



# Regiment Mixed Use Redevelopment Project University of Sydney, Darlington Campus Construction Traffic Management Plan

|                     |                                       |
|---------------------|---------------------------------------|
| <b>Client //</b>    | Richard Crookes Constructions Pty Ltd |
| <b>Office //</b>    | NSW                                   |
| <b>Reference //</b> | N122710                               |
| <b>Date //</b>      | 17/05/17                              |

# Regiment Mixed Use Redevelopment Project

## University of Sydney, Darlington Campus

### Construction Traffic Management Plan

Issue: A 17/05/17

Client: Richard Crookes Constructions Pty Ltd

Reference: N122710

GTA Consultants Office: NSW

#### Quality Record

| Issue | Date     | Description | Prepared By | Checked By   | Approved By  | Signed      |
|-------|----------|-------------|-------------|--------------|--------------|-------------|
| A     | 17/05/17 | Final       | Anna Scott  | Tim De Young | Tim De Young | T. De Young |



**GTA**consultants

Melbourne | Sydney | Brisbane  
Canberra | Adelaide | Perth  
Gold Coast | Townsville

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# 1. Introduction

## 1.1 Background

Planning approval is being sought for a proposed mixed-use development (SSD\_741) to be located on Darlington Road, as part of the Darlington Campus of the University of Sydney. The development intends to replace the existing Regiment and Darlington Centre with student accommodation and educational facilities.

In February 2017, GTA prepared a Traffic Impact Assessment Report to detail the transport impacts of the proposed development. The report focused principally on the suitability of the proposed car parking provision and pedestrian / cycling connectivity and infrastructure proposed as part of the development, with commentary only on traffic related implications of the proposed construction works.

In response to authority comments provided in relation to the proposed development, GTA was reengaged by Richard Crookes Constructions Pty Ltd, on behalf of the University of Sydney, in May 2017 to prepare this Construction Traffic Management Plan (CTMP).

## 1.2 Purpose of this Report

This report has been prepared to respond to the authority request for further information relating to construct traffic management impacts of the proposed development.

Specifically, the report respond to the authority requests as detailed in Table 1.1 (which provides a reference to the relevant sections of this report). In this regard, however, it is emphasised that this report is not expected to be the final CTMP prepared for the proposed development. Rather, it is expected that this report will form the basis of a CTMP, prepared as a condition of Consent, which will contain further detail once the construction programme is better known.

**Table 1.1: Summary of Requests and Responses**

| Request Item                                                                                                                                                    | GTA Response Location |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <b>Construction Traffic Management:</b> Assessment of construction traffic impacts be undertaken, to include, but not be limited to, the following information: |                       |
| a) an approximate number of daily construction traffic vehicle movements to and from the proposed development site;                                             | Section 5             |
| b) consideration of additional construction traffic vehicles on the surrounding road network from other construction activities in proximity to the site;       | Section 5             |
| c) plans showing the proposed construction vehicle transit routes to and from the site, including the location(s) of site access and egress;                    | Section 4             |
| d) an assessment on the Level of Service of surrounding intersections as a result of construction-generated traffic;                                            | Section 2 and 5       |
| e) an assessment of impacts on public transport operations, particularly along City Road;                                                                       | Section 6             |
| f) an assessment of impacts on traffic flows along surrounding residential streets;                                                                             | Section 2 and 5       |
| g) any traffic management measures that may be required during construction, including pedestrian and cycleway diversions; and                                  | Section 5             |
| h) identification of locations for construction worker car parking (if there is insufficient on site car parking).                                              | Section 6             |

## 2. Existing Conditions

### 2.1 Site Context

The subject site is located at City Road, Darlington, on the corner of City Road and Darlington Road, within the University of Sydney's Darlington Campus.

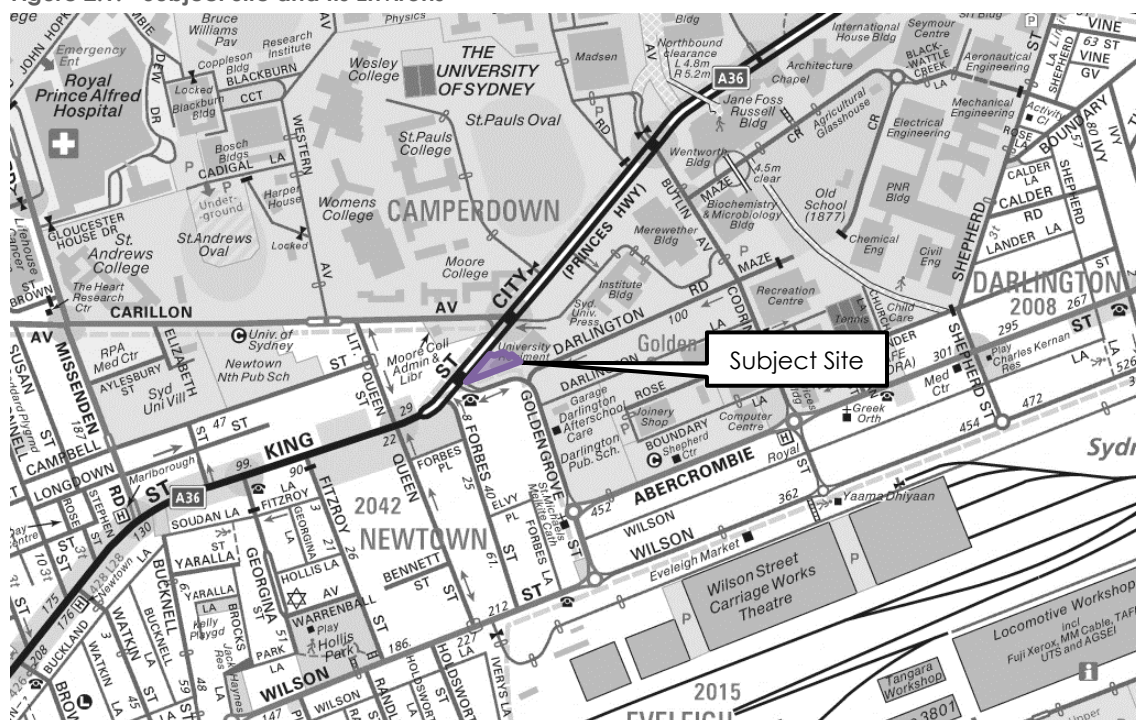
The site of approximately 5,000sqm has frontages of 100m to City Road and 140m to Darlington Road, and a Local Environmental Plan (LEP) 2012 land use classification of SP2 Infrastructure (Educational Establishment).

