach		84	2.5	84	2.5	0.048	3.6	NA	0.2	1.5	0.14	0.36	0.14	50.0
All Vehicles		217	1.9	217	1.9	0.051	3.5	NA	0.2	1.5	0.10	0.34	0.10	50.5

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.

MOVEMENT SUMMARY

Site: 103A [Existing AM - Murdoch Street & Iredale Avenue]

Network: N101 [Existing AM Peak]

Existing AM Peak
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Murdoch Street (S)														
2	T1	123	0.9	123	0.9	0.064	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.6
3	R2	1	0.0	1	0.0	0.064	5.7	LOS A	0.0	0.0	0.00	0.01	0.00	52.1
Approach		124	0.8	124	0.8	0.064	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.4
East: Iredale Avenue (E)														
4	L2	1	0.0	1	0.0	0.007	5.8	LOS A	0.0	0.1	0.23	0.57	0.23	33.8
6	R2	6	0.0	6	0.0	0.007	6.2	LOS A	0.0	0.1	0.23	0.57	0.23	33.8
Approach		7	0.0	7	0.0	0.007	6.1	LOS A	0.0	0.1	0.23	0.57	0.23	33.8
North: Murdoch Street (N)														
7	L2	13	0.0	13	0.0	0.051	2.9	LOS A	0.0	0.0	0.00	0.07	0.00	49.3
8	T1	84	3.8	84	3.8	0.051	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	50.8
Approach		97	3.3	97	3.3	0.051	0.4	NA	0.0	0.0	0.00	0.07	0.00	50.2
All Vehicles		228	1.8	228	1.8	0.064	0.4	NA	0.0	0.1	0.01	0.05	0.01	55.5

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.

MOVEMENT SUMMARY

Site: 104A [Existing AM - Murdoch Street & Milson Road]

Network: N101 [Existing AM Peak]

Existing AM Peak
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Milson Road (S)														
2	T1	174	3.0	174	3.0	0.093	0.0	LOS A	0.0	0.2	0.01	0.01	0.01	59.7
3b	R3	3	0.0	3	0.0	0.093	6.3	LOS A	0.0	0.2	0.01	0.01	0.01	59.7
Approach		177	3.0	177	3.0	0.093	0.1	NA	0.0	0.2	0.01	0.01	0.01	59.7
SouthEast: Murdoch Street (SE)														
21b	L3	3	0.0	3	0.0	0.146	4.1	LOS A	0.5	3.6	0.36	0.59	0.36	52.0
23a	R1	137	1.5	137	1.5	0.146	3.7	LOS A	0.5	3.6	0.36	0.59	0.36	21.8
Approach		140	1.5	140	1.5	0.146	3.7	LOS A	0.5	3.6	0.36	0.59	0.36	25.7
North: Murdoch Street (N)														
7a	L1	93	5.7	93	5.7	0.112	5.4	LOS A	0.4	3.2	0.02	0.28	0.02	44.1
8	T1	100	2.1	100	2.1	0.112	0.0	LOS A	0.4	3.2	0.02	0.28	0.02	56.1
Approach		193	3.8	193	3.8	0.112	2.6	NA	0.4	3.2	0.02	0.28	0.02	53.9
All Vehicles		509	2.9	509	2.9	0.146	2.0	NA	0.5	3.6	0.11	0.27	0.11	54.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
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: 105A [Existing AM - Murdoch Street & Bannerman Street]

Network: N101 [Existing AM Peak]

Existing AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Murdoch Street (S)														
1	L2	118	0.9	118	0.9	0.417	9.0	LOS A	2.9	20.9	0.80	0.84	0.83	43.3
2	T1	208	2.0	208	2.0	0.417	9.3	LOS A	2.9	20.9	0.80	0.84	0.83	41.3
3u	U	1	0.0	1	0.0	0.417	15.9	LOS B	2.9	20.9	0.80	0.84	0.83	28.3
Approach		327	1.6	327	1.6	0.417	9.2	LOS A	2.9	20.9	0.80	0.84	0.83	42.1
North: Murdoch Street (N)														
8	T1	140	4.5	140	4.5	0.547	4.6	LOS A	5.3	37.8	0.32	0.57	0.32	35.7
9	R2	672	0.8	672	0.8	0.547	9.1	LOS A	5.3	37.8	0.32	0.57	0.32	47.0
9u	U	11	0.0	11	0.0	0.547	11.2	LOS A	5.3	37.8	0.32	0.57	0.32	46.1
Approach		822	1.4	822	1.4	0.547	8.4	LOS A	5.3	37.8	0.32	0.57	0.32	45.8
West: Bannerman Street (W)														
10	L2	356	7.4	356	7.4	0.369	5.4	LOS A	2.7	19.8	0.54	0.60	0.54	47.0
12	R2	49	6.4	49	6.4	0.369	10.2	LOS A	2.7	19.8	0.54	0.60	0.54	44.4
12u	U	3	0.0	3	0.0	0.369	12.1	LOS A	2.7	19.8	0.54	0.60	0.54	53.2
Approach		408	7.2	408	7.2	0.369	6.0	LOS A	2.7	19.8	0.54	0.60	0.54	46.9
All Vehicles		1558	3.0	1558	3.0	0.547	7.9	LOS A	5.3	37.8	0.48	0.63	0.48	45.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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: 101A [Existing PM - Kareela Road & Hodgson Avenue & Iredale] Network: N101 [Existing PM Peak]

