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Prepared for

RBG SERVICES GROUP PTY LTD

# Traffic Impact Assessment Report

## Planning Proposal
## 41 McLaren Street, North Sydney

Ref: 0401r01
31/08/2017

Info@asongroup.com.au | +61 2 9083 6601 | Suite 1202, Level 12, 220 George Street, Sydney, NSW 2000

# Document Control

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# Appendices

# 1 Introduction

## 1.1 Study Objectives

Ason Group has been commissioned by RBG Services Group Pty Ltd to prepare a Traffic Impact Assessment (TIA) report to support a Planning Proposal relating to the subject site at 41 McLaren Street, North Sydney (the Site). The Planning Proposal seeks approval for an increase to the permitted building height on the subject Site, which would allow for a 46-storey mixed-use development comprising of 10,148m$^2$ commercial gross floor area (GFA) and 224 residential apartments (the Proposal).

The Site is located within the Local Government Area of North Sydney Council (the Council), and the Planning Proposal has been assessed against that Council's controls.

This TIA report addresses the relevant traffic, transport and parking implications of the Proposal, including compliance with relevant State and Local Government controls and Australian Standards. In preparing this TIA report, Ason Group has referenced the following reports and key planning documents that are relevant to development at the Site:

- North Sydney Council Development Control Plan 2013 (DCP).
- North Sydney Council Local Environmental Plan 2013 (LEP).
- *Chatswood to Sydenham – State Significant Infrastructure Application Report*, prepared by Transport for NSW (TfNSW), dated November 2015 (Metro Report).
- Draft Ward Street Precinct Master Plan planning documents.

This TIA report also references general access, traffic and parking guidelines, including:

- Roads & Maritime Services (RMS) *Guide to Traffic Generating Developments, 2002* (RMS Guide).
- RMS Technical Direction TDT 2013/04a, *Guide to Traffic Generating Developments – Updated traffic surveys* (RMS Guide Update).
- Australian Standard 2890.1 (2004): *Off-street car parking* (AS2890.1).
- Australian Standard 2890.2 (2002): *Off-street commercial vehicle facilities* (AS2890.2).
- Australian Standard 2890.6 (2009): *Off-street parking for people with disabilities* (AS2890.6).

# 2 Existing Conditions

## 2.1 Site and Location

The Site is located at 41 McLaren Street, North Sydney, approximately 600 metres north of the North Sydney Railway Station and 300 metres south of North Sydney Oval. The Site is rectangular in configuration with an approximate area of 2,359m$^2$ and is legally described as Lot 1, DP 557103.

The Site is zoned B4 (Mixed-Use) and currently accommodates a commercial development known as *Simsmetal House*, a heritage item of local significance. Vehicular access to the Site is currently provided by two separate vehicle crossings on Harnett Street.

**Figure 1** provides an appreciation of the Site and its location with regard to the local road network.

## 2.2 Road Network

With reference to Figure 1, the key local roads influenced by the application include:

- Warringah Freeway – an RMS classified Freeway (F1) that generally runs in a north-south direction in the vicinity of the Site and forms a principal arterial link between the Sydney Harbour Bridge and Willoughby Road, Naremburn. The Warringah Freeway is subject to an 80 km/h speed zoning and generally carries at least 4 lanes of traffic in either direction within a divided carriageway. Traffic volumes along the Freeway are in the order of 100,000 vehicles per day (vpd) local to the Site.
- Pacific Highway – an RMS classified Highway (A1) that generally runs in a northwest-southeast direction in the vicinity of the Site and forms a major arterial link between the Sydney CBD and Hornsby to the north. The Pacific Highway carries about 60,000 vpd local to the Site. It is subject to a 60 km/h speed zoning and generally carries 3 lanes of traffic in either direction within an undivided carriageway.
- Miller Street – a local collector road that generally runs in a north-south direction to the west of the Site, providing a key link between Falcon Street (to the north) and the Pacific Highway (to the south). Miller Street is subject to a 50 km/h speed zoning and generally carries 1 lane of traffic in either direction with a parking lane on both sides of the street. Clearway restrictions apply along Miller Street, during peak periods, increasing the street's capacity to 2 southbound lanes in the morning peak and 2 northbound lanes in the evening peak.
- Walker Street – a local road that runs in a north-south direction to the east of the Site, carrying 1 lane of traffic in either direction with parking provided on both sides of the street. The road is

generally subject to a 50 km/h speed zoning however, 40 km/h School Zone speed limits apply in the morning and afternoon for school drop-off and pick-up and drop-off at Wenona School.

- McLaren Street – a local road that runs in an east-west direction along the northern frontage of the Site, carrying 1 lane of traffic in either direction along an undivided carriageway. Parking is provided on both sides of McLaren Street with the road subject to a 50 km/h speed zoning. 40 km/h School Zone speed limits apply along McLaren Street between Miller Street and Walker Street adjacent to the Site.
- Harnett Street – a local road the runs in a north-south direction and forms the eastern Site boundary. Restricted parking is provided on the western side of the road, whilst the eastern side is subject to "No Parking" restrictions. It forms a priority controlled intersection with McLaren Street, at the north-eastern corner of the Site.

It can be seen from **Figure 1** that the Site is conveniently located with respect to the arterial and local road network serving the region. It is therefore able to effectively distribute traffic onto the wider road network, minimising local traffic impacts.


**Figure 1 - Site and Location Plan**

## 2.3 Public Transport

### 2.3.1 Rail

The *Integrated Public Transport Service Planning Guidelines*, Sydney Metropolitan Area (TfNSW, December 2013), states that train services influence the travel mode choices of areas within 800 metres walking distance (approximately 10 minutes) of a railway station. It is therefore noteworthy that the Site is located approximately 600 metres from North Sydney railway station, on the North Shore branch of the North Shore, Northern and Western Line. Accordingly, a significant proportion of future commuters travelling to / from the Site would use the train services at North Sydney Station.

The station's location within the Sydney Trains Network Map is shown in **Figure 2** and the existing train services that operate in the locality are shown in **Figure 3**.


**Figure 2 - Suburban Rail Network**

North Sydney station provides direct services to Redfern, Central, Town Hall, Wynyard and Parramatta railway stations. Connections to Intercity train services and other services on the rail network are available at Redfern and Central stations. **Table 1** summarises the peak hour train frequencies for North Sydney station.

**Table 1 - Train Frequencies at North Sydney Train Station**

| Station – Line | To City | From City | Total |
|---|---|---|---|
| *North Sydney Station - via North Shore, Northern and Western lines* | | | |
| Morning Peak Hour (8-9AM) | 16 | 16 | 32 |
| Off Peak Hour | 6 | 6 | 12 |
| Afternoon Peak Hour (5-6PM) | 15 | 12 | 27 |

The above table demonstrates that North Sydney railway station is well serviced in the peak periods with trains arriving every 4 minutes in each direction. Furthermore, the station is conveniently located from the Sydney CBD with a 13 minute travel time between North Sydney and Central stations.

### 2.3.2 Bus

With regard to bus travel, the same TfNSW guidelines state that bus services influence the travel mode choices of sites within 400 metres walk (approximately 5 minutes) of a bus stop. In this regard, the Site is accessible by public bus services with existing bus routes and stops also shown in **Figure 3** with the details of each service that stops within 400 metres of the Site presented in ***Table 2***. The table details each route number, route description and service frequencies during the morning and evening peak periods.

**Table 2 - Existing Bus Services**

| Route No. | Route | Route Description | Service Frequency |
|---|---|---|---|
| E50 | Milsons Point to Manly | Milsons Point, North Sydney, Neutral Bay, Balgowlah, Manly | Weekday: Every 10 minutes during the peak, not operating off-peak. |
| 173 | Milsons Point to Narraweena | Milsons Point, North Sydney, Neutral Bay, Cremorne, Seaforth, Frenches Forest, Narraweena | Weekday: Every 20 minutes during the peak, not operating off-peak. |
| L78 | Milsons Point to Dee Why | Milsons Point, North Sydney, Neutral Bay, Mosman, Manly Vale, Brookvale, Dee Why | Weekday: Every 20 minutes during the peak, not operating off-peak. |
| 187 | Milsons Point to Newport | Milsons Point, North Sydney, Neutral Bay, Mosman, Balgowlah, Brookvale, North Curl Curl, Narrabeen, Mona Vale, Newport | Weekday: Single service during peak. |
| 202, 203, 207, 208, 209 | City to Northbridge, Castlecrag and Lindfield | Sydney, North Sydney, Cammeray, Northbridge, Willoughby East, Roseville, Lindfield | Weekday: Every 20-30 minutes during the peak, not operating off-peak. |
| 227, 228, 229, 230 | Milsons Point to Mosman Junction, Clifton Gardens, Beauty Point and Mosman Wharf | Milsons Point, North Sydney, Neutral Bay, Mosman | Weekday: Every 15-30 minutes during the peak, every 30 minutes off-peak.<br>Weekend: Every 30-60 minutes off-peak. |

Table 2 demonstrates that the area is well serviced by buses along Miller Street between Milsons Point and locations such as Mosman, Manly, Lindfield and Dee Why during the weekday peak and off-peak periods. Bus stops are located near the corner of Miller Street and McLaren Street, approximately 100 metres walking distance from the Site, providing access to these services.

## 2.4 Pedestrian and Cycling Network

There is adequate pedestrian accessibility to key local facilities and transport facilities to and from the Site. Pedestrian footpaths are provided on both sides of McLaren Street and Walker Street, providing access to destinations such as the North Sydney Commercial Core, North Sydney Station and North Sydney Oval.

As shown in **Figure 3**, the Site has good access to the local bicycle network. Off-road paths are located along Miller Street to the south and Ridge Street to the north. These paths link to the wider cycling network providing a convenient route to Neutral Bay, Lane Cove and the Sydney CBD.

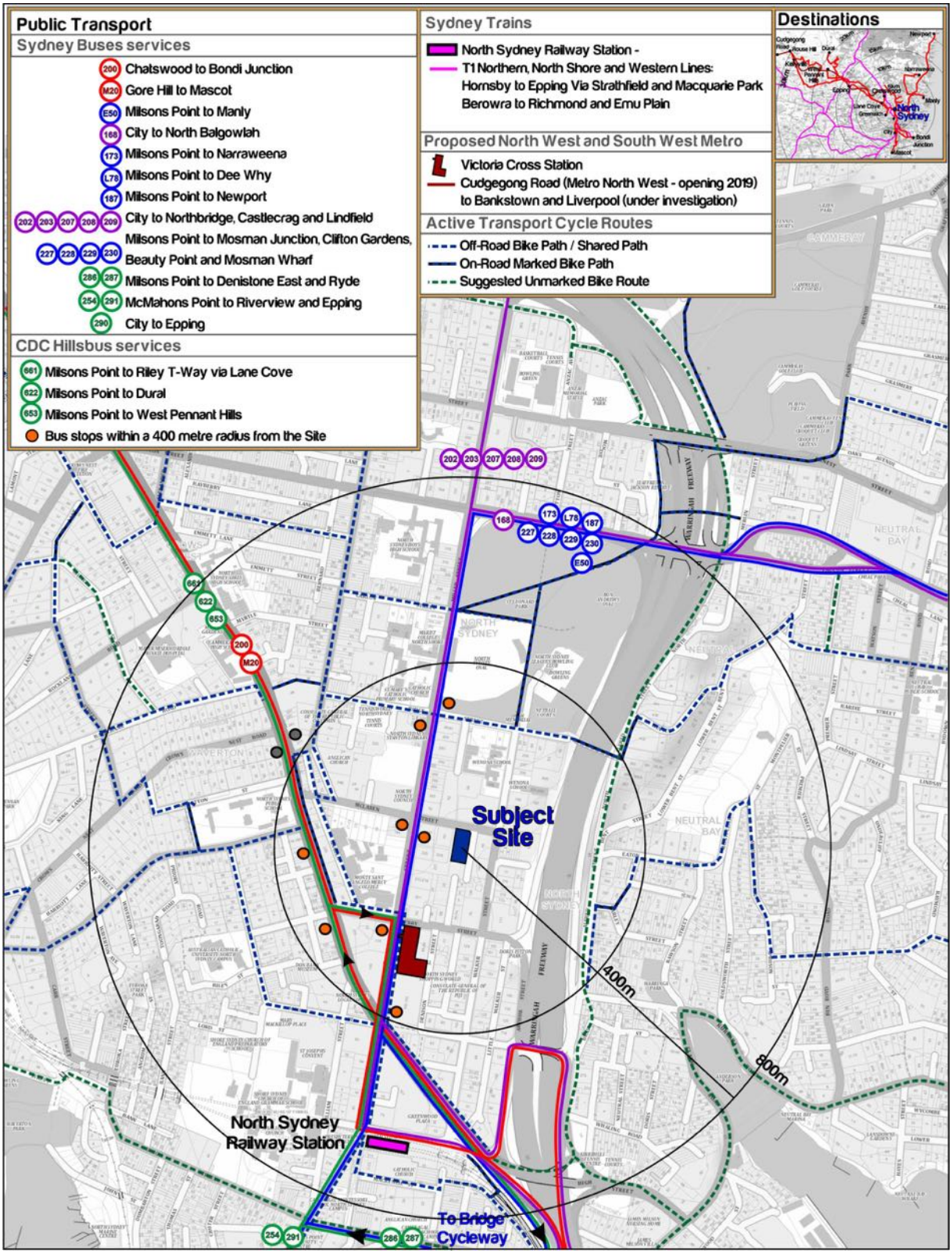



**Figure 3 - Public and Active Transport Services**

## 2.5 Journey to Work Data Analysis

The existing travel patterns of residents within the surrounding locality were surveyed as part of the 2011 Census and the findings are presented in the Journey-to-Work data provided by the Bureau of Transport Statistics. The data is presented graphically in ***Figure 4*** and indicates that the primary destinations for residents within the locality are the Sydney CBD, North Sydney, Mosman, Chatswood, Lane Cove & Ryde and Hunters Hill, which covers approximately 85% of the total employed residents within the area. The modal share data shows that 40% of trips were undertaken by public transport and 33% of trips were taken by private cars.