It has been communicated that the current use of the Regiment building is educational and office accommodation. The site also hosts a number of maintenance contractors that use the building for site office accommodation. It is further noted that a site inspection indicated that the land houses a number of maintenance and small service vehicles which would create a negligible number of traffic movements at present.

The site is surrounded by a mix of property uses including mixed and commercial uses (B2 and B4), residential (R1) and public recreation uses, as well as the University of Sydney to the north.

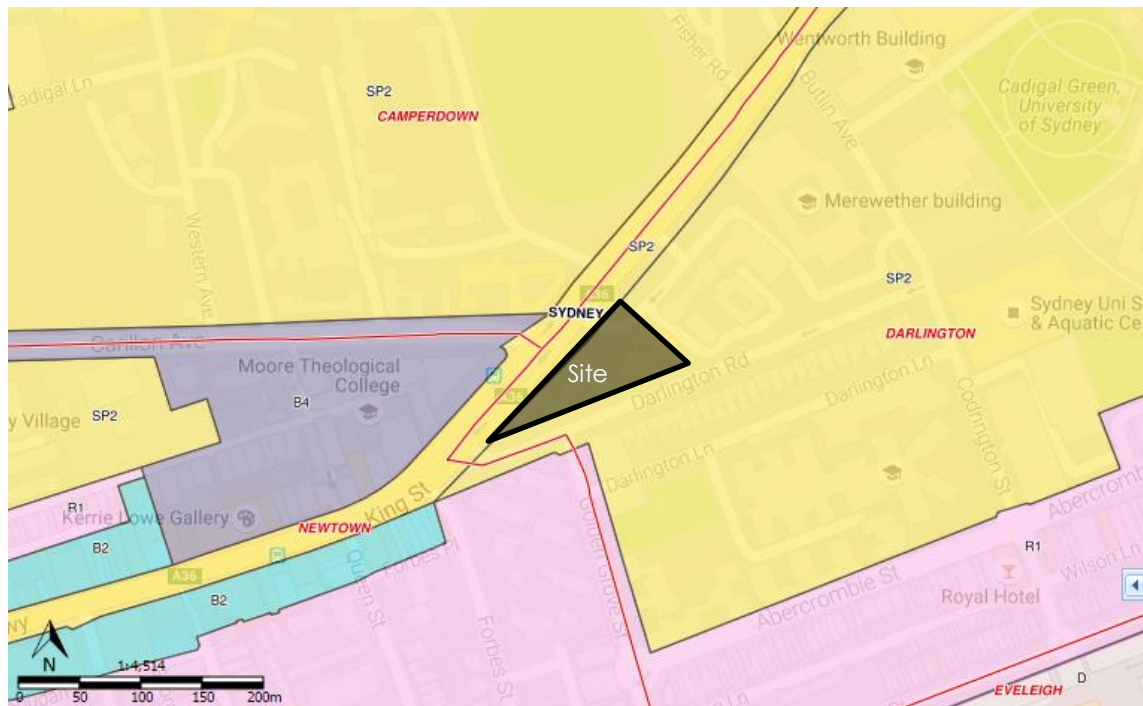
The location of the site and its surrounding environs is shown in Figure 2.1, with the local land zoning map shown in Figure 2.2.

**Figure 2.1: Subject Site and Its Environs**



(Reproduced with permission from Sydway Publishing Pty Ltd)

**Figure 2.2: Land Zoning Map**



Source: [https://www.planningportal.nsw.gov.au/find-a-property/property/3501734\\_96-148\\_City\\_Road\\_1\\_Darlington\\_DP790620](https://www.planningportal.nsw.gov.au/find-a-property/property/3501734_96-148_City_Road_1_Darlington_DP790620), accessed 15 November 2016

## 2.1 Road Network

### 2.1.1 Adjoining Roads

#### City Road/King Street

City Road is classified as a state road in the Roads and Maritime Schedule of Classified Roads.

In the vicinity of the site, City Road is aligned in a north-east to south-west direction and is configured with three lanes in each direction and one additional southbound right hand turning bay into Carillon Avenue. City Road has a speed limit of 60km/hr and is estimated to carry approximately 15,000 vehicles per day in each direction<sup>1</sup>.

Kerbside parking is permitted outside of clearway times, between 6am-10am (northbound) and 3pm-7pm (southbound), subject to four-hour time restrictions.

City Road is shown in Figure 2.3.

#### Darlington Road

Darlington road functions as a local road and is a one-way westbound road connecting surrounding local streets through to City road.

Kerbside parking is permitted on the eastern side of the road, subject to a two-hour time restriction. Perpendicular parking spaces are marked on the western side of the road, subject to paid four-hour time restriction.

Darlington Road is shown in Figure 2.4.

<sup>1</sup> Based on surveys outlined later in this report and assuming a peak hour to daily ratio of 1:12.5.

Figure 2.3: City Road, Looking South



Figure 2.4: Darlington Road, Looking West



### 2.1.2 Surrounding Intersections

The key intersections in the vicinity of the site:

- City Road/Carillon Avenue (signalised)
- City Road/Butlin Avenue (signalised)
- City Road/Darlington Road (unsignalised)

### 2.1.3 Traffic Volumes

#### City Road/Carillon Road Intersection

GTA Consultants commissioned a traffic and pedestrian movement survey at the intersection of City Road and Carillon Avenue on Tuesday 29 November 2016 between 7am-9am and 4pm-6pm.

The AM and PM vehicle movement summaries are shown below in Figure 2.5 and Figure 2.6.

Figure 2.5: AM Peak Hour Traffic Volumes

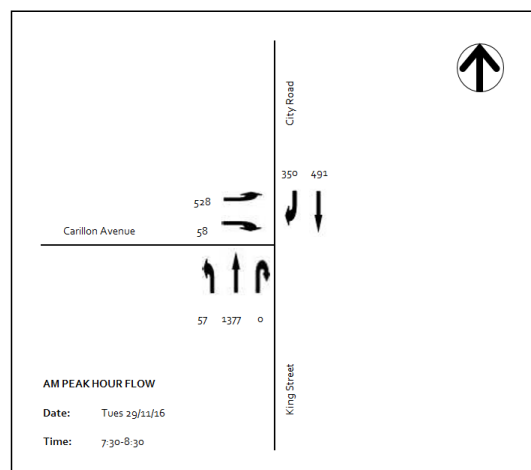
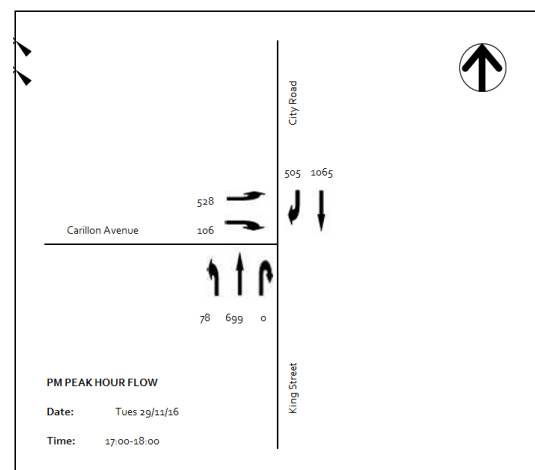


Figure 2.6: PM Peak Hour Traffic Volumes



#### City Road/Butlin Avenue Intersection

GTA has also sourced traffic volumes for the City Road/Butlin Avenue intersection to the northeast of the site from the report prepared by our office for the approved "F23 Administrative Building". These volumes are not produced in this report but can be provided upon request.