Existing AM Peak
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kareela Road (S)														
1	L2	21	0.0	21	0.0	0.014	5.5	LOS A	0.0	0.1	0.00	0.57	0.00	51.1
1a	L1	3	0.0	3	0.0	0.014	4.5	LOS A	0.0	0.1	0.00	0.57	0.00	49.2
3a	R1	1	0.0	1	0.0	0.014	5.2	LOS A	0.0	0.1	0.00	0.57	0.00	48.7
Approach		25	0.0	25	0.0	0.014	5.4	NA	0.0	0.1	0.00	0.57	0.00	50.7
NorthEast: Kareela Road (NE)														
24a	L1	1	0.0	1	0.0	0.003	5.1	LOS A	0.0	0.1	0.07	0.56	0.07	49.5
26a	R1	1	0.0	1	0.0	0.003	4.1	LOS A	0.0	0.1	0.07	0.56	0.07	30.6
26	R2	1	0.0	1	0.0	0.003	5.2	LOS A	0.0	0.1	0.07	0.56	0.07	13.5
Approach		3	0.0	3	0.0	0.003	4.8	LOS A	0.0	0.1	0.07	0.56	0.07	31.7
West: Hodgson Avenue (W)														
10b	L3	7	0.0	7	0.0	0.021	6.1	LOS A	0.1	0.6	0.03	0.59	0.03	19.5
10a	L1	4	0.0	4	0.0	0.021	4.6	LOS A	0.1	0.6	0.03	0.59	0.03	19.8
12	R2	22	4.8	22	4.8	0.021	5.2	LOS A	0.1	0.6	0.03	0.59	0.03	48.8
Approach		34	3.1	34	3.1	0.021	5.3	NA	0.1	0.6	0.03	0.59	0.03	41.0
All Vehicles		62	1.7	62	1.7	0.021	5.3	NA	0.1	0.6	0.02	0.58	0.02	44.5

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.

MOVEMENT SUMMARY

Site: 102A [Existing PM - Hodgson Avenue & Cremorne Road]

Network: N101 [Existing PM Peak]

Existing AM Peak
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cremorne Road (S)														
1	L2	45	2.3	45	2.3	0.033	5.7	LOS A	0.1	0.9	0.09	0.55	0.09	50.4
3	R2	4	0.0	4	0.0	0.033	6.0	LOS A	0.1	0.9	0.09	0.55	0.09	50.4
Approach		49	2.1	49	2.1	0.033	5.7	LOS A	0.1	0.9	0.09	0.55	0.09	50.4
East: Hodgson Road (E)														
4	L2	4	0.0	4	0.0	0.020	5.1	LOS A	0.0	0.0	0.00	0.07	0.00	56.4
5	T1	34	0.0	34	0.0	0.020	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	54.3
Approach		38	0.0	38	0.0	0.020	0.6	NA	0.0	0.0	0.00	0.07	0.00	55.2
West: Hodgson Road (W)														
11	T1	48	2.2	48	2.2	0.069	0.1	LOS A	0.3	2.2	0.11	0.35	0.11	41.9
12	R2	76	0.0	76	0.0	0.069	5.6	LOS A	0.3	2.2	0.11	0.35	0.11	51.8
Approach		124	0.8	124	0.8	0.069	3.4	NA	0.3	2.2	0.11	0.35	0.11	50.3
All Vehicles		212	1.0	212	1.0	0.069	3.4	NA	0.3	2.2	0.09	0.35	0.09	50.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
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: 103A [Existing PM - Murdoch Street & Iredale Avenue]

Network: N101 [Existing PM Peak]