Furthermore, the existing travel patterns of people who work within the locality was also surveyed in the 2011 Census. The data is also presented graphically in **Figure 4** and indicates that the primary origin of workers are from within the local area of North Sydney, Mosman, Chatswood and Lane Cove, which covers approximately 23% of all people who work within the study area. The modal share data shows that 46% of all trips were undertaken by public transport and 43% of all trips were undertaken by private cars.

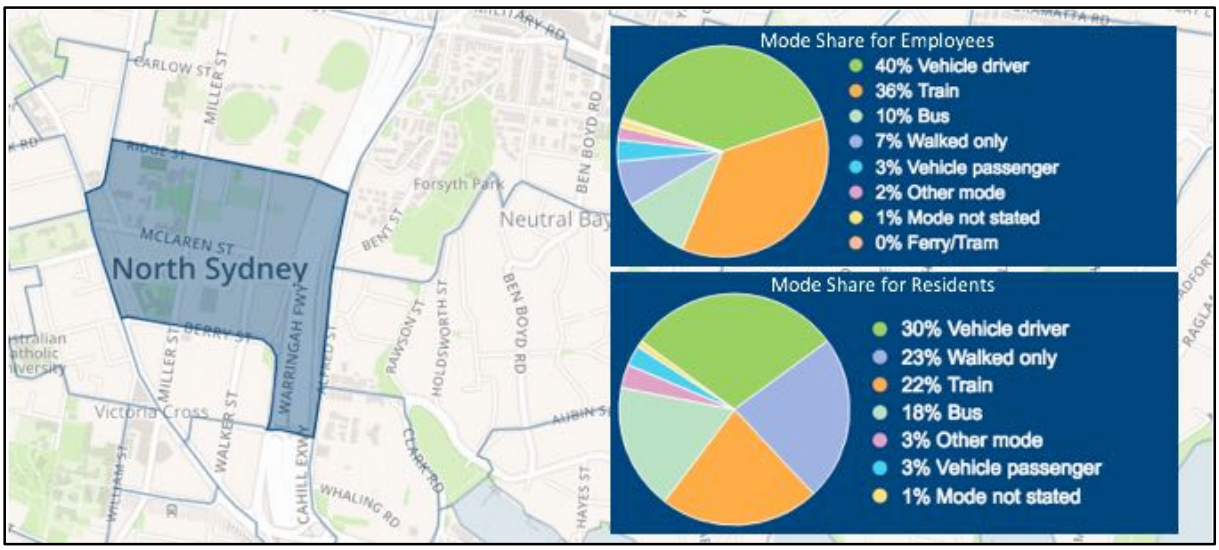



**Figure 4 - Journey-to-Work Data for Travel Zone 1951**

## 2.6 Existing Traffic Generation

The Site currently accommodates an 8-storey commercial development having a total GFA of approximately 10,148m$^2$ and 91 car parking spaces provided over two basement levels.

Given that the existing development accommodates a 'constrained' level of car parking, it is considered that the most accurate way of assessing the traffic generation of the existing development is to use a 'trip per parking space' rate, as opposed to a 'trip per area' rate.

In developing the update to the RMS Guide, TDT 2013/04a, surveys of 10 commercial developments were undertaken by GTA Consultants. A similar development was analysed at 100 Arthur Street, North Sydney, which incorporated consistent development and site characteristics as the Proposal. The following parking space trip rates were derived from the comparable development:

- 0.38 AM Peak trips per parking space
- 0.32 PM Peak trips per parking space

Accordingly, the existing development, with an estimated 50 car parking spaces, is expected to generate the following peak hourly traffic volumes:

- 19 trips (15 in, 4 out) during the morning peak hour
- 16 trips (3 in, 13 out) during the evening peak hour

The above generation has been used to assess the net increase in traffic generation as a result of the Proposal, as is discussed in Section 6.1 of this report.

## 2.7 Existing Network Performance

For the purposes of assessing the existing performance, morning (7-9am) and evening (4-6pm) traffic surveys were undertaken of the below key intersections:

- Miller Street / McLaren Street; and
- McLaren Street / Walker Street.

The performance of these two intersections have been analysed using the SIDRA Intersection modelling program to assess existing intersection capacity. SIDRA modelling outputs a range of performance measures, in particular:

- *Degree of Saturation (DOS)* – The DOS is used to measure the performance of intersections where a value of 1.0 represents an intersection at theoretical capacity. As the performance of an intersection approaches DOS of 1.0, queue lengths and delays increase rapidly. It is usual to attempt to keep DOS to less than 0.9, with satisfactory intersection operation generally achieved with a DOS below 0.8.

- *Average Vehicle Delay (AVD)* – The AVD (or average delay per vehicle in seconds) for intersections also provides a measure of the operational performance of an intersection and is used to determine an intersection's Level of Service (see below). For priority (Give Way, Stop & Roundabout controlled) intersections, the AVD reported is that for the movement with the highest AVD.
- *Level of Service (LOS)* – This is a comparative measure that provides an indication of the operating performance, based on AVD.

The following table provides a recommended baseline for assessment as per the RMS Guide:

| Level of Service | Average Delay per Vehicle (secs/veh) | Traffic Signals, Roundabout | Give Way and Stop Signs |
|---|---|---|---|
| **A** | less than 14 | Good operation | Good operation |
| **B** | 15 to 28 | Good with acceptable delays & 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 & 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** | More than 70 | Unsatisfactory and requires additional capacity. | Unsatisfactory and requires other control mode or major treatment. |

The following **Table 3** presents a summary of the results of the SIDRA analysis of the key intersection under the 'existing traffic conditions' scenario. The detailed output of the SIDRA results are attached at **Appendix A**.

**Table 3 - Existing Local Intersection Performance**

| Intersection | Period | Degree of Saturation (DoS) | Average Intersection Delay (AVD) | Level of Service (LoS) |
|---|---|---|---|---|
| Miller St / McLaren St | AM | 0.580 | 17.5 | B |
| | PM | 0.572 | 18.1 | B |
| McLaren St / Walker St | AM | 0.129 | 8.4 | A |
| | PM | 0.195 | 7.8 | A |

The table above demonstrates that the intersection of Miller Street and McLaren Street is currently operating at a Level of Service of B in the morning and evening peak periods. This is considered "Good with acceptable delays & spare capacity" for a signalised intersection as per the RMS Guide criteria above. The priority controlled intersection at McLaren Street and Walker Street experiences very short delays, operating at a Level of Service of A in the morning and evening peak periods. Therefore, the analysis demonstrates that the key intersections that are influenced by the Proposal are operating satisfactorily.

# 3 Strategic Context

## 3.1 Sydney Metro

### 3.1.1 Sydney's Rail Future

The Sydney Metro is a new standalone rail network identified in *Sydney's Rail Future* and consists of the Sydney Metro Northwest (previously known as the North West Rail Link) and the Sydney Metro City & Southwest. TfNSW proposes to construct and operate a new underground rail line, about 16km long, with new stations between Chatswood and Sydenham (known as the Chatswood to Sydenham project), as part of the NSW Government's plan to implement Sydney's Rail Future. The proposed route and stations for the new Sydney Metro are shown in ***Figure 5***.


**Figure 5 - Proposed Sydney Metro Route and Stations**

Once complete, Sydney Metro City & Southwest would deliver a major increase in the capacity of Sydney's rail network, with the capacity to run up to 30 trains per hour through the Sydney CBD in each direction. This provides the foundation for delivering a 60 per cent increase in the number of trains operating on Sydney's rail network in peak periods, which would cater for an extra 100,000 commuters per hour.

Some of the key components of the project would include:

- About 15 kilometres of twin rail tunnels (that is, 2 tunnels located side-by-side) between Mowbray Road, Chatswood and north of Sydenham Station (near Bedwin Road, Marrickville).
- Realignment of the existing T1 North Shore Line surface track within the existing rail corridor between Chatswood Station and in the vicinity of Brand Street, Artarmon, including a new bridge for a section of the 'down' (northbound) track to pass over the proposed northern dive structure.
- About 250 metres of aboveground metro tracks between Chatswood Station and the northern dive structure.
- New metro stations at Crows Nest, Victoria Cross, Barangaroo, Martin Place and Pitt Street, as well as new underground platforms at Central Station.

The Sydney City Metro project was approved for construction on 9 January 2017, with early works currently being undertaken. The estimated total period for the major construction works would be approximately 7 years, with the Sydney City Metro planned to be open in late 2024.

### 3.1.2 Victoria Cross Metro Station

Of significance to the Site is the proposed station at Victoria Cross, which currently has a preferred location at the north eastern corner of McLaren Street / Miller Street intersection (approximately 100m west of the Site). It would be strategically located within the North Sydney Commercial Centre and close to a number of educational institutions (including the Australian Catholic University and Northern Sydney Institute of TAFE Bradfield Campus) and mixed employment areas along Miller Street, Walker Street and the Pacific Highway.

The metro station at Victoria Cross would support the continued growth of the North Sydney CBD as an integral part of Global Sydney. The new station would improve customer experience at the existing North Sydney Station by relieving demand in peak times. The station at Victoria Cross would:

- Create a new transport focus in the North Sydney CBD.
- Contribute to the attractiveness of the North Sydney CBD by adding to and integrating with the public domain.

- Improve the connectivity to and permeability through the area surrounding the station.

The preferred location of the proposed Victoria Cross Station is shown in **Figure 6**.

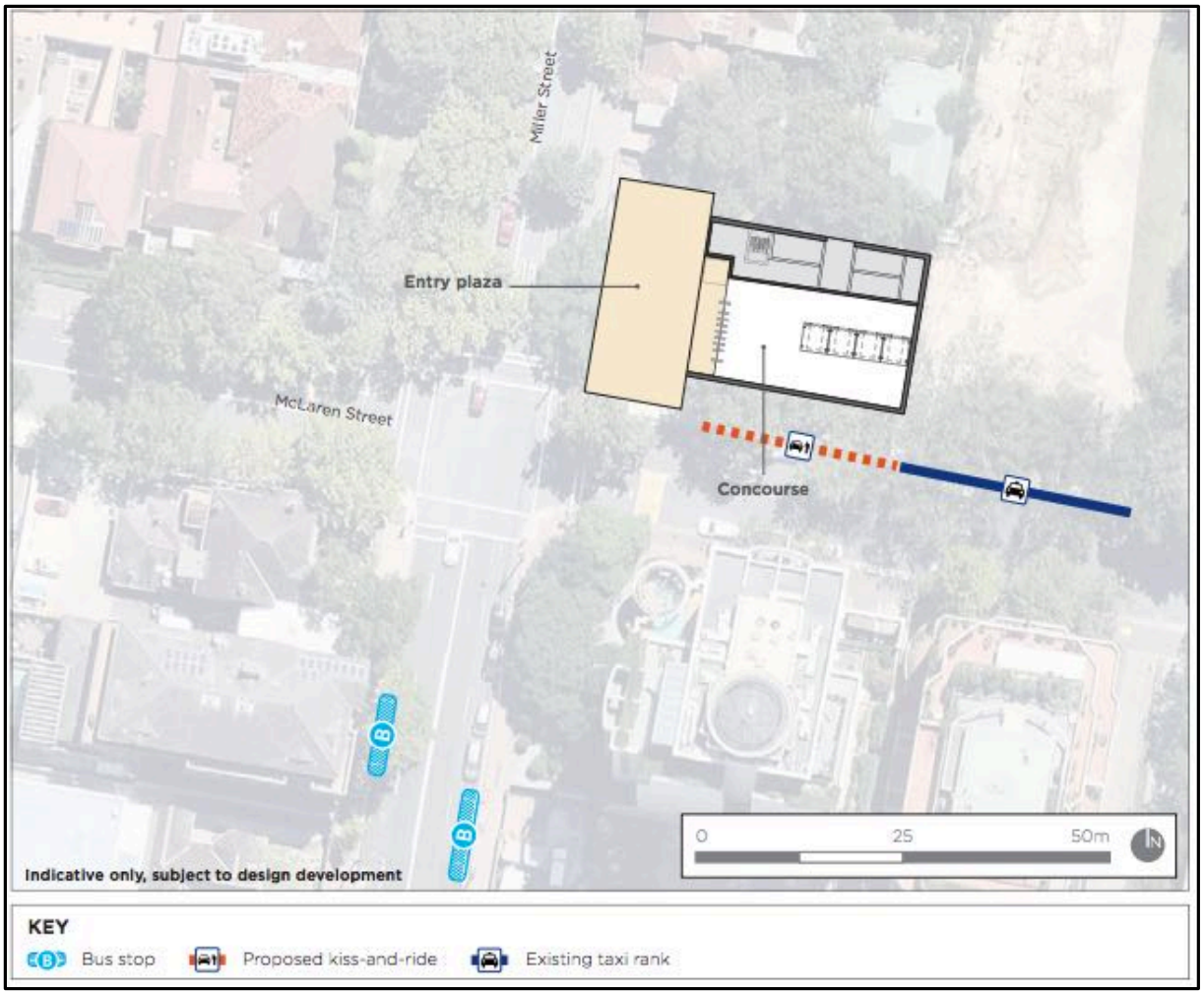



**Figure 6 - Proposed Victoria Cross Station**

**(Source: Sydney Metro, City & Southwest – Chatswood to Sydenham, Victoria Cross Station and Artarmon Substation Modification Report)**

In this regard, the Proposal is well suited to take advantage of the new infrastructure upon its completion in 2024. The improved access to transport services would ensure that future residents and tenants have a wide range of options, in addition to the numerous existing transport options, as alternatives to private vehicle use.