## 2.1.4 Intersection Performance

### Signalised Intersections

The operation of the City Road intersections with Carillon Avenue and Butlin Avenue has been assessed using SIDRA INTERSECTION<sup>2</sup>, a computer based modelling package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by RMS, is vehicle delay, which in turn allows a measure of the overall level of service of the intersection. For reference, Table 2.1 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

**Table 2.1: SIDRA INTERSECTION Level of Service Criteria**

| Level of Service (LOS) | Average Delay per vehicle (secs/veh) | Traffic Signals, Roundabout                                   | Give Way & Stop Sign                      |
|------------------------|--------------------------------------|---------------------------------------------------------------|-------------------------------------------|
| A                      | Less than 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                             | Near capacity                                                 | Near capacity, accident study required    |
| E                      | 57 to 70                             | At capacity, at signals incidents will cause excessive delays | At capacity, requires other control mode  |
| F                      | Greater than 70                      | Extra capacity required                                       | Extreme delay, major treatment required   |

Table 2.2 presents a summary of the existing operation of the abovementioned intersections, with full results available on request.<sup>3</sup>

**Table 2.2: Existing Operating Conditions of Key Intersections (Indicative)**

| Intersection                           | Peak | Average Delay | 95th Percentile Queue | Level of Service (LOS) |
|----------------------------------------|------|---------------|-----------------------|------------------------|
| Carillon Avenue / City Road            | AM   | 28 sec        | 255 m                 | C                      |
|                                        | PM   | 22 sec        | 171 m                 | C                      |
| Butlin Avenue / City Road <sup>4</sup> | AM   | 6 sec         | 58 m                  | A                      |
|                                        | PM   | 8 sec         | 65 m                  | A                      |

Table 2.2 indicates that the key intersections in the vicinity of the site currently operate with a LOS of C or better, with the City Road / Butlin Avenue intersection in particular operating with minor delays and queuing and a LOS of A. Based on the criteria detailed above, this analysis indicates that the signalised intersections are operating "satisfactorily" and are not yet approaching their capacity (LOS of E or worse). This is consistent with GTA observations of the intersections.

### Unsignalised Intersections

Observations undertaken by GTA during site inspections indicate that the City Road / Darlington Road intersection currently operates satisfactorily, with all legs of the intersection operating without unacceptable delays or queuing.

<sup>2</sup> Program used under license from Akcelik & Associates Pty Ltd.

<sup>3</sup> The results are presented as indicative outputs for the purposes of comparison only. GTA has not sought to fully calibrate the existing conditions of these intersections for the purposes of this Construction Traffic Management Plan.

<sup>4</sup> Results sourced from "F23 Administrative Building, The University of Sydney Camperdown Campus, Transport Impact Assessment" report, prepared in April 2016. The road alignment and traffic volumes modelled in preparation of this report are considered suitable to provide an approximation of the performance of the intersection.

## 2.2 Car Parking

As outlined above, car parking surrounding the site predominantly occurs on-street, and is subject to various short-term metered (paid) time restrictions. Darlington Road is generally subject to 4 hour paid parking on the northern side of the road and 2 hour paid parking on the southern side of Darlington Road). All on-street parking around the site is managed by the City of Sydney. During our site visit on Friday 25 November 2016, car parking on the local streets was observed to be in moderate demand, although parking is reported to be in high demand during semester periods.

## 2.3 Sustainable Transport

### 2.3.1 Public Transport

The site is extremely well serviced by high-frequency public transport services, with City Road being a key bus corridor. A summary of key bus services available in the vicinity of the site is provided in Table 2.3 with further information relating to the bus network shown in Figure 2.7.

**Table 2.3: Public Transport Provision**

| Service | Route # | Route Description                                               | Location of Stop                    | Distance to Nearest Stop | Frequency On/Off Peak                   |
|---------|---------|-----------------------------------------------------------------|-------------------------------------|--------------------------|-----------------------------------------|
| Bus     | 352     | Bondi Junction to Marrickville Metro via Oxford Street          | City Road opposite Carillion Avenue | 5m                       | 20 minutes peak / 30 minutes off peak   |
|         | 370     | Leichardt Marketplace to Coogee                                 |                                     |                          | 10 minutes peak / 20 minutes off peak   |
|         | 422     | City Martin place to Kogarah                                    |                                     |                          | 5-10 minutes peak / 20 minutes off peak |
|         | 423     | City Martin Place to Kingsgrove via central station and Newtown |                                     |                          | Every 10 minutes                        |
|         | 426     | City Martin Place to Dulwich Hill                               |                                     |                          | 10 minutes peak / 20 minutes off peak   |
|         | 428     | City Martin Place to Dulwich Hill                               |                                     |                          | 5-10 minutes peak / 15 minutes off peak |
|         | M30     | Sydenham to Mosman                                              |                                     |                          | 10 minutes peak / 15 minutes off peak   |
|         | N10     | City Town Hall to Sutherland                                    | City Road near Butlin Avenue        | 200m                     | Hourly 1am – 5am                        |
|         | N30     | City Town Hall to Macarthur                                     |                                     |                          | Every Half Hour 1am-5am                 |
|         | N40     | City Town Hall to East Hills                                    |                                     |                          | Every Half Hour 12am-5am                |
|         | L23     | City Martin Place to Kingsgrove                                 |                                     |                          | Every 15 minutes 4:30pm – 6:30pm        |
|         | L28     | City Martin Place to Canterbury                                 |                                     |                          | Every 15 minutes 4:30pm – 6:30pm        |

[illegible]

Source: [http://www.sydneybuses.info/routes/Region\\_guide\\_South-2015.pdf](http://www.sydneybuses.info/routes/Region_guide_South-2015.pdf), accessed 15 November 2016

In addition to the bus services, it is noted that Redfern Railway Station is located 1.1km east of the site, with Macdonaldtown Railway Station approximately located 750m south of the site. These rail stations provide direct access to the majority of the Sydney Trains network.