Existing AM Peak
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Murdoch Street (S)														
2	T1	80	2.6	80	2.6	0.043	0.0	LOS A	0.0	0.1	0.02	0.02	0.02	58.6
3	R2	2	0.0	2	0.0	0.043	5.9	LOS A	0.0	0.1	0.02	0.02	0.02	51.7
Approach		82	2.6	82	2.6	0.043	0.2	NA	0.0	0.1	0.02	0.02	0.02	58.2
East: Iredale Avenue (E)														
4	L2	1	0.0	1	0.0	0.005	5.9	LOS A	0.0	0.1	0.25	0.56	0.25	33.7
6	R2	4	0.0	4	0.0	0.005	6.2	LOS A	0.0	0.1	0.25	0.56	0.25	33.7
Approach		5	0.0	5	0.0	0.005	6.1	LOS A	0.0	0.1	0.25	0.56	0.25	33.7
North: Murdoch Street (N)														
7	L2	24	0.0	24	0.0	0.079	2.9	LOS A	0.0	0.0	0.00	0.09	0.00	49.0
8	T1	128	0.8	128	0.8	0.079	0.0	LOS A	0.0	0.0	0.00	0.09	0.00	49.4
Approach		153	0.7	153	0.7	0.079	0.5	NA	0.0	0.0	0.00	0.09	0.00	49.2
All Vehicles		240	1.3	240	1.3	0.079	0.5	NA	0.0	0.1	0.01	0.07	0.01	53.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 104A [Existing PM - Murdoch Street & Milson Road]

Network: N101 [Existing PM Peak]

Existing AM Peak
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Milson Road (S)														
2	T1	115	4.6	115	4.6	0.064	0.0	LOS A	0.0	0.2	0.02	0.02	0.02	59.4
3b	R3	4	0.0	4	0.0	0.064	6.5	LOS A	0.0	0.2	0.02	0.02	0.02	59.4
Approach		119	4.4	119	4.4	0.064	0.3	NA	0.0	0.2	0.02	0.02	0.02	59.4
SouthEast: Murdoch Street (SE)														
21b	L3	3	0.0	3	0.0	0.089	4.3	LOS A	0.3	2.1	0.36	0.59	0.36	52.0
23a	R1	81	1.3	81	1.3	0.089	3.7	LOS A	0.3	2.1	0.36	0.59	0.36	21.8
Approach		84	1.3	84	1.3	0.089	3.7	LOS A	0.3	2.1	0.36	0.59	0.36	27.8
North: Murdoch Street (N)														
7a	L1	132	3.2	132	3.2	0.165	5.4	LOS A	0.7	4.8	0.03	0.26	0.03	44.7
8	T1	159	0.0	159	0.0	0.165	0.0	LOS A	0.7	4.8	0.03	0.26	0.03	56.3
Approach		291	1.4	291	1.4	0.165	2.4	NA	0.7	4.8	0.03	0.26	0.03	54.3
All Vehicles		494	2.1	494	2.1	0.165	2.1	NA	0.7	4.8	0.08	0.26	0.08	54.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
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: 105A [Existing PM - Murdoch Street & Bannerman Street]

Network: N101 [Existing PM Peak]

Existing AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Murdoch Street (S)														
1	L2	54	0.0	54	0.0	0.205	6.2	LOS A	1.2	8.6	0.58	0.63	0.58	45.9
2	T1	143	4.4	143	4.4	0.205	6.5	LOS A	1.2	8.6	0.58	0.63	0.58	44.1
3u	U	1	0.0	1	0.0	0.205	13.1	LOS A	1.2	8.6	0.58	0.63	0.58	32.0
Approach		198	3.2	198	3.2	0.205	6.4	LOS A	1.2	8.6	0.58	0.63	0.58	44.7
North: Murdoch Street (N)														
8	T1	208	2.0	208	2.0	0.449	4.7	LOS A	3.6	26.0	0.37	0.57	0.37	36.4
9	R2	406	2.6	406	2.6	0.449	9.4	LOS A	3.6	26.0	0.37	0.57	0.37	47.2
9u	U	8	0.0	8	0.0	0.449	11.4	LOS A	3.6	26.0	0.37	0.57	0.37	46.9
Approach		623	2.4	623	2.4	0.449	7.8	LOS A	3.6	26.0	0.37	0.57	0.37	44.8
West: Bannerman Street (W)														
10	L2	563	0.2	563	0.2	0.507	5.0	LOS A	4.3	30.1	0.51	0.56	0.51	48.0
12	R2	88	0.0	88	0.0	0.507	9.8	LOS A	4.3	30.1	0.51	0.56	0.51	44.6
12u	U	3	0.0	3	0.0	0.507	11.9	LOS A	4.3	30.1	0.51	0.56	0.51	53.4
Approach		655	0.2	655	0.2	0.507	5.7	LOS A	4.3	30.1	0.51	0.56	0.51	47.7
All Vehicles		1476	1.5	1476	1.5	0.507	6.7	LOS A	4.3	30.1	0.46	0.57	0.46	46.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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.