## 3.2 Draft Ward Street Precinct Master Plan

The Ward Street Precinct is located at the northern end of the North Sydney CBD and contains a mix of commercial, mixed use and residential development. The precinct, which the Site is situated within, is bound by McLaren Street to the north, Berry Street to the south, Miller Street to the west and includes a number of properties on the eastern side of Walker Street, south of Hampden Street and is shown by **Figure 7**.


**Figure 7 – Ward Street Precinct**

The draft Ward Street Precinct Master Plan prepared by North Sydney Council, aims to significantly improve the public domain offering of the CBD and carefully plan for its urban renewal. Specifically, the draft Master Plan proposes to replace the Ward Street car park with a major new community facility and a 1,450m$^2$ public plaza that is connected by active, pedestrian focussed laneways, as shown by **Figure 8** overleaf.

The draft Master Plan was publicly exhibited between 26 January and 10 March 2017 and is currently still under consideration by North Sydney Councillors. The Draft Master Plan is at this stage intended to encourage discussion on the future of the precinct for further refinement of the plan. There is presently no detailed design or development application seeking to implement the draft Master Plan.

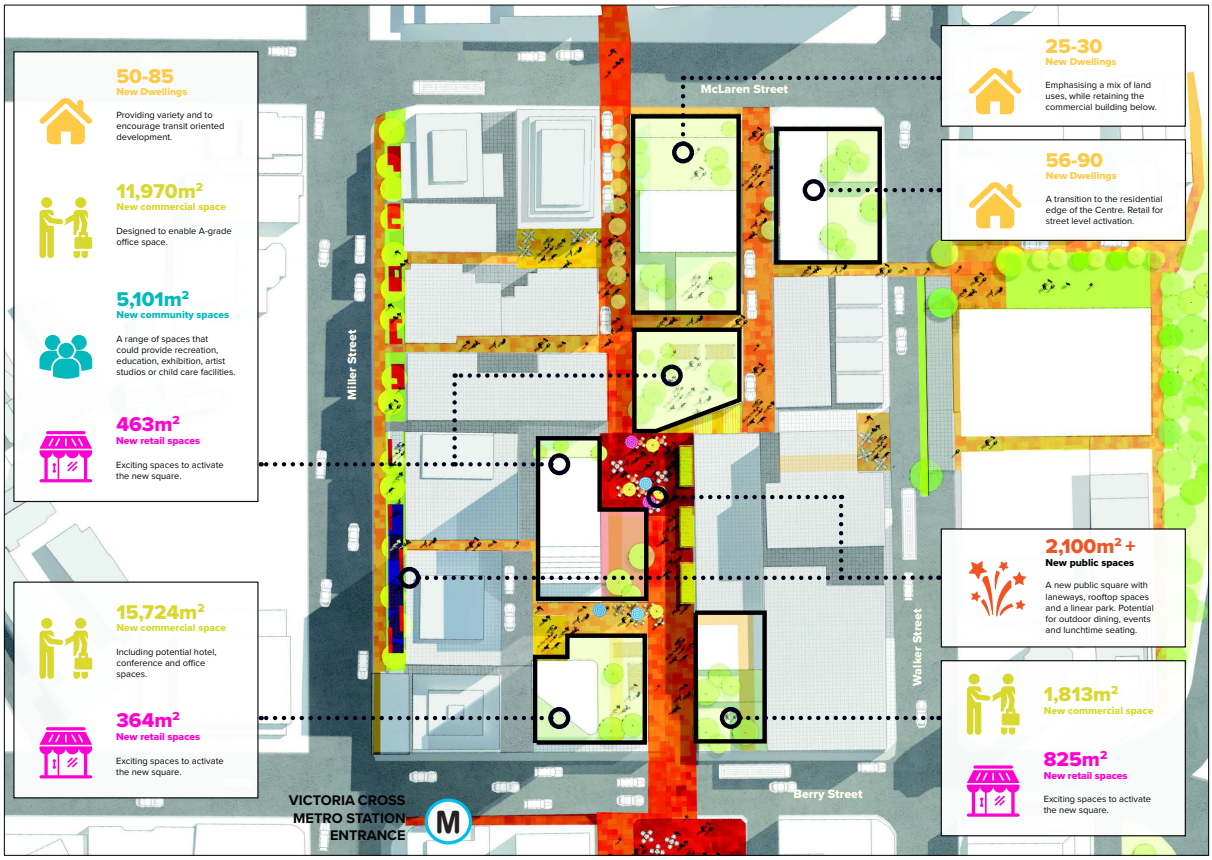



**Figure 8 – Concept Plan for Ward Street Precinct**

In this regard, it is evident that the Site is extremely well located to allow for further refinement of the Master Plan with the aim of achieving a superior design outcome for the Precinct, in terms of pedestrian connectivity and public open space.

# 4 Overview of Planning Proposal

The development contemplated under the Planning Proposal application is shown by the architectural plans prepared by Harry Seidler & Associates, included at a reduced scale in **Appendix B**. In summary, the Planning Proposal contemplates alterations and additions to the existing *Simsmetal House* building and the construction of a new 37-storey residential tower above, consisting of the following:

- Commercial GFA of 7,285m$^2$
- Provision of 224 residential apartments comprising:
  - 22 x studio apartments
  - 78 x one-bedroom apartments
  - 86 x two-bedroom apartments
  - 32 x three-bedroom apartments
  - 6 x four-bedroom apartments
- Provision of 5 basement levels of parking comprising:
  - 219 x car parking spaces (including 40 accessible spaces and 24 visitor parking spaces)
  - 278 x bicycle parking spaces
  - 24 x motorcycle spaces
  - 2 x small rigid vehicle (SRV) loading bays
- Relocate the two (2) existing vehicular access driveways onto Harnett Street.

The traffic and parking implications arising from the Proposal are discussed in the following sections.

# 5 Parking Requirements

## 5.1 Proposed Parking Provisions

The North Sydney DCP stipulates maximum car parking rates for all developments, and includes different rates for a number of land-uses based on the zoning of a site. The subject Site is zoned B4 (Mixed-Use) and accordingly, the development contemplated under the Planning Proposal is required to be assessed in accordance with the rates outlined in **Table 4** below.

**Table 4 – DCP Car Parking Requirement**

| Land Use | No. / Area ($m^2$) | Maximum Parking Rate | Maximum No. Spaces Permitted | Parking Provision |
|---|---|---|---|---|
| **Commercial** | | | | |
| Commercial | 7,285$m^2$ | 1 space per 400$m^2$ GFA | 18 | 22 |
| **Residential** | | | | |
| Studio / One-Bedroom | 100 | 0.5 spaces / dwelling | 50 | 197 |
| Two or more Bedroom | 124 | 1.0 space / dwelling | 124 | |
| | **Total** | | **192** | **219** |

It is evident from Table 4 that the development contemplated under the Planning Proposal would be permitted to provide up to a maximum of 192 car parking spaces, including 174 residential spaces and 18 commercial spaces. In response, the architectural drawings included in Appendix B show that the development would provide a total of 219 car parking spaces including 197 residential spaces and 22 commercial spaces.

It should be noted that Council's DCP does not provide visitor parking rate, hence the development provides an oversupply of 27 parking spaces. The RMS guide recommends residential development to provide one visitor parking space for every 5 – 7 residential units, however Councils may wish to reduce this requirement for buildings located in close proximity to public transport. Accordingly, application of RMS visitor parking rate correlates to a visitor parking demand of 32-45 space for the proposed development. Thus, the oversupply of 27 parking spaces is considered appropriate in this instance, noting the Site is well located to public transport services.

## 5.2 Accessible Parking

Clause 10.2.1, P6 of the North Sydney DCP-Part B stipulates that each adaptable residential apartment is required to be allocated an accessible car parking space. Additionally, Clause 10.3.1, P2 of the North Sydney DCP-Part B stipulates that 1-2% of all non-residential car parking is required to be provided as accessible parking. Accordingly, the Proposal provides 40 accessible parking spaces in compliance with Councils DCP.

## 5.3 Bicycle Parking

Clause 10.5.1, P1 of the North Sydney DCP-Part B requires bicycle parking to be provided at the following rates:

*Residential Land Use*

- 1 bicycle space per dwelling, plus
- 1 bicycle space per 10 units for visitors

*Commercial Land Use*

- 1 bicycle space per 150m$^2$ for occupants (staff), plus
- 1 space per 400m$^2$ of GFA for visitors

Application of the above rates to the Proposal results in a requirement for a total of 314 bicycle spaces comprising 247 residential spaces and 67 commercial spaces. In response, architectural drawings included in Appendix B show that the development would provide a total of 278 bicycle spaces including 52 spaces within a designated bicycle parking area on Basement Level 1 and 226 storage lockers that are large enough to accommodate a bicycle and hence, can be regarded as bicycle parking spaces in accordance with Clause 10.5.1, P1(a) of the North Sydney DCP-Part B. Compliance with Council's parking requirements will be further investigated at DA stage noting that it is likely this can be achieved.

## 5.4 Motorcycle Parking

The North Sydney DCP requires the provision of motorcycle parking at the rate of 1 space per 10 car spaces, or part thereof. Application of this rate to the proposed 219 car spaces results in a requirement of 22 motorcycle spaces. In response, the architectural drawings included in Appendix B show that the development would provide a total of 24 motorcycle spaces, thereby satisfying the minimum requirements of the North Sydney DCP.

## 5.5 Service Vehicle Parking

Council's service vehicle requirements are outlined in Clause 10.4 of the North Sydney DCP-Part B. The relevant section requires at least 1 service delivery space, capable of accommodating:

- One (1) 12.5 metre Heavy Rigid Vehicle (HRV); or
- Two (2) 8.8 metre Medium Rigid Vehicles (MRV)

However, as a consequence of design constraints associated with the heritage significance of the *Simsmetal House* building, particularly with providing a 4.5 metre head height clearance into the basement car park, it is proposed that servicing of the development be limited to vehicles not greater than a 6.4 metre small rigid vehicle (SRV) with a 3.5 metre head height clearance. In this regard, the architectural drawings included in Appendix B show that the development would seek to provide a total of two (2) SRV bays, which is considered an acceptable compromise between satisfying Council's service vehicle parking requirements and maintaining the heritage significance of the *Simsmetal House* building.

Additionally, it is noted that Hartnett Street is provided in the form of a cul-de-sac with no turning head provided at its southern end. Larger vehicles such as Council's waste collection vehicle would therefore have difficulty with entering and exiting Hartnett Street in a forward direction. With this in mind, it is considered appropriate that waste collection of the development may need to be undertaken with the use of a private contractor such that the size of the waste collection vehicle could also be limited to an SRV. This arrangement would ensure that waste collection could be undertaken on-site and eliminate the requirement for larger vehicles to undertake reverse movements on the public roadway. This matter will be assessed in greater detail at DA stage in liaison with Council waste services. It can be concluded that a reasonable and appropriate waste strategy could be implemented to ensure that the heritage integrity of the site.

# 6 Traffic Impacts

## 6.1 Future Traffic Generation

Residential

In developing the update to the RMS Guide, TDT 2013/04a, surveys of 9 high-density residential developments were undertaken by Halcrow. A similar residential development was analysed at 1 Cambridge Lane, Chatswood, which incorporated consistent development and site characteristics as the Proposal. Consistent characteristics included parking provision and accessibility score noting its close proximity to Chatswood railway station. The following trip rates were derived from the comparable development:

- 0.14 AM Peak trips per apartment
- 0.12 PM Peak trips per apartment

Accordingly, the residential component, with 224 apartments, will generate the following peak hourly traffic volumes:

- 31 trips (6 in, 25 out) during the morning peak hour
- 27 trips (22 in, 5 out) during the evening peak hour

Commercial

Given that the North Sydney DCP permits only a 'constrained' level of car parking, it is considered that the most accurate way of assessing the traffic generation of the Proposal is to use a 'trip per parking space' rate, as opposed to a 'trip per area' rate. Similar to the above, a comparable commercial development was surveyed by GTA Consultants in developing the RMS Guide Update.