### 2.3.2 Pedestrian Infrastructure

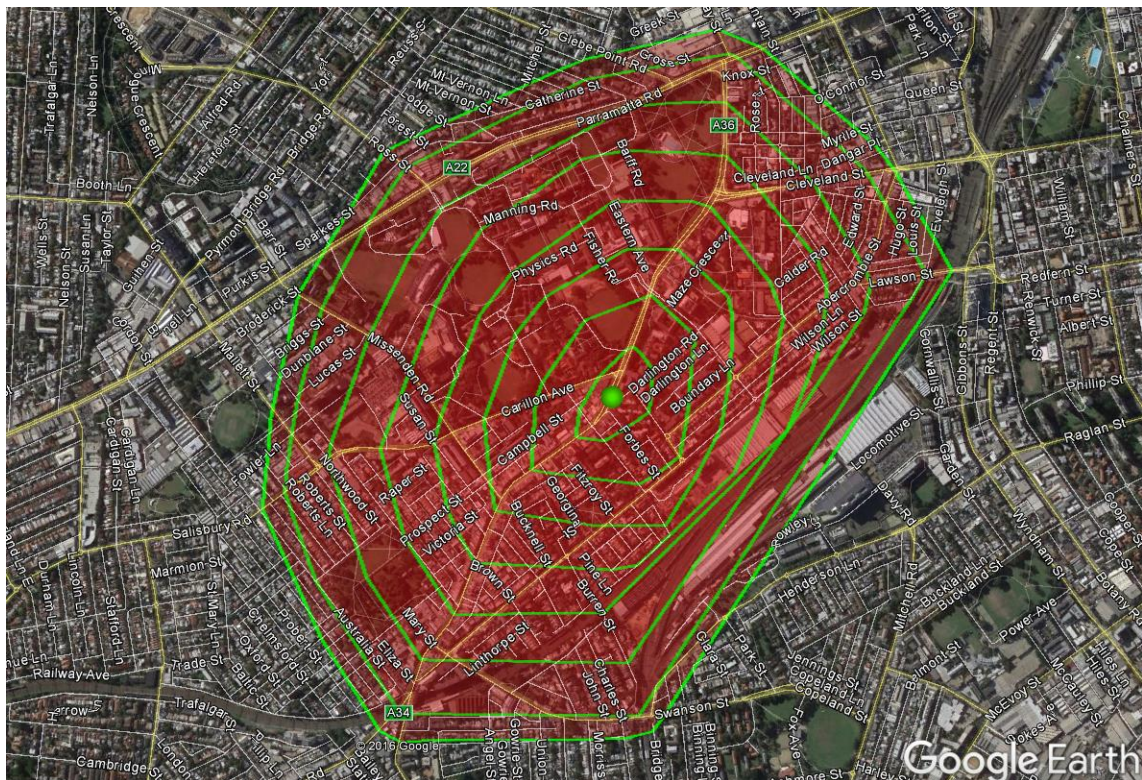
The pedestrian network surrounding the site is well established with pedestrian paths located on both sides of the majority of streets assessed in a site assessment.

Safe crossing points in vicinity of the site leading towards the University include the following pedestrian crossings:

- Pedestrian crossing on the western and northern legs of the intersection of City Road and Carillon Avenue noting:
- Pedestrian crossings on all legs of the City Road and Butlin Avenue/Fisher Avenue intersection 200m North of the site.

For reference, Figure 2.8 shows that nearly the whole University is within a reasonable walking catchment of the site, including other surrounding points of interest including Newtown and Broadway, as well as Redfern station. It is noted that this assessment has been determined using “Pedcatch”; a tool which can map a potential walking catchment for a given time and speed (Inputting a speed of 4.8km/h for a 15-minute walk in this instance).

Figure 2.8: 15-Minute Walking Catchment



Source: [www.pedcatch.com](http://www.pedcatch.com) and extracted to Google Earth, accessed 15 November 2016

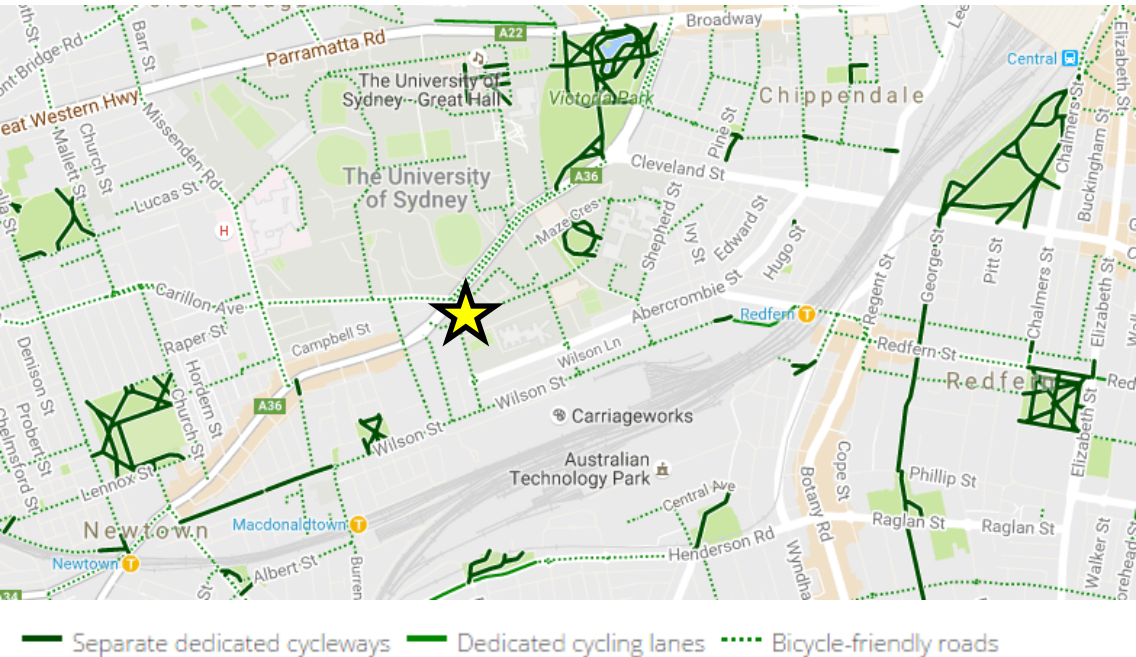
### 2.3.3 Cycle Infrastructure

The site is located within close proximity to both on and off-road cycling facilities as indicated in an extract from the City of Sydney's cycle network map shown in Figure 2.9.

The majority of the University grounds are safe to ride on, and the City of Sydney is currently further progressing the development of the Wilson Street cycleway which will provide a largely separated cycling route into the Sydney CBD.