This development is located at 100 Arthur Street, North Sydney, being comparable to the Proposal in terms of parking provision and accessibility score noting its close proximity to North Sydney railway station. The following parking space trip rates were derived from the comparable development:

- 0.38 AM Peak trips per parking space
- 0.32 PM Peak trips per parking space

Accordingly, the commercial component, with 22 car parking spaces, will generate the following peak hourly traffic volumes:

- 8 trips (6 in, 2 out) during the morning peak hour
- 7 trips (1 in, 6 out) during the evening peak hour

Combined

Having regard for the above, the development is expected to generate in the order of:

- 39 veh/hr (12 in, 27 out) during the morning peak hour
- 34 veh/hr (23 in, 11 out) during the evening peak hour

The above is not a net increase however as it does not take into consideration the generation of the existing development, as is discussed in Section 2 of this report. In this regard, the expected net increase in traffic generation as a result of the Proposal is as follows:

- 20 veh/hr (-3 in, 23 out) during the morning peak hour
- 18 veh/hr (20 in, -2 out) during the evening peak hour

Therefore, the traffic analysis demonstrates that the Proposal would generate – on average – approximately 1 additional trip to the surrounding road network every 3-4 minutes (approximately) during the morning and evening peak periods, with reduced impacts at other times. The following section assesses the impact of the proposed traffic generation on the local intersections.

## 6.2 Future Road Network Performance

The above net increase in peak period traffic generation will be split into both directions (in/out) and distributed to the east and west along McLaren Street, thereby minimising impacts. For the purposes of assessment, the below distributions have been assumed, having regard for the surveyed traffic volumes of the key intersections and access routes to/from the major arterial roads of Pacific Highway and Warringah Freeway:

- 60% via McLaren Street / Walker Street intersection
- 40% via McLaren Street / Miller Street intersection

The traffic impacts of the Proposal have been analysed using SIDRA modelling, with Error! Reference source not found. overleaf providing a comparison between the existing and future intersection performances.

**Table 5 - Existing & Future Local Intersection Performance**

| Intersection | Scenario | Period | Degree of Saturation (DoS) | Average Intersection Delay (AVD) | Level of Service (LoS) |
|---|---|---|---|---|---|
| Miller St / McLaren St | Existing | AM | 0.580 | 17.5 | B |
| | | PM | 0.572 | 18.1 | B |
| | With Development | AM | 0.584 | 17.9 | B |
| | | PM | 0.575 | 18.1 | B |
| McLaren St / Walker St | Existing | AM | 0.129 | 8.4 | A |
| | | PM | 0.195 | 7.8 | A |
| | With Development | AM | 0.142 | 8.5 | A |
| | | PM | 0.196 | 7.9 | A |

It can be seen from Table 5**Error! Reference source not found.** that the additional traffic generated by the development will have a negligible impact on the performance of both intersections with only minor increases to intersection delays and Degree of Saturations, and no change to existing Levels of Service.

Accordingly, the SIDRA modelling results confirm that the traffic impacts of the Proposal can be accommodated within the existing road network, with no upgrades required. The Proposal is therefore considered supportable on traffic generation grounds.

# 7 Access and Internal Design Aspects

The site access, internal circulation and car parking arrangements have been developed with consideration of the requirements of Council's DCP and the relevant Australian Standards (AS2890.1, AS2890.2 and AS2890.6). The following characteristics are noteworthy with regard to the design of the site access driveway, loading docks and basement car parking.

## 7.1 Site Access

Access to the Site is proposed from Hartnett Street via the following two driveways:

- Service vehicle and commercial parking access:
  A single 5.5 metre entry/exit driveway for commercial (heavy) vehicles, located on the eastern Site boundary and towards the southern end of the Site.
- Car park access:

  A single 6.0 metre entry/exit driveway for light vehicles only, centrally located on the eastern Site boundary.

The proposed driveway providing access to the basement car parking complies with Category 2 driveway (User Class 1 and 1A, with a local road frontage servicing 100-300 parking spaces) in accordance with AS2890.1 which requires a 6.0-9.0 metre wide combined entry/exit driveway.

Furthermore, it is important to note that the commercial vehicle driveway has been configured to enable the necessary manoeuvres for the largest vehicle to be accommodated on-site, being a 6.4 metre SRV. The swept path analysis attached at **Appendix C** demonstrates that the necessary manoeuvres would be accommodated under this scenario.

## 7.2 Car Park Design

The internal design of the car park has been developed with consideration of AS2890.1, as outlined in the following:

- All parking space dimensions are to be provided for a Class 1A user, which requires a minimum space length of 5.4m, a minimum width of 2.4m and a minimum aisle width of 5.8m.
- All spaces located adjacent to obstructions greater than 150mm in height are to be provided with an additional width of 300mm. This includes any landscaping that exceeds 150mm.
- All accessible parking spaces are designed in accordance with AS2890.6. Spaces are provided with a clear width of 2.4m and located adjacent to a minimum shared area of 2.4m.

## 7.3 Commercial Vehicle Facilities

The circulation areas for commercial vehicles have been designed having regard for the requirements of AS2890.2. In this regard, the following is considered noteworthy:

- Swept path analysis has been performed using a 6.4 metre SRV, to verify the design widths of the circulation roads and driveways. The results of this analysis reveal that the necessary manoeuvres of the largest vehicle expected to access the site are able to be accommodated under the Proposal.
- A clear head height clearance of 3.5 metres has been provided above the service vehicle area.

It is important to note the loading bays require a total with of 7 metres (2 adjacent loading bays x minimum width of 3.5 metres each), however a total loading bay width of 6.5 metres is provided. Noting the heritage status of the building, the development can be appropriately conditioned to provide a loading bay width of 7 metres during the Development Application stage.

## 7.4 Design Summary

The internal configuration of the Site – including light and heavy vehicular access, car parking and servicing areas – has been designed generally in accordance with the requirements of Council's DCP and the relevant Australian Standards of AS2890.1, AS2890.2 and AS2890.6.

# 8 Conclusions

The key findings of this Traffic Impact Assessment can be summarised as follows:

- The Planning Proposal seeks approval for an increase to the permitted building height on the subject Site, which would allow for a 46-storey mixed-use development having an 7,285m$^2$ commercial gross floor area (GFA) and 224 residential apartments (the Proposal).
- The development would generate in the order of 39 and 34 vehicle trips during the morning and evening peak periods respectively. The net increase in traffic generation will however be only 20 and 18 vehicle trips during the morning and evening peak periods respectively, once the generation of the existing development is taken into account.
- The SIDRA modelling results confirm that the additional traffic generated by the development will have a negligible impact on the performance of key intersections in the locality with only minor increases to intersection delays and Degree of Saturations, and no change to existing Levels of Service. Accordingly, the SIDRA modelling results confirm that the traffic impacts of the Proposal can be accommodated within the existing road network, with no upgrades required. The Proposal is therefore considered supportable on traffic generation grounds.
- A maximum of 192 car parking spaces are permitted under application of the North Sydney DCP. In response, the Proposal is able to accommodate a total of 219 car parking spaces (an oversupply of 27 spaces). It should be noted that the North Sydney DCP does not provide visitor parking rates, hence the RMS Guide provides a basis for visitor parking rates. It was concluded that the development would generate a visitor parking demand of approximately 32-45 parking spaces, thus the oversupply of 27 spaces is considered appropriate in this instance (noting the Site is considered to be well serviced by public transport).
- The Proposal includes the provision of two (2) SRV bays, which is considered an acceptable compromise between satisfying Council's service vehicle parking requirements for use of larger vehicles and maintaining the heritage significance of the Simsmetal House building.
- The internal configuration of the Site – including light and heavy vehicular access, car parking and servicing areas – has been designed in accordance with Council's DCP and the relevant Australian Standards of AS2890.1, AS2890.2 and AS2890.6.

It is therefore concluded that the Planning Proposal is supportable on traffic planning grounds.

# Appendix A

# MOVEMENT SUMMARY

## Site: 1 [Walker x McLaren - EX AM]

Walker St x McLaren St
Existing AM Peak
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand 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 per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Walker St (200m) | | | | | | | | | | | |
| 1 | L2 | 243 | 0.4 | 0.186 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.39 | 48.3 |
| 2 | T1 | 119 | 0.0 | 0.186 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.39 | 52.2 |
| Approach | | 362 | 0.3 | 0.186 | 3.7 | NA | 0.0 | 0.0 | 0.00 | 0.39 | 49.6 |
| North: Walker St (200m) | | | | | | | | | | | |
| 8 | T1 | 261 | 0.0 | 0.205 | 0.7 | LOS A | 0.8 | 5.4 | 0.27 | 0.17 | 54.3 |
| 9 | R2 | 89 | 0.0 | 0.205 | 7.0 | LOS A | 0.8 | 5.4 | 0.27 | 0.17 | 49.5 |
| Approach | | 351 | 0.0 | 0.205 | 2.3 | NA | 0.8 | 5.4 | 0.27 | 0.17 | 53.1 |
| West: McLaren St (160m) | | | | | | | | | | | |
| 10 | L2 | 52 | 2.0 | 0.035 | 5.9 | LOS A | 0.1 | 1.0 | 0.21 | 0.54 | 43.8 |
| 12 | R2 | 93 | 1.1 | 0.129 | 8.4 | LOS A | 0.4 | 3.0 | 0.49 | 0.77 | 40.8 |
| Approach | | 144 | 1.5 | 0.129 | 7.5 | LOS A | 0.4 | 3.0 | 0.39 | 0.69 | 41.8 |
| All Vehicles | | 857 | 0.4 | 0.205 | 3.8 | NA | 0.8 | 5.4 | 0.18 | 0.35 | 49.5 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 1 [Walker x McLaren - FU AM]

Walker St x McLaren St
Future AM Peak
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand 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 per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Walker St (200m) | | | | | | | | | | | |
| 1 | L2 | 243 | 0.4 | 0.186 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.39 | 48.3 |
| 2 | T1 | 119 | 0.0 | 0.186 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.39 | 52.2 |
| Approach | | 362 | 0.3 | 0.186 | 3.7 | NA | 0.0 | 0.0 | 0.00 | 0.39 | 49.6 |
| North: Walker St (200m) | | | | | | | | | | | |
| 8 | T1 | 261 | 0.0 | 0.205 | 0.7 | LOS A | 0.8 | 5.4 | 0.27 | 0.17 | 54.3 |
| 9 | R2 | 89 | 0.0 | 0.205 | 7.0 | LOS A | 0.8 | 5.4 | 0.27 | 0.17 | 49.5 |
| Approach | | 351 | 0.0 | 0.205 | 2.3 | NA | 0.8 | 5.4 | 0.27 | 0.17 | 53.1 |
| West: McLaren St (160m) | | | | | | | | | | | |
| 10 | L2 | 56 | 1.9 | 0.038 | 5.9 | LOS A | 0.2 | 1.1 | 0.21 | 0.54 | 43.8 |
| 12 | R2 | 102 | 1.0 | 0.142 | 8.5 | LOS A | 0.5 | 3.3 | 0.50 | 0.77 | 40.7 |
| Approach | | 158 | 1.3 | 0.142 | 7.6 | LOS A | 0.5 | 3.3 | 0.40 | 0.69 | 41.8 |
| All Vehicles | | 871 | 0.4 | 0.205 | 3.8 | NA | 0.8 | 5.4 | 0.18 | 0.36 | 49.3 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 1 [Walker x McLaren - EX PM]

Walker St x McLaren St
Existing PM Peak
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand 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 per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Walker St (200m) | | | | | | | | | | | |
| 1 | L2 | 236 | 0.0 | 0.218 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.32 | 49.5 |
| 2 | T1 | 193 | 0.0 | 0.218 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.32 | 53.4 |
| Approach | | 428 | 0.0 | 0.218 | 3.1 | NA | 0.0 | 0.0 | 0.00 | 0.32 | 51.3 |
| North: Walker St (200m) | | | | | | | | | | | |
| 8 | T1 | 142 | 0.0 | 0.094 | 0.4 | LOS A | 0.2 | 1.6 | 0.18 | 0.10 | 56.3 |
| 9 | R2 | 25 | 0.0 | 0.094 | 7.2 | LOS A | 0.2 | 1.6 | 0.18 | 0.10 | 51.4 |
| Approach | | 167 | 0.0 | 0.094 | 1.5 | NA | 0.2 | 1.6 | 0.18 | 0.10 | 55.6 |
| West: McLaren St (160m) | | | | | | | | | | | |
| 10 | L2 | 58 | 0.0 | 0.042 | 6.1 | LOS A | 0.2 | 1.2 | 0.28 | 0.56 | 43.7 |
| 12 | R2 | 160 | 0.0 | 0.195 | 7.8 | LOS A | 0.7 | 4.8 | 0.46 | 0.74 | 41.7 |
| Approach | | 218 | 0.0 | 0.195 | 7.4 | LOS A | 0.7 | 4.8 | 0.41 | 0.69 | 42.2 |
| All Vehicles | | 814 | 0.0 | 0.218 | 3.9 | NA | 0.7 | 4.8 | 0.15 | 0.38 | 49.4 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 1 [Walker x McLaren - FU PM]

Walker St x McLaren St
Future PM Peak
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand 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 per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Walker St (200m) | | | | | | | | | | | |
| 1 | L2 | 245 | 0.0 | 0.223 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.33 | 49.4 |
| 2 | T1 | 193 | 0.0 | 0.223 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.33 | 53.3 |
| Approach | | 438 | 0.0 | 0.223 | 3.1 | NA | 0.0 | 0.0 | 0.00 | 0.33 | 51.2 |
| North: Walker St (200m) | | | | | | | | | | | |
| 8 | T1 | 142 | 0.0 | 0.097 | 0.5 | LOS A | 0.3 | 1.8 | 0.20 | 0.11 | 55.9 |
| 9 | R2 | 28 | 0.0 | 0.097 | 7.2 | LOS A | 0.3 | 1.8 | 0.20 | 0.11 | 51.0 |
| Approach | | 171 | 0.0 | 0.097 | 1.6 | NA | 0.3 | 1.8 | 0.20 | 0.11 | 55.1 |
| West: McLaren St (160m) | | | | | | | | | | | |
| 10 | L2 | 58 | 0.0 | 0.042 | 6.1 | LOS A | 0.2 | 1.2 | 0.28 | 0.56 | 43.7 |
| 12 | R2 | 160 | 0.0 | 0.196 | 7.9 | LOS A | 0.7 | 4.8 | 0.47 | 0.74 | 41.6 |
| Approach | | 218 | 0.0 | 0.196 | 7.4 | LOS A | 0.7 | 4.8 | 0.42 | 0.70 | 42.2 |
| All Vehicles | | 826 | 0.0 | 0.223 | 3.9 | NA | 0.7 | 4.8 | 0.15 | 0.38 | 49.3 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 1 [Miller x McLaren - EX AM]

Miller St x McLaren St
Existing AM Peak
Signals - Fixed Time Isolated  Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand 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 per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Miller St (200m) | | | | | | | | | | | |
| 1 | L2 | 136 | 3.1 | 0.117 | 10.2 | LOS A | 1.6 | 11.3 | 0.42 | 0.68 | 41.1 |
| 2 | T1 | 276 | 6.9 | 0.449 | 14.5 | LOS A | 6.6 | 48.8 | 0.78 | 0.67 | 37.5 |
| 3 | R2 | 26 | 0.0 | 0.449 | 20.0 | LOS B | 6.6 | 48.8 | 0.78 | 0.67 | 34.3 |
| Approach | | 438 | 5.3 | 0.449 | 13.5 | LOS A | 6.6 | 48.8 | 0.67 | 0.67 | 38.4 |
| East: McLaren St (160m) | | | | | | | | | | | |
| 4 | L2 | 77 | 0.0 | 0.252 | 30.1 | LOS C | 2.1 | 14.4 | 0.91 | 0.75 | 24.9 |
| 5 | T1 | 154 | 0.0 | 0.580 | 25.9 | LOS B | 4.3 | 30.3 | 0.95 | 0.77 | 29.1 |
| Approach | | 231 | 0.0 | 0.580 | 27.3 | LOS B | 4.3 | 30.3 | 0.94 | 0.77 | 27.6 |
| North: Miller St (200m) | | | | | | | | | | | |
| 7 | L2 | 52 | 0.0 | 0.559 | 19.5 | LOS B | 9.8 | 75.2 | 0.80 | 0.71 | 34.8 |
| 8 | T1 | 533 | 12.3 | 0.559 | 14.7 | LOS B | 9.8 | 75.2 | 0.81 | 0.73 | 36.5 |
| 9 | R2 | 153 | 0.0 | 0.559 | 22.4 | LOS B | 7.1 | 52.5 | 0.85 | 0.77 | 33.1 |
| Approach | | 737 | 8.9 | 0.559 | 16.6 | LOS B | 9.8 | 75.2 | 0.82 | 0.73 | 35.6 |
| West: McLaren St (230m) | | | | | | | | | | | |
| 10 | L2 | 62 | 1.7 | 0.092 | 19.1 | LOS B | 1.2 | 8.5 | 0.69 | 0.71 | 33.6 |
| 11 | T1 | 103 | 1.0 | 0.276 | 16.2 | LOS B | 3.2 | 22.8 | 0.81 | 0.66 | 34.6 |
| 12 | R2 | 41 | 0.0 | 0.276 | 21.7 | LOS B | 3.2 | 22.8 | 0.81 | 0.66 | 34.6 |
| Approach | | 206 | 1.0 | 0.276 | 18.1 | LOS B | 3.2 | 22.8 | 0.77 | 0.67 | 34.3 |
| All Vehicles | | 1612 | 5.6 | 0.580 | 17.5 | LOS B | 9.8 | 75.2 | 0.79 | 0.71 | 34.7 |

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

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | South Full Crossing | 53 | 24.4 | LOS C | 0.1 | 0.1 | 0.90 | 0.90 |
| P2 | East Full Crossing | 53 | 15.4 | LOS B | 0.1 | 0.1 | 0.72 | 0.72 |
| P3 | North Full Crossing | 53 | 18.4 | LOS B | 0.1 | 0.1 | 0.79 | 0.79 |
| P4 | West Full Crossing | 53 | 16.2 | LOS B | 0.1 | 0.1 | 0.73 | 0.73 |
| All Pedestrians | | 211 | 18.6 | LOS B | | | 0.79 | 0.79 |

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

# MOVEMENT SUMMARY

## Site: 1 [Walker x McLaren - FU AM]

Walker St x McLaren St
Future AM Peak
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand 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 per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Walker St (200m) | | | | | | | | | | | |
| 1 | L2 | 243 | 0.4 | 0.186 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.39 | 48.3 |
| 2 | T1 | 119 | 0.0 | 0.186 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.39 | 52.2 |
| Approach | | 362 | 0.3 | 0.186 | 3.7 | NA | 0.0 | 0.0 | 0.00 | 0.39 | 49.6 |
| North: Walker St (200m) | | | | | | | | | | | |
| 8 | T1 | 261 | 0.0 | 0.205 | 0.7 | LOS A | 0.8 | 5.4 | 0.27 | 0.17 | 54.3 |
| 9 | R2 | 89 | 0.0 | 0.205 | 7.0 | LOS A | 0.8 | 5.4 | 0.27 | 0.17 | 49.5 |
| Approach | | 351 | 0.0 | 0.205 | 2.3 | NA | 0.8 | 5.4 | 0.27 | 0.17 | 53.1 |
| West: McLaren St (160m) | | | | | | | | | | | |
| 10 | L2 | 56 | 1.9 | 0.038 | 5.9 | LOS A | 0.2 | 1.1 | 0.21 | 0.54 | 43.8 |
| 12 | R2 | 102 | 1.0 | 0.142 | 8.5 | LOS A | 0.5 | 3.3 | 0.50 | 0.77 | 40.7 |
| Approach | | 158 | 1.3 | 0.142 | 7.6 | LOS A | 0.5 | 3.3 | 0.40 | 0.69 | 41.8 |
| All Vehicles | | 871 | 0.4 | 0.205 | 3.8 | NA | 0.8 | 5.4 | 0.18 | 0.36 | 49.3 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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: 1 [Miller x McLaren - EX PM]

Miller St x McLaren St
Existing PM Peak
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand 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 per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Miller St (200m) | | | | | | | | | | | |
| 1 | L2 | 109 | 0.0 | 0.114 | 18.1 | LOS B | 2.4 | 17.2 | 0.68 | 0.71 | 35.1 |
| 2 | T1 | 378 | 10.3 | 0.572 | 15.2 | LOS B | 8.7 | 66.1 | 0.81 | 0.71 | 36.9 |
| 3 | R2 | 18 | 0.0 | 0.572 | 20.8 | LOS B | 8.7 | 66.1 | 0.82 | 0.71 | 33.8 |
| Approach | | 505 | 7.7 | 0.572 | 16.0 | LOS B | 8.7 | 66.1 | 0.78 | 0.71 | 36.3 |
| East: McLaren St (160m) | | | | | | | | | | | |
| 4 | L2 | 84 | 0.0 | 0.230 | 28.1 | LOS B | 2.1 | 15.0 | 0.88 | 0.75 | 25.9 |
| 5 | T1 | 169 | 0.0 | 0.542 | 23.7 | LOS B | 4.5 | 31.8 | 0.92 | 0.74 | 30.4 |
| Approach | | 254 | 0.0 | 0.542 | 25.1 | LOS B | 4.5 | 31.8 | 0.91 | 0.75 | 28.8 |
| North: Miller St (200m) | | | | | | | | | | | |
| 7 | L2 | 34 | 0.0 | 0.334 | 19.2 | LOS B | 5.2 | 37.9 | 0.73 | 0.64 | 35.0 |
| 8 | T1 | 295 | 6.4 | 0.334 | 15.0 | LOS B | 5.2 | 37.9 | 0.76 | 0.66 | 36.3 |
| 9 | R2 | 59 | 0.0 | 0.334 | 24.6 | LOS B | 3.3 | 23.7 | 0.83 | 0.72 | 32.0 |
| Approach | | 387 | 4.9 | 0.334 | 16.9 | LOS B | 5.2 | 37.9 | 0.77 | 0.67 | 35.4 |
| West: McLaren St (230m) | | | | | | | | | | | |
| 10 | L2 | 69 | 0.0 | 0.093 | 17.7 | LOS B | 1.3 | 8.9 | 0.65 | 0.71 | 34.8 |
| 11 | T1 | 59 | 0.0 | 0.166 | 13.9 | LOS A | 1.8 | 12.9 | 0.74 | 0.62 | 36.2 |
| 12 | R2 | 32 | 0.0 | 0.166 | 19.4 | LOS B | 1.8 | 12.9 | 0.74 | 0.62 | 36.0 |
| Approach | | 160 | 0.0 | 0.166 | 16.6 | LOS B | 1.8 | 12.9 | 0.70 | 0.66 | 35.5 |
| All Vehicles | | 1306 | 4.4 | 0.572 | 18.1 | LOS B | 8.7 | 66.1 | 0.79 | 0.70 | 34.3 |

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

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | South Full Crossing | 53 | 24.4 | LOS C | 0.1 | 0.1 | 0.90 | 0.90 |
| P2 | East Full Crossing | 53 | 16.9 | LOS B | 0.1 | 0.1 | 0.75 | 0.75 |
| P3 | North Full Crossing | 53 | 16.9 | LOS B | 0.1 | 0.1 | 0.75 | 0.75 |
| P4 | West Full Crossing | 53 | 17.7 | LOS B | 0.1 | 0.1 | 0.77 | 0.77 |
| All Pedestrians | | 211 | 19.0 | LOS B | | | 0.79 | 0.79 |

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

# MOVEMENT SUMMARY

## Site: 1 [Miller x McLaren - FU PM ]

Miller St x McLaren St
Future PM Peak
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand 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 per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Miller St (200m) | | | | | | | | | | | |
| 1 | L2 | 109 | 0.0 | 0.115 | 18.1 | LOS B | 2.4 | 17.3 | 0.68 | 0.71 | 35.1 |
| 2 | T1 | 378 | 10.3 | 0.575 | 15.2 | LOS B | 8.7 | 66.3 | 0.82 | 0.71 | 36.8 |
| 3 | R2 | 19 | 0.0 | 0.575 | 20.8 | LOS B | 8.7 | 66.3 | 0.82 | 0.72 | 33.8 |
| Approach | | 506 | 7.7 | 0.575 | 16.0 | LOS B | 8.7 | 66.3 | 0.79 | 0.71 | 36.3 |
| East: McLaren St (160m) | | | | | | | | | | | |
| 4 | L2 | 84 | 0.0 | 0.230 | 28.1 | LOS B | 2.1 | 15.0 | 0.88 | 0.75 | 25.9 |
| 5 | T1 | 169 | 0.0 | 0.542 | 23.7 | LOS B | 4.5 | 31.8 | 0.92 | 0.74 | 30.4 |
| Approach | | 254 | 0.0 | 0.542 | 25.1 | LOS B | 4.5 | 31.8 | 0.91 | 0.75 | 28.8 |
| North: Miller St (200m) | | | | | | | | | | | |
| 7 | L2 | 35 | 0.0 | 0.335 | 19.2 | LOS B | 5.2 | 38.0 | 0.73 | 0.64 | 35.0 |
| 8 | T1 | 295 | 6.4 | 0.335 | 15.1 | LOS B | 5.2 | 38.0 | 0.76 | 0.66 | 36.3 |
| 9 | R2 | 59 | 0.0 | 0.335 | 24.6 | LOS B | 3.3 | 23.8 | 0.83 | 0.72 | 32.0 |
| Approach | | 388 | 4.9 | 0.335 | 16.9 | LOS B | 5.2 | 38.0 | 0.77 | 0.67 | 35.4 |
| West: McLaren St (230m) | | | | | | | | | | | |
| 10 | L2 | 69 | 0.0 | 0.093 | 17.7 | LOS B | 1.3 | 8.9 | 0.65 | 0.71 | 34.8 |
| 11 | T1 | 65 | 0.0 | 0.174 | 13.9 | LOS A | 2.0 | 13.8 | 0.74 | 0.62 | 36.3 |
| 12 | R2 | 32 | 0.0 | 0.174 | 19.5 | LOS B | 2.0 | 13.8 | 0.74 | 0.62 | 36.1 |
| Approach | | 166 | 0.0 | 0.174 | 16.6 | LOS B | 2.0 | 13.8 | 0.71 | 0.65 | 35.6 |
| All Vehicles | | 1315 | 4.4 | 0.575 | 18.1 | LOS B | 8.7 | 66.3 | 0.79 | 0.70 | 34.3 |