Correspondence provided to GTA indicates that at present, 12 bicycle loops are present in the vicinity of the site which can provide parking for up to 24 bicycles.

Figure 2.9: Local Cycling Network

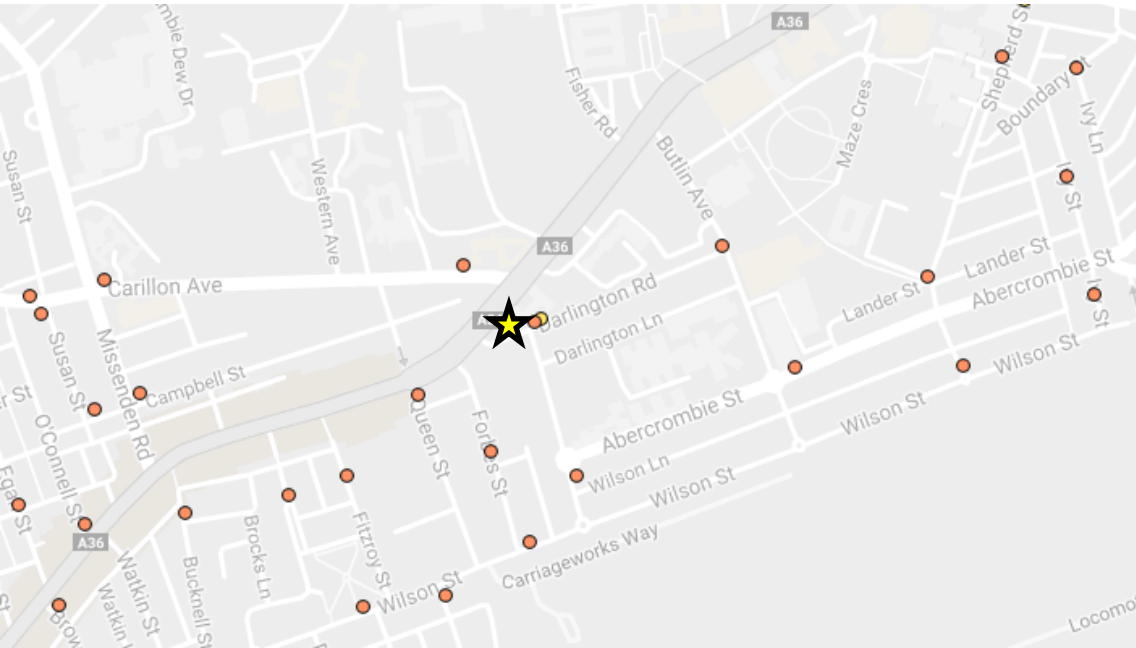


Source: <http://www.sydneycycleways.net/map/>, accessed 15 November 2016

### 2.3.4 Local Car Sharing Initiatives

Car share operators have a high density of vehicles immediately surrounding the site. These car share services have been shown to significantly reduce private vehicle ownership. The car share pods surrounding the site are shown in Figure 2.10. Two are located immediately adjacent to the site on Darlington Road, with other surrounding pods on Butlin Avenue, Carillon Avenue and Queen Street.

Figure 2.10: Local Car Share Pods



Source: <http://www.cityofsydney.nsw.gov.au/live/residents/car-sharing>, accessed 15 November 2016

## 3. Overview of Construction Activities

### 3.1 Description

The development includes replacing the existing Regiment and Darlington Centre with student accommodation of 658 student rooms as well as educational and associated ancillary facilities including dining, relaxation and study areas.

### 3.2 Duration of Construction Works

It is understood that construction is estimated to take approximately 15 months commencing early June 2017, subject to planning approval, and concluding in September 2018. The indicative timing of the various construction stages<sup>5</sup> is outlined as follows:

- Demolition – Early June 2017 to early of August 2017 (8 weeks)
- Bulk Excavation – August 2017 (3 weeks)
- Structure – September 2017 to March 2018 (20 weeks)
- Façade – November 2017 to May 2018 (24 weeks)
- Internal Fitout – December 2017 to August 2018 (34 weeks)
- Completion works – July 2018 to September 2018 (10 weeks)

### 3.3 Hours of Construction Activity

It is understood that construction work will generally be carried out between the following hours:

- Monday to Friday 7:00am and 6:00pm
- Saturday 7:00am and 3:00pm
- Sunday no work.

It is expected that Richard Crookes Construction (RCC) will be responsible for instructing and controlling all subcontractors regarding the hours of work. Any work outside the approved construction hours would be subject to specific prior approval from Council.

### 3.4 Construction Site Access

All construction related site access is to be provided via a single access point on Darlington Road, utilising an existing driveway. This arrangement is outlined in Figure 3.1.

In addition, it is expected that on-street construction zone will be required at times throughout the construction works along Darlington Road. This zone is shown indicatively in Figure 3.2. Importantly, it is emphasised that City Road is not to be utilised at any time as on-street loading zone.

<sup>5</sup> This construction programme is indicative only and is expected to be confirmed and documented in an updated version of this report.

Figure 3.1: Site Access Arrangements

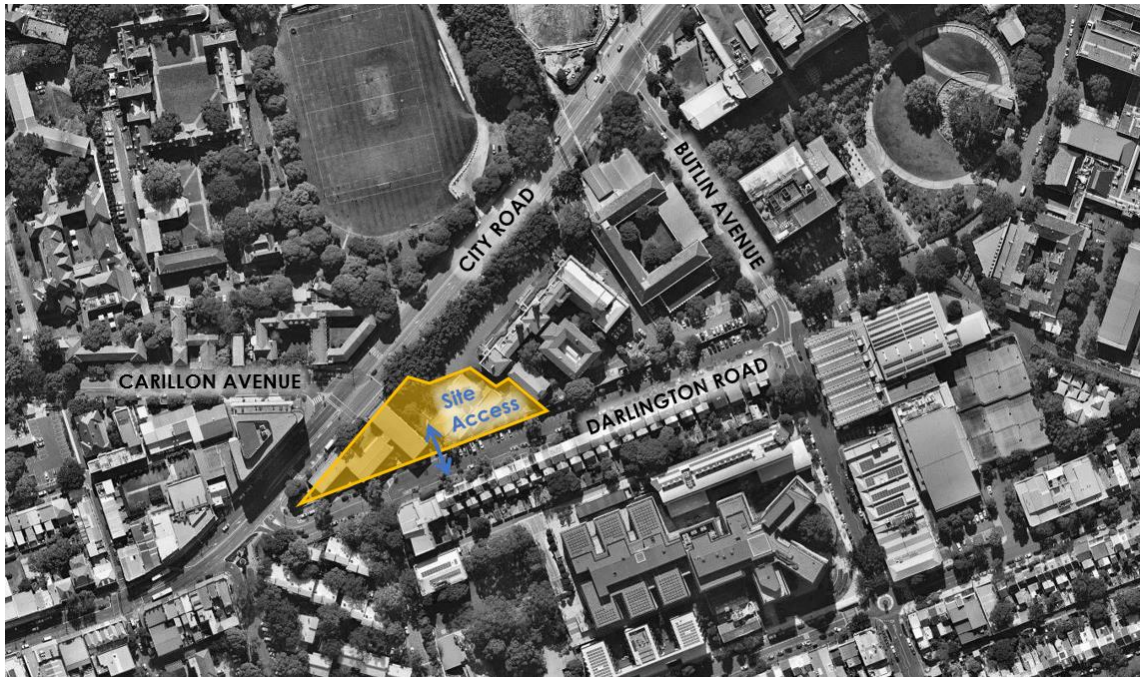


Figure 3.2: On-street Loading Zone Location



# 4. Construction Vehicle Access

## 4.1 Proposed Traffic Routes

Advice provided by RCC indicates that truck movements will be restricted to designated routes on the broader road network to:

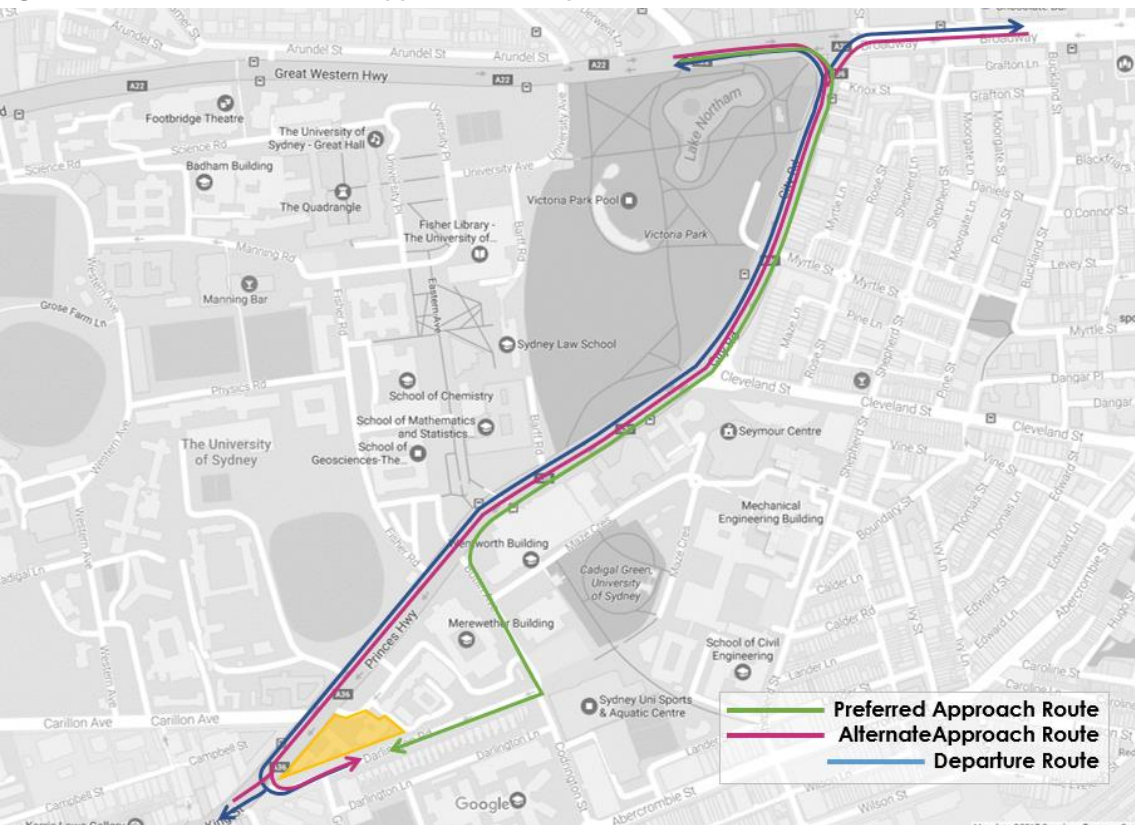
- Minimise the impact of the truck movements on residential streets, and
- Ensure that the trucks are physically able to gain access to the site (e.g. by avoiding the use of road which are dimensionally incapable of accommodating the trucks).

With respect to the subject site and its environs, it is noted that a desktop assessment of surrounding roads (and associated intersections) indicates that they are of sufficient width and design to allow access by trucks. In this respect, the proposed truck routes are outlined in Table 4.1, and shown in Figure 4.1 and Figure 4.2.

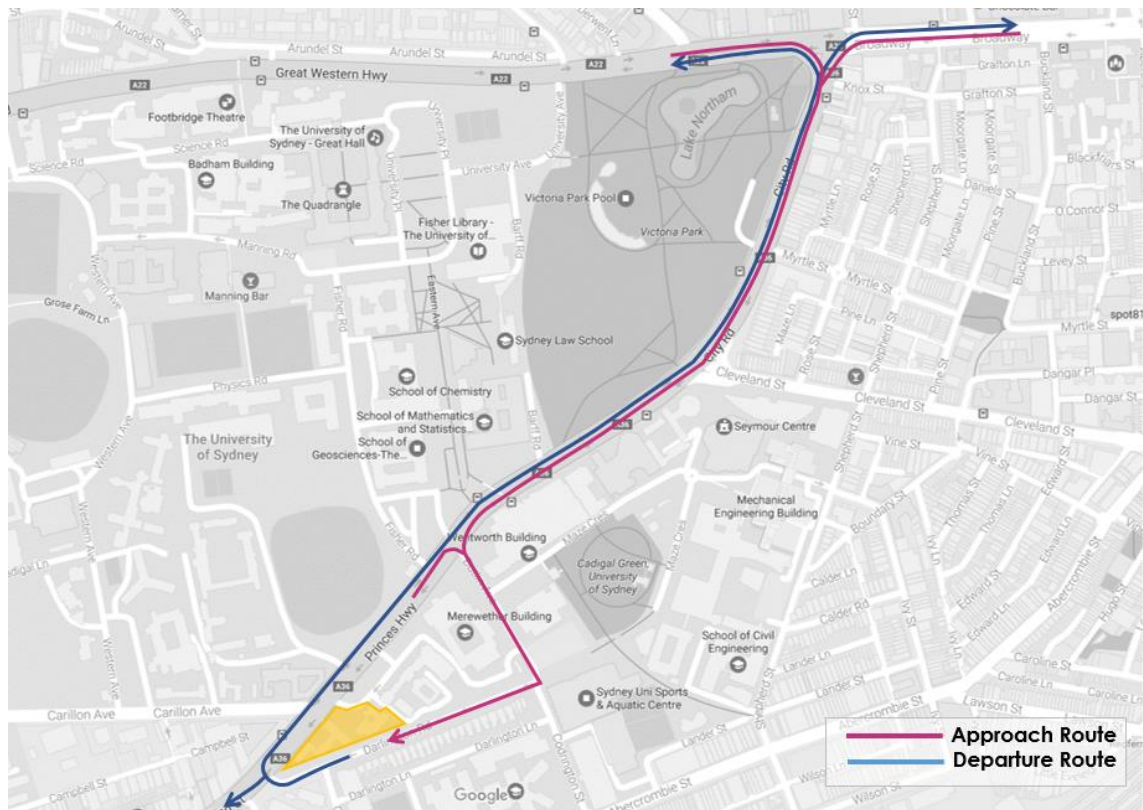
Table 4.1: Demolition and Construction Traffic Routes