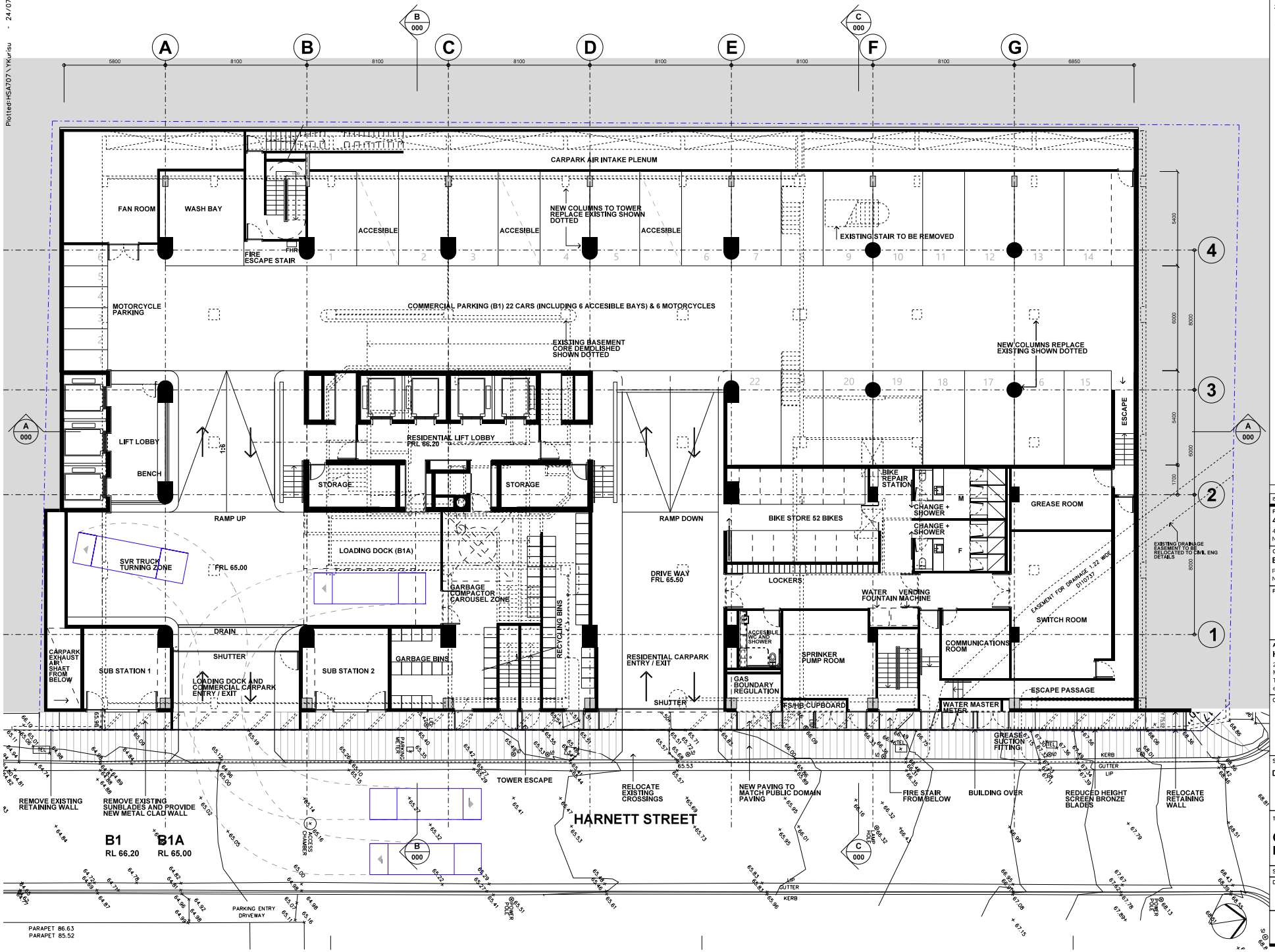
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard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

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | South Full Crossing | 53 | 24.4 | LOS C | 0.1 | 0.1 | 0.90 | 0.90 |
| P2 | East Full Crossing | 53 | 16.9 | LOS B | 0.1 | 0.1 | 0.75 | 0.75 |
| P3 | North Full Crossing | 53 | 16.9 | LOS B | 0.1 | 0.1 | 0.75 | 0.75 |
| P4 | West Full Crossing | 53 | 17.7 | LOS B | 0.1 | 0.1 | 0.77 | 0.77 |
| All Pedestrians | | 211 | 19.0 | LOS B | | | 0.79 | 0.79 |

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

# Appendix B

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| ISSUE | REVISION | DATE |
|---|---|---|
| A | Initial issue. | 24-07-17 |

Project
**41 McLaren Street Redevelopment**
41 Mclaren Street
North Sydney NSW 2060

Client
**Erolcene Pty Ltd and Claijade Pty Ltd**
P.O. Box 6395
North Sydney NSW 2060

Project Manager

Architect
**Harry Seidler & Associates**
2 Glen Street
Milsons Point NSW 2061
Tel. (02)99221388 Fax. (02)99572974
email. hsa@seidler.net.au

Consultant

Stage
**DA / Planning Submission**

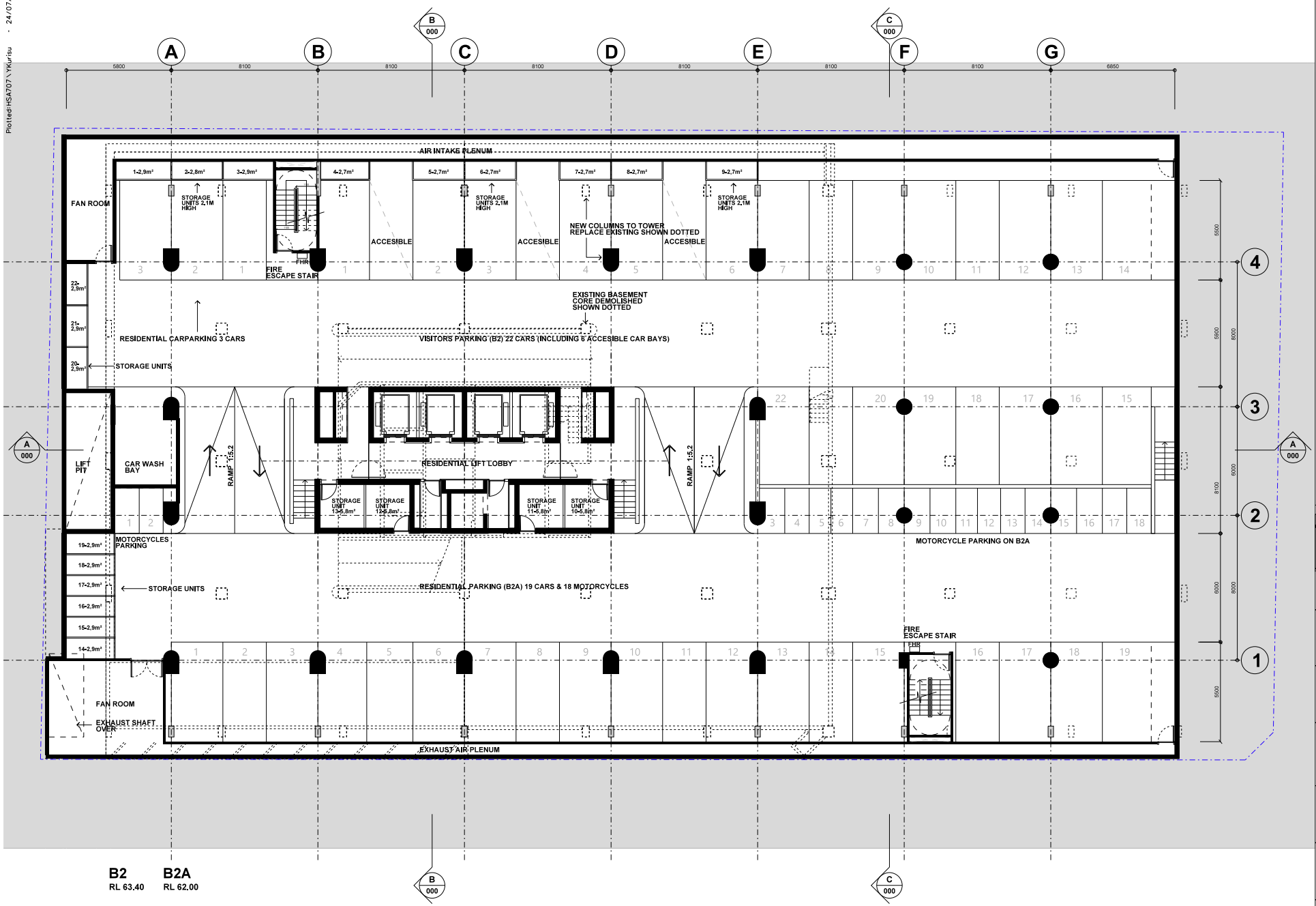
Title
**Carpark Entry-Exit Plan B1-B1A**

Scale 1 : 100 @ A1

| Drawn | Checked | Co Ord. | Approved | Date |
|---|---|---|---|---|
| | | | | Apr 2017 |

| Drawing Number | Issue |
|---|---|
| 010 | A |

Plotted:HSA707\YKurisu - 24/07/2017 5:33:21




**B2** RL 63.40

**B2A** RL 62.00

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**41 McLaren Street Redevelopment**
41 Mclaren Street
North Sydney NSW 2060

Client
**Erolcene Pty Ltd and Claijade Pty Ltd**
P.O. Box 6395
North Sydney NSW 2060

Project Manager

Architect
**Harry Seidler & Associates**
2 Glen Street
Milsons Point NSW 2061
Tel. (02)9921388 Fax. (02)99572974
email. hsa@seidler.net.au

Consultant

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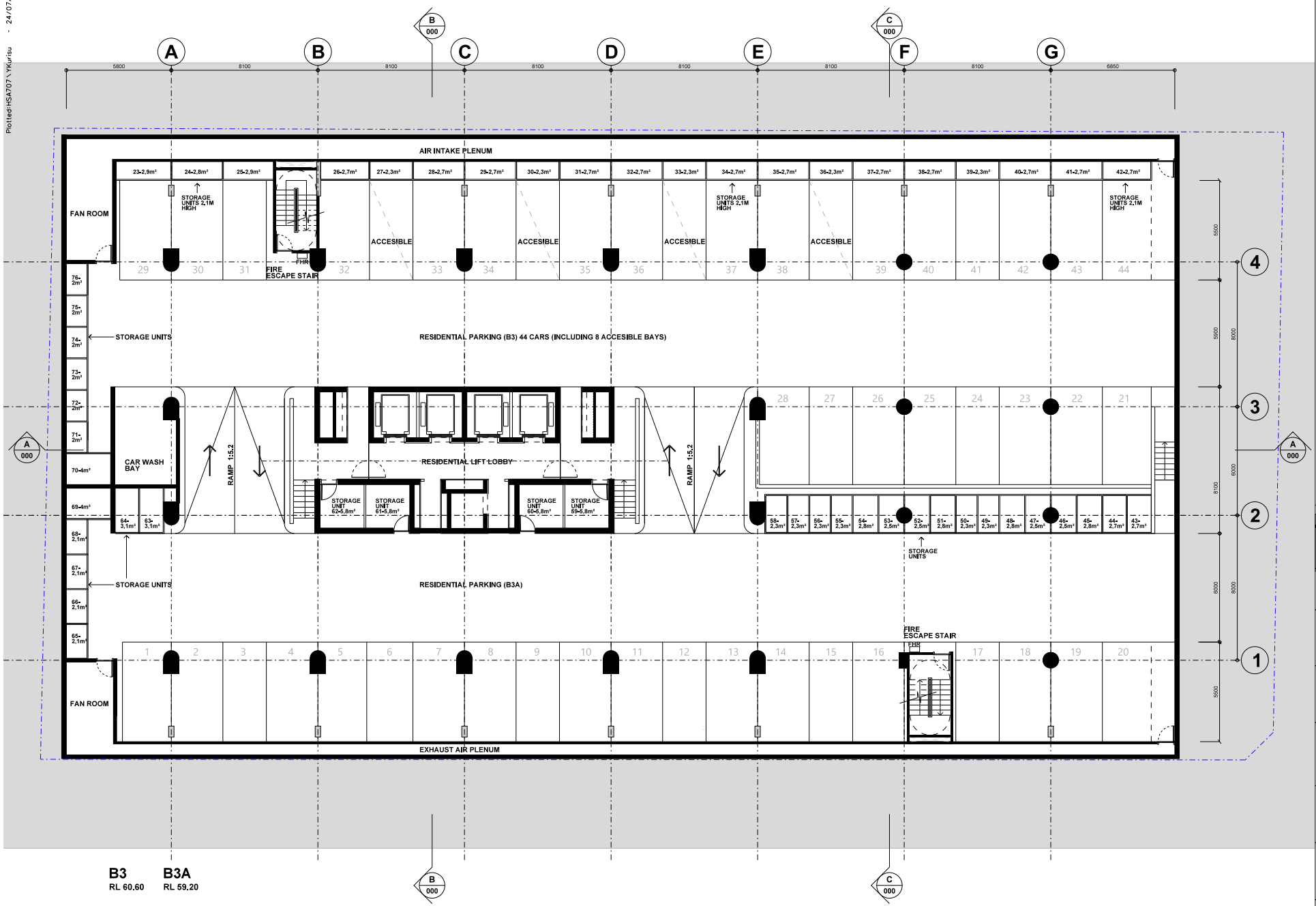
|---|---|---|---|---|
| | | | | Apr 2017 |

| Drawing Number | Issue |
|---|---|
| 011 | A |




**B3** RL 60.60 **B3A** RL 59.20

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**41 McLaren Street Redevelopment**
41 Mclaren Street
North Sydney NSW 2060

Client
**Erolcene Pty Ltd and Claijade Pty Ltd**
P.O. Box 6395
North Sydney NSW 2060

Project Manager

Architect
**Harry Seidler & Associates**
2 Glen Street
Milsons Point NSW 2061
Tel. (02)9221388 Fax. (02)99572974
email. hsa@seidler.net.au

Consultant

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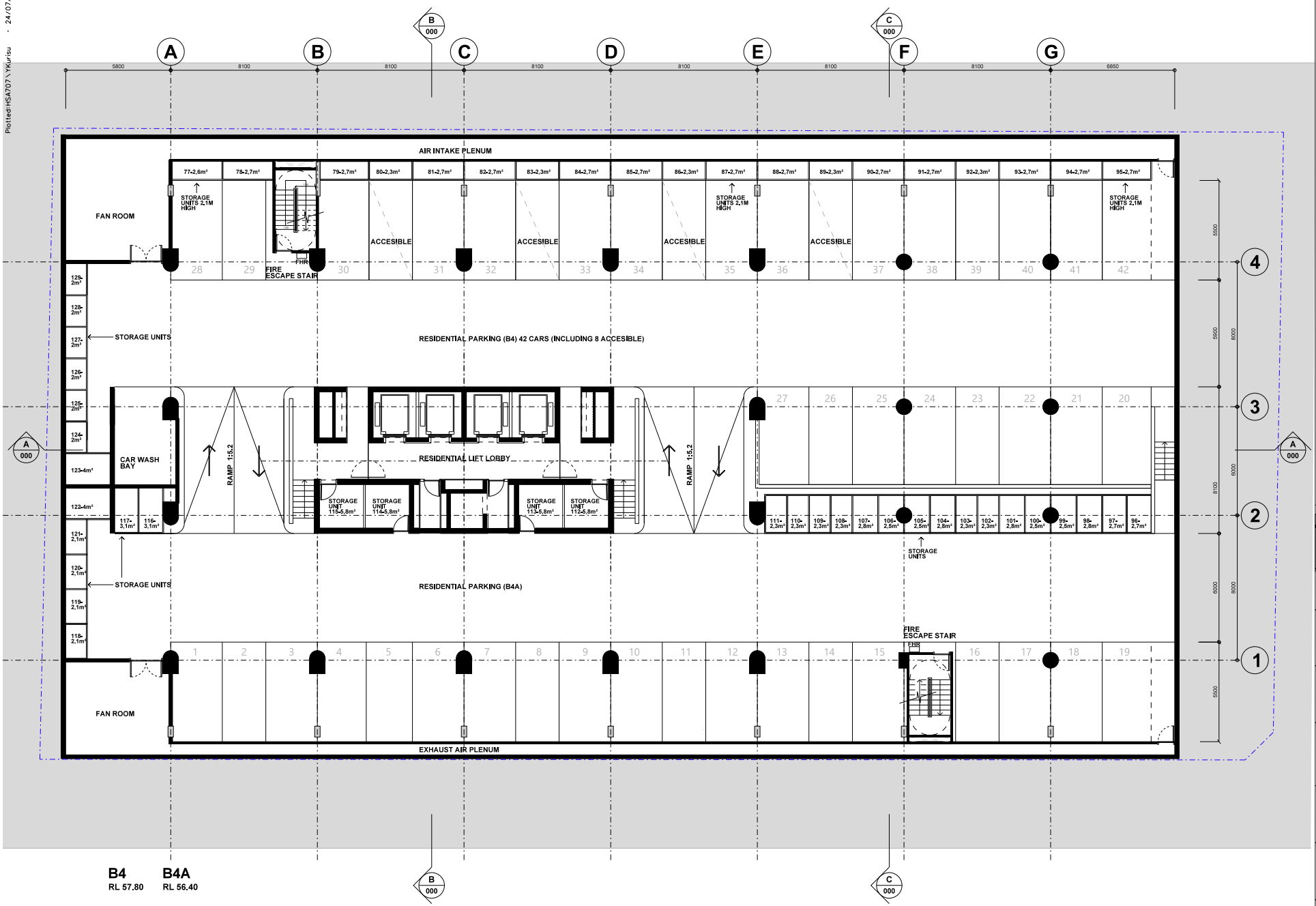
| Drawing Number | Issue |
|---|---|
| 012 | A |




**B4** RL 57.80 **B4A** RL 56.40

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41 Mclaren Street
North Sydney NSW 2060

Client
**Erolcene Pty Ltd and Claijade Pty Ltd**
P.O. Box 6395
North Sydney NSW 2060

Project Manager

Architect
**Harry Seidler & Associates**
2 Glen Street
Milsons Point NSW 2061
Tel. (02)9221388 Fax. (02)99572974
email. hsa@seidler.net.au

Consultant

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Title
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Scale 1 : 100 @ A1

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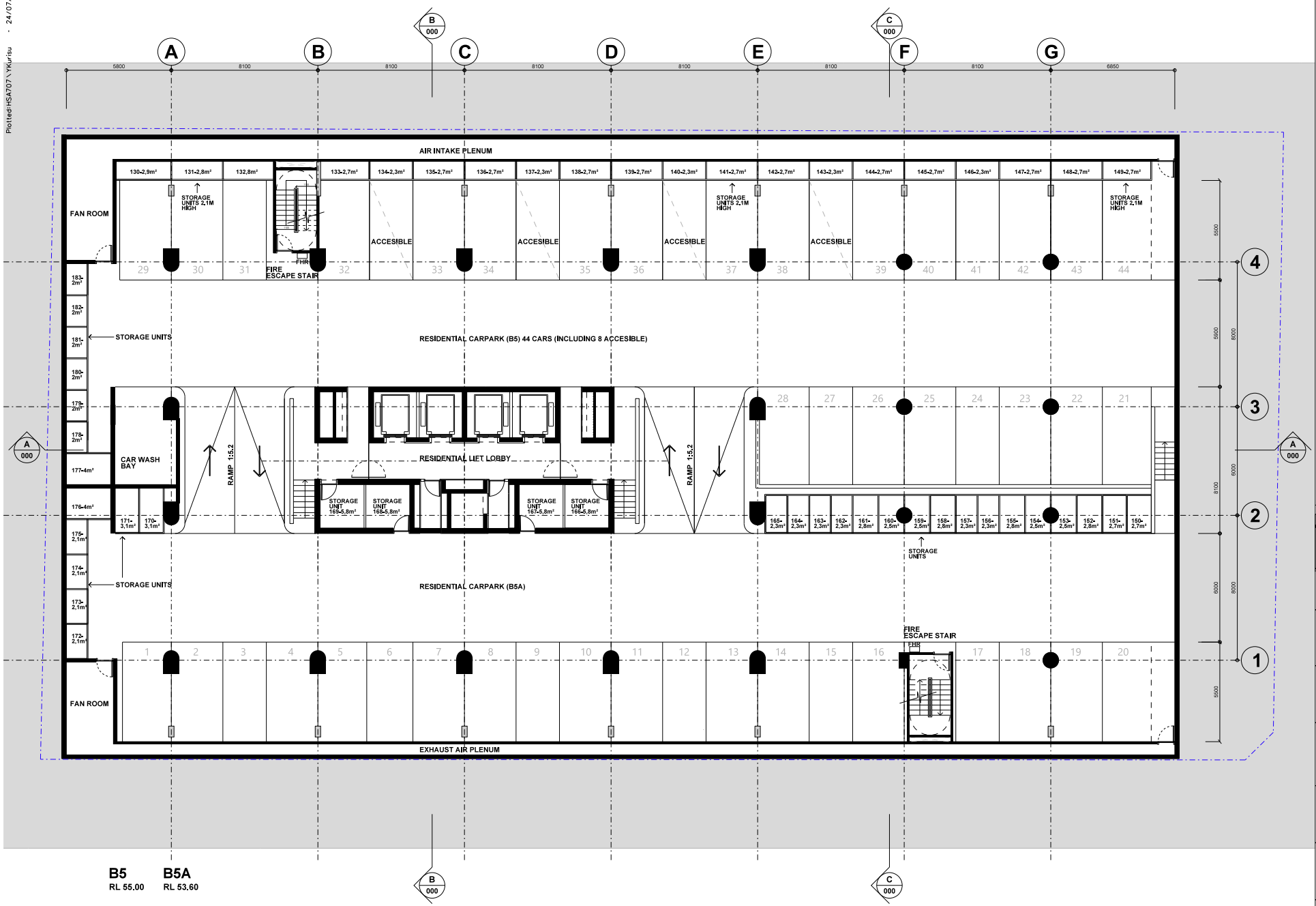
| Drawing Number | Issue |
|---|---|
| 013 | A |




**B5** RL 55.00 **B5A** RL 53.60

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**41 McLaren Street Redevelopment**
41 Mclaren Street
North Sydney NSW 2060

Client
**Erolcene Pty Ltd and Claijade Pty Ltd**
P.O. Box 6395
North Sydney NSW 2060

Project Manager

Architect
**Harry Seidler & Associates**
2 Glen Street
Milsons Point NSW 2061
Tel. (02)99221388 Fax. (02)99572974
email. hsa@seidler.net.au

Consultant

Stage
**DA / Planning Submission**

Title
**Carpark Plan B5-B5A**

Scale 1 : 100 @ A1

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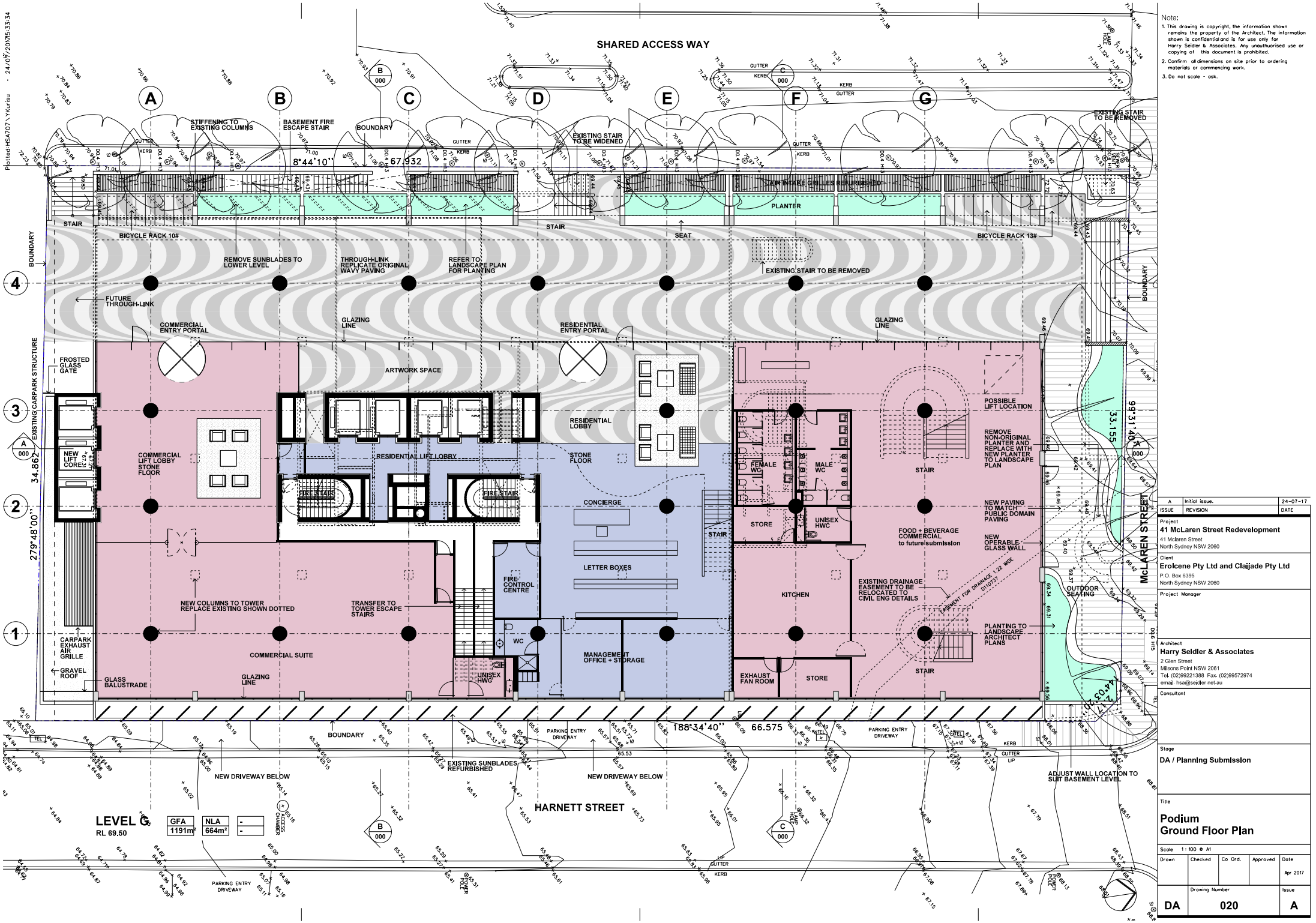
|---|---|---|---|---|
| | | | | Apr 2017 |

| Drawing Number | Issue |
|---|---|
| 014 | A |

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41 Mclaren Street
North Sydney NSW 2060