|                    | Approach                                                                                                                                                                                           | Departure                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Demolition Phase   | Arriving via City Road; either turning into Darlington Road and then entering the site prior to the one-way westbound section, or turning off City Road onto Butlin Avenue and onto Darlington Rad | Departing to City Road; turning from Darlington Road left or right (under traffic management) onto City Road |
| Construction Phase | Arriving via City Road; turning into Butlin Avenue and turning right into Darlington Road to utilise the on-street loading zone                                                                    | Departing to City Road; turning from Darlington Road left or right (under traffic management) onto City Road |

Figure 4.1: Construction Vehicle Approach and Departure Routes – Demolition Phase



**Figure 4.2: Construction Vehicle Approach and Departure Routes – Construction Phase**



## 4.2 Site Access

Advice provided by RCC indicates that trucks will physically enter the site during the demolition phase whereas they will utilise the proposed on-street loading zone during the construction phase.

It is understood that this arrangement is proposed to ensure efficient on-site operations throughout the work stages while also minimising impacts to the on-street environment, as follows:

- During the demolition phase, construction traffic will travel along City Road and either turn into Butlin Avenue and then Darlington Road, or turn into Darlington Road before entering the site to enable the trucks to be loaded from within the site. These vehicles will then exit back onto Darlington Road and turn left or right onto City Road, as outlined in Figure 4.3. Licensed traffic controllers will be engaged to direct truck movements into and out of the site.
- During the construction phase, a Construction Works Zone is to be established at the site frontage to Darlington Road. Construction vehicles will use traffic signals on City Road to turn into Butlin Avenue and access the work zone from Darlington Road. This access arrangement is shown in Figure 4.4.

It is expected that detailed vehicle swept path assessments illustrating the turning paths of the largest trucks likely to access the site (and pass through nearby intersections) will be presented in Appendix A of this report within its next evolution. Based on our understanding of the construction travel paths of other similar developments in the vicinity of the site, it is expected that these assessments will illustrate that the trucks are able to negotiate the nearby residential streets without unreasonable impact (e.g. without needing to ban parking and/or cross unreasonably onto the wrong side of the roads).

Figure 4.3: Site Access - Demolition Phase

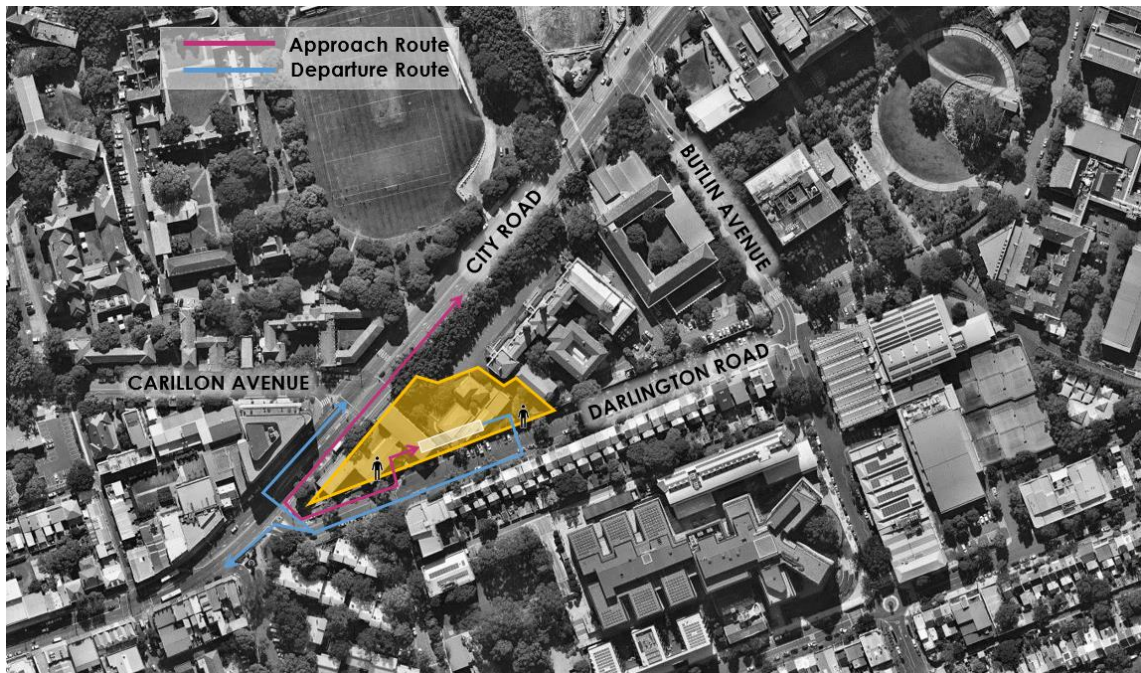
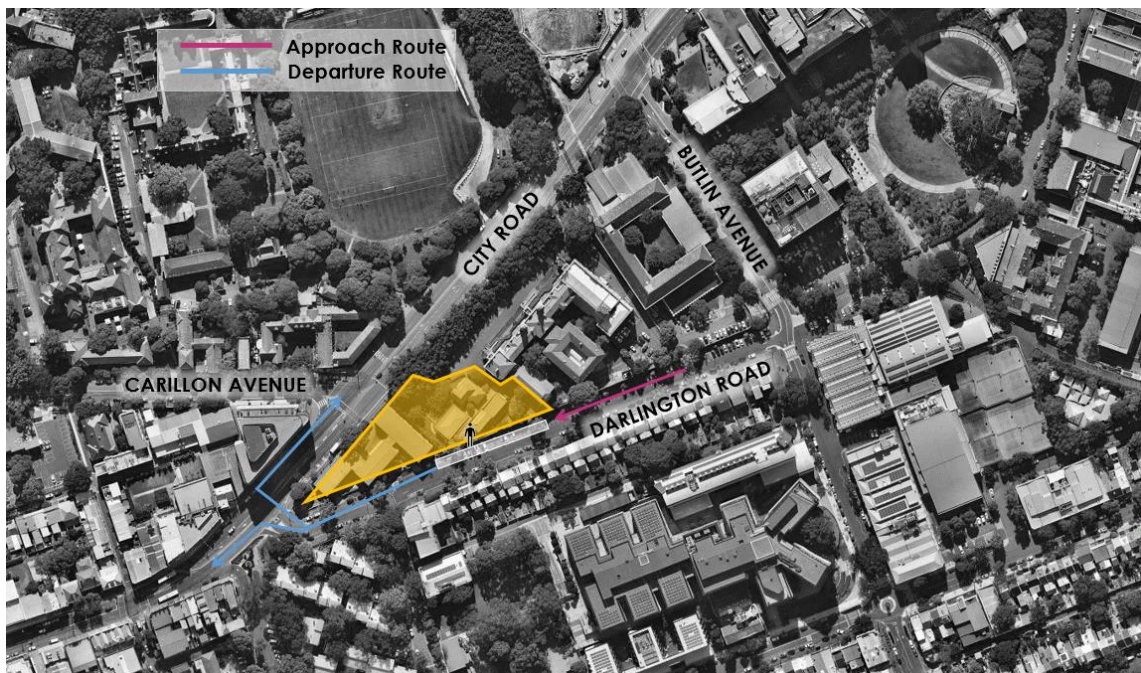