Client
**Erolcene Pty Ltd and Claijade Pty Ltd**
P.O. Box 6395
North Sydney NSW 2060

Project Manager

Architect
**Harry Seidler & Associates**
2 Glen Street
Milsons Point NSW 2061
Tel. (02)99221388 Fax. (02)99572974
email. hsa@seidler.net.au

Consultant

Stage
**DA / Planning Submission**

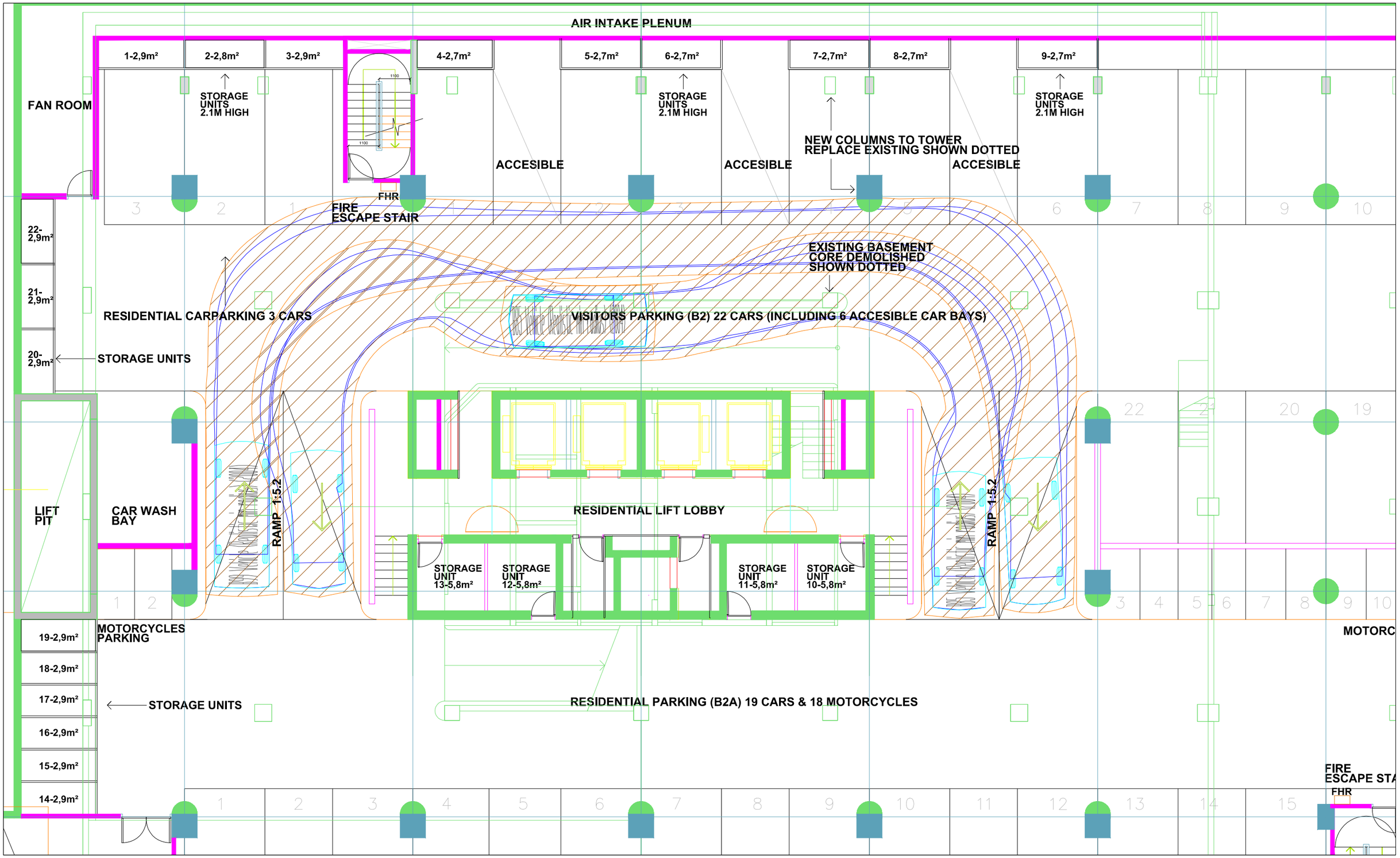
Title
**Podium**
**Ground Floor Plan**

Scale 1:100 @ A1

| Drawn | Checked | Co Ord. | Approved | Date |
|---|---|---|---|---|
| | | | | Apr 2017 |

| Drawing Number | Issue |
|---|---|
| DA 020 | A |

# Appendix C




Revision notes:

| Rev: | Date: | Notes: |
|---|---|---|

Drawn By: VC

Client: RBG Services Group Pty Ltd

Project: 0401 41 McLaren Street North Sydney

Drawing Title: Internal Circulation

Date: 01/08/2017

Scale @ A3: 1:125

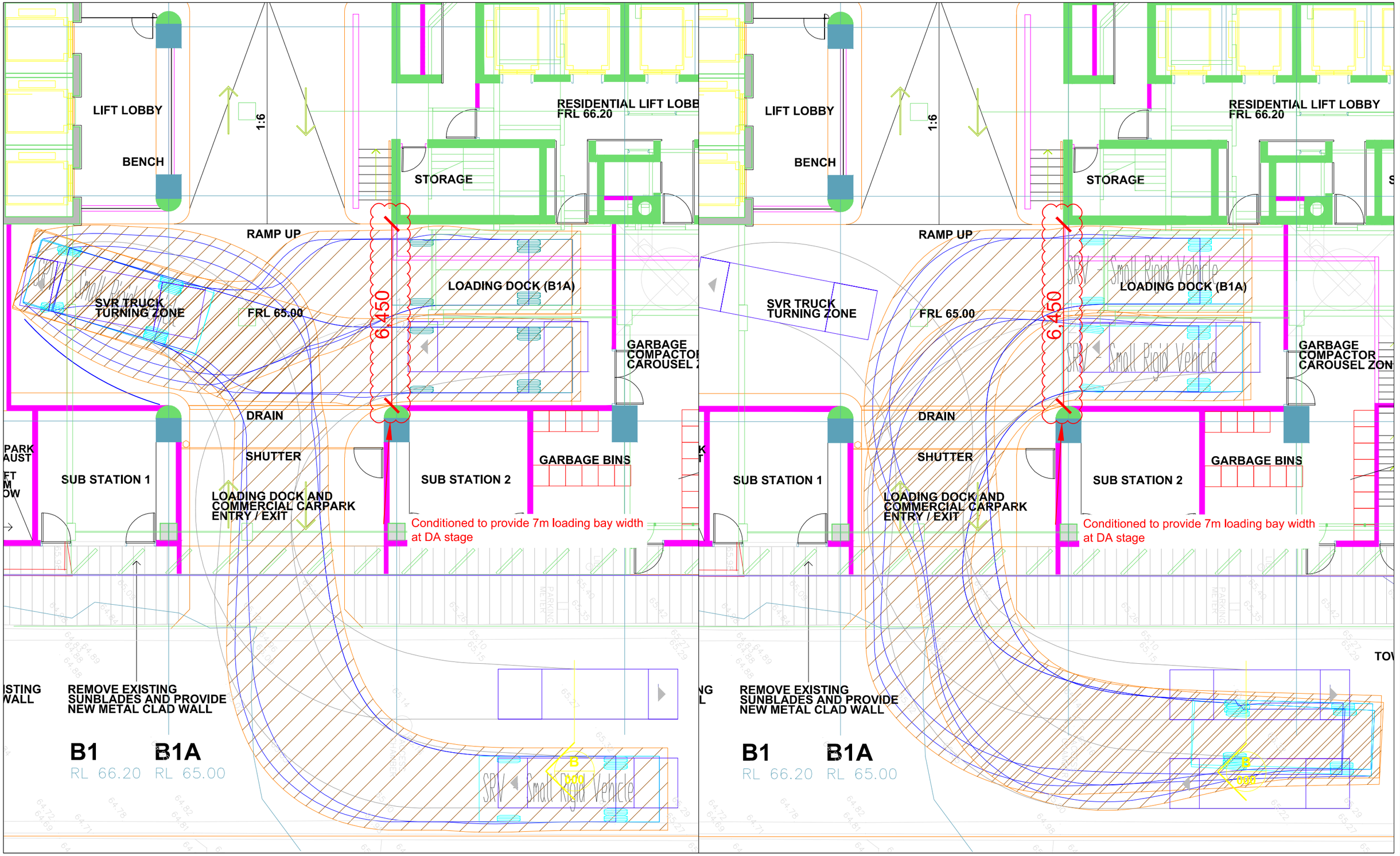
Drawing Number: -

asongroup
Suite 1202, Level 12, 220 George Street
Sydney NSW 2000
info@asongroup.com.au

IFT LOBBY
BENCH
1:6
RESIDENTIAL LIFT LOBBY
FRL 66.20
STORAGE
STORAGE
RAMP UP
RAMP DOWN
BIKE
REPAIR
STATION
M
CHANGE +
SHOWER
BIKE STORE 52 BIKES
CHANGE +
SHOWER
F
SVR TRUCK
TURNING ZONE
FRL 65.00
LOADING DOCK (B1A)
GARBAGE
COMPACTOR
CAROUSEL ZONE
DRIVE WAY
FRL 65.50
LOCKERS
WATER
FOUNTAIN
VENDING
MACHINE
DRAIN
SHUTTER
TATION 1
LOADING DOCK AND
COMMERCIAL CARPARK
ENTRY / EXIT
SUB STATION 2
GARBAGE BINS
RECYCLING BINS
RESIDENTIAL CARPARK
ENTRY / EXIT
ACCESIBLE
WC AND
SHOWER
SPRINKER
PUMP ROOM
COMMUNIC
ROOM
GAS
BOUNDARY
REGULATION
FS/HB CUPBOARD
SHUTTER
WATER MA
METER
TOWER ESCAPE
OVE EXISTING
BLADES AND PROVIDE
METAL CLAD WALL
RELOCATE
EXISTING
CROSSINGS
NEW PAVING TO
MATCH PUBLIC DOMAIN
PAVING
FIRE STAIR
FROM BELOW
BUIL
HARNETT STREET
B1A
66.20 RL 65.00
B
000
C
000
PARKING ENTRY
DRIVEWAY
GUTTER
KERB

| Revision notes: | | |
|---|---|---|
| Rev: | Date: | Notes: |

| | | | |
|---|---|---|---|
| Drawn By: VC | Project: 0401 41 McLaren Street North Sydney | Date: 01/08/2017 | asongroup |
| Client: RBG Services Pty Ltd | Drawing Title: Access Driveways | Scale @ A3: 1:125 | Suite 1202, Level 12, 220 George Street<br>Sydney NSW 2000<br>info@asongroup.com.au |
| | | Drawing Number: - | |




Revision notes:

| Rev: | Date: | Notes: |
|---|---|---|

Drawn By: VC

Client: RBG Services Group

Project: 0401 41 McLaren Street, North Sydney

Drawing Title: SRV Entry and Exit

Date: 01/08/2017

Scale @ A3: 1:125

Drawing Number: -

asongroup
Suite 1202, Level 12, 220 George Street
Sydney NSW 2000
info@asongroup.com.au