Figure 4.4: Site Access – Construction Phase



### 4.3 Summary

Assuming the vehicle access arrangements outlined above, and subject to detailed traffic control plans being prepared to outline the required location of work zone signage, traffic controllers and the like, it is expected that safe and efficient vehicle access by construction trucks will be provided to the site.

## 5. Traffic Impact Assessment

### 5.1 Traffic Volumes

#### 5.1.1 Development Site

Advice provided by RCC indicates that an average of 15-20 trucks will likely service the site during the construction stages; resulting in the order of 30-40 truck movements to/from the site per day.

Assuming conservatively that 20% of these movements occur in any peak hour period, it follows that up to approximately 8 truck movements could be expected per hour. These volumes would be distributed across the network in accordance with the figures outlined above, such that only half of the movements (approx. 4 truck movements) would occur through any intersection.

It is further noted that as no on-site car parking is proposed to be provided, additional car trips are not expected during peak hours.

#### 5.1.2 Nearby Development Sites

It is understood that other development sites are located in the vicinity of the subject site, including (for example) the F23 Administration Building and LEES development project are located on City Road to the northeast, which will likely generate additional construction related activity.

These traffic increases are expected to be in the same order of magnitude as the volumes forecast for the development site (refer to Section 5.1.1) and therefore are not expected to materially increase construction traffic volumes through the key intersections along City Road.

### 5.2 Intersection Operation

Having regard to the minor increase in peak hour vehicle movements due to construction vehicles, coupled with the existing operation of nearby intersection (which operate well below capacity, as outlined in Section 2), it is evident that the additional construction related vehicle activity will have a negligible impact on the operation of the abutting road network. In practice, it is expected that existing levels of service (of up to LOS C) will remain during construction phases.

### 5.3 Management Measures

Notwithstanding this, it is recommended that Traffic Control Plans be prepared for key surrounding intersections (namely the City Road / Darlington Road unsignalised intersection to appropriately manage construction related traffic at these locations and minimise impacts to passing traffic on City Road in particular. It is expected that these Plans would be prepared in the next evolution of this report and outline traffic controller responsibilities as well as necessary signage and be included in Appendix B.

## 6. Other Considerations

### 6.1 Car Parking

Advice provided by RCC indicates that no on-site parking will be provided for construction workers, who will instead be required to access the site using active travel or public transport.

As outlined earlier in this report (Section 2), the site is well serviced by public transport, with a number of bus routes passing the site along City Road and Macdonaldtown and Redfern Railway Stations located nearby. The use of these public transport services should be strongly encouraged by RCC.

In addition, it is recommended that measures be undertaken to actively discourage construction workers from driving to the site. These could include:

- As part of the induction process, clarify that car parking on neighbouring streets is time restricted and is regularly enforced, and construction staff are not permitted to park at these locations.
- Prepare Travel Plans for staff which outlines the public transport opportunities available in the vicinity of the site, together with any available off-site parking areas that could be used by construction workers (including paid parking opportunities).
- Provide appropriate drop-off areas at the construction site (e.g. within a Works Zone) for workers who are required the use of a car for moving tools and equipment.

### 6.2 Public Transport

As discussed, there is no site access proposed from City Road. This will minimise effects of the project on bus movements.

It is also expected that traffic controllers implementing "stop and go" control at intersections on City Road will do so by giving priority to bus movements. As such, it is anticipated that buses will not be delayed by the traffic management of construction vehicles on the site.

## Appendix A

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Swept Path Assessments (not included in this report version)

## Appendix B

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Traffic Control Plans (not included in this report version)

Melbourne  
A Level 25, 55 Collins Street  
PO Box 24055  
MELBOURNE VIC 3000  
P +613 9851 9600  
E melbourne@gta.com.au

Sydney  
A Level 6, 15 Help Street  
CHATSWOOD NSW 2067  
PO Box 5254  
WEST CHATSWOOD NSW 1515  
P +612 8448 1800  
E sydney@gta.com.au

Brisbane  
A Ground Floor, 283 Elizabeth Street  
BRISBANE QLD 4000  
GPO Box 115  
BRISBANE QLD 4001  
P +617 3113 5000  
E brisbane@gta.com.au

Canberra  
A Tower A, Level 5,  
7 London Circuit  
Canberra ACT 2600  
P +612 6243 4826  
E canberra@gta.com.au

Adelaide  
A Suite 4, Level 1, 136 The Parade  
PO Box 3421  
NORWOOD SA 5067  
P +618 8334 3600  
E adelaide@gta.com.au

Gold Coast  
A Level 9, Corporate Centre 2  
Box 37, 1 Corporate Court  
BUNDALL QLD 4217  
P +617 5510 4800  
F +617 5510 4814  
E goldcoast@gta.com.au

Townsville  
A Level 1, 25 Sturt Street  
PO Box 1064  
TOWNSVILLE QLD 4810  
P +617 4722 2765  
E townsville@gta.com.au

Perth  
A Level 2, 5 Mill Street  
PERTH WA 6000  
PO Box 7025, Cloisters Square  
PERTH WA 6850  
P +618 6169 1000  
E perth@gta.com